

THE IMPACT OF ECONOMIC GROWTH, FINANCIAL DEVELOPMENT, FINANCIAL PERFORMANCE AND CAPITAL GROWTH ON THE ADOPTION OF ARTIFICIAL INTELLIGENCE IN THE ASEAN COUNTRIES

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ABSTRACT

The foremost purpose of current literature is to examine the role of economic growth, financial development, financial performance, and capital growth on the adoption of artificial intelligence in the ASEAN countries of the world. For the hypotheses testing, this study extracted the data from the database of World Bank of the banking working in the context of ASEAN countries from 2001 to 2017. Random effect model was employed for the hypotheses testing after checking its appropriateness through Hausman test. The results indicated that economic growth, financial development, and financial performance have positive nexus with the adoption of artificial intelligence in the ASEAN countries. These outcomes provided the guidance to the regulation making and implementation authorities that they much focus on the economic, financial and non-financial condition of the firms that enhance the ability of the firms to adopt the artificial intelligence in the organization.

Keywords: Artificial Intelligence, Economic Growth, Capital Growth, Financial Performance.

INTRODUCTION

The advancement of new innovations, versatile, while then again fiscal difficulties and fiscal advancements, bolstered with the developing commitments and methods of customers are yet establishing a generous weight on the world monetary aspects, on countries and its spending shortages, on capital linked organizations and on work especially on the gainfulness and returns of the budgetary graphs. The last worldwide monetary strife quickened the passageway of the humankind to another way by solid effects and conclusions on the worldwide economies. The fiscal paltry and the circulation of cash in whole way across the created and great 20 nations are widely developing and financial developments and incomes particularly to rising nations by means of hazard capital assets, business blessed messengers, non-bank money related

establishments for example microfinance, versatile administrators supported new business enterprises, SMEs and above all advancement and more explores in organizations and ventures. The "Computerized Age" that started with web and portable advances, dives companies into starting their work in web and cloud, to activate in sync with their clients, put authorities into propelling their e-authority activities, monetary organizations into introducing itself in cell phones, brochures and web based life. Colossal change in doing another sort of work which is called e-work holding e-signs, e-receipts, web-based business, web, portable banking and e-installments, makes productivity in business and singular life. Limiting or enhancing the business, work forms reengineering moved mechanical tenure to the computerized tenure with assistance of e-work situations.

Then again, measure of data getting greater and greater each and every day drove business condition to break down large information and to respond all the while with CRM frameworks. Albeit, computerized tenure with together different fields like innovation, and hereditary is a stage for "Space Financial matters", some different advances are about to change work and financial aspects legitimately or by implication of different improvements. Such advances were mechanical autonomy and computerized reasoning. Mechanical Age that has been inaugurated by the stylish insurgency and automation fundamentally via vehicle producers and in UK (Hussain, Mosa, & Omran, 2017). Starting towards the twentieth century, financial and business matter can have had an immense effect through an inventory side of financial means. The generation elements, e.g. work power, land business enterprise and capital were affected through current age improvements and notarization and the way of training, the executive, life and funds generally altered their impacts (Ramos, Augusto, & Shapiro, 2008). To deal with the board, white collars, issues and new issues have gone to the inspiration which made thrust direction needs in view of step towards ingredients, orders and nature of the assignment control required (Shoham, 1988).

Despite of selecting countries struggling for artificial intelligence, we have selected industries to interpret the application of artificial intelligence in such industries and the departments of such industries and how much of the risk is involved in application of AI. Certain industries and their relevant departments are selected on this basis of studies done in past and present to evaluate the implications of artificial intelligence through below Table 1.

Industries	Service Operations	Product/Service Development	Marketing & Sales	Manufacturing	Supply Chain	Risk
Automotive	26	43	13	53	18	9
Professional Services	36	31	29	10	17	12
Financial Services	55	25	43	2	12	42

Healthcare	50	31	19	10	12	10
Infrastructure	26	43	11	30	13	6
Retail	47	33	36	14	34	14
Telecom	74	48	28	21	27	30

It further resulted via application of graph that, artificial intelligence is the continuous use in all industries and their relevant areas of working. Indeed, the departments are however providing great and huge measures to the effectiveness but in fact risk factor is also involved because what a human brain can do the effectiveness cannot be done through artificial intelligence. However, it is quite true that time frame is the gap which can be overcome by artificial robotic work outs but cannot be from human being.

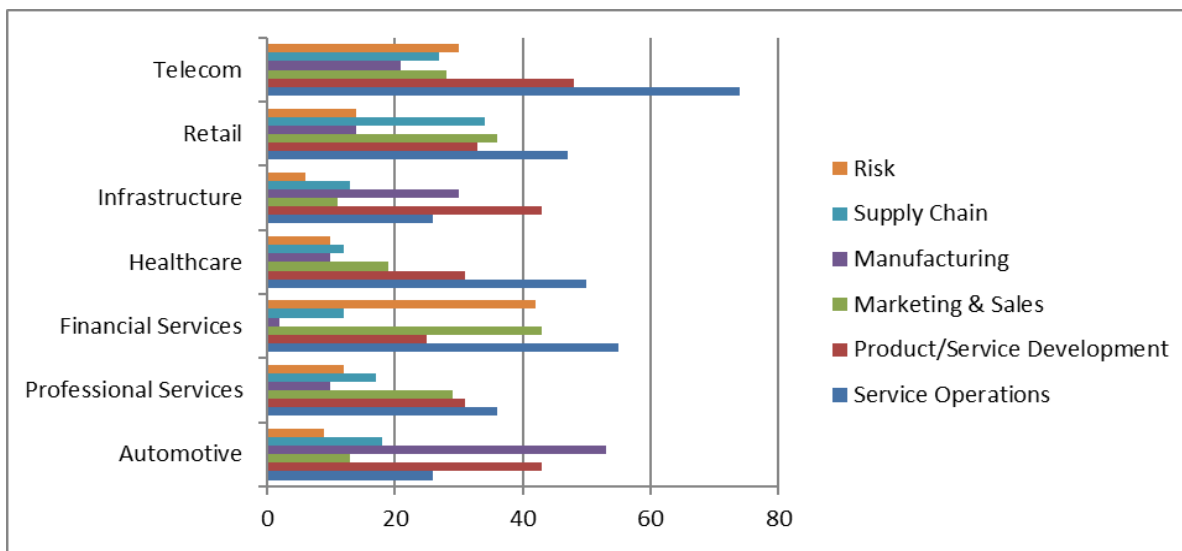


FIGURE 1
EVALUATION OF IMPLICATION OF ARTIFICIAL INTELLIGENCE

Laborers at comparable assembling plants and creation of cabin endowments, immense structures or complex workings guided lifestyle to live in urban networks rather than towns. Social practices and purchasing mentalities have changed by riches and wages (Cohen, 1985). Cutting down the work of human control expense single side by mass people the board for instance, transportation, metropolitan organizations and workers interests on working condition, despite this disintegration of stipend of the apparatus in progress, measurement of the appearing hypothesis of such creation provoked fresh accounting definitions to subsidize and the capital cost. Mechanical self-rule with man-made mental aptitude will be in like manner starting new pages in money related issues and business which bring better approach forever and general manifestations. The potential effects and results together with various talks stay in money related assembling, areas of late have been given on comparable subjects (Roubini, 2014).

Another sensible effect can be development of unemployed extent. As to first, sway on the work side in like manner on securing or acquiring which probably have robotic mechanized thinking differentiating and its first travelers. Such sensible and theoretical study rundown the essential elaborations, designs and past convictions which are up 'til now framing budgetary angles, work and store (Abidin, Haseeb, Azam, & Islam, 2015). Study expecting to guide and discuss admirable tricky alterations and effects similarly adventures, the official limits and money related issues speculations happen in upcoming basically in present day point of view. An enormous bit of the disputes are still under discourse or couldn't be up 'til now considerable with the present trains anyway future is clearly related with the imaginative personality and estimation as written in the book of Jules Verne (Abdulkarim & Ali, 2019).

LITERATURE REVIEW

After 2008 Worldwide Monetary Unrest, began with Lehman Siblings disappointment; the primary speculation can be another tenure called Space Economy has started on the planet's financial matters and money motivation because of the principle logic of financial matters, assets of low designation and streamlining among populace (Seedhouse et al., 2014). National banks which are right off the bat capable of dealing with the estimation of the cash and value steadiness, assumed significant jobs by exponentially facilitating cash supply and money related base extension after and before 2008 just been doing consistently (Hussain, Musa, & Omran, 2018). Facilitating of governments quantitative and bail outs of national banks by great 20 and creating nations were done so as to restrict disappointments and insolvencies of banks, treasuries and monetary organizations of the, to stop credit crisis, to recapture the budgetary misfortunes after and during 2008, to help the financial recuperation and Gross domestic product increment, to carry equalization to the worldwide economy and these endeavors to continue world Monetary security. Aside from the national bank monetary records extensions, altering type of the cash in the advanced tenure (and progression of giving cash just as improvements on the portable budgetary administrations, the quick improvement of installment frameworks, non-money related mediators and non-bank establishments for example Wall-Shop, business holy messengers, chance investments, swarm subsidizing and microfinance establishments starting to play a functioning job in the money related places and by the assistance of activities for approach to fund and for budgetary consideration by great 20 nations (Glover, 1986).

Subsidizing a venture or discovering credits and capital for speculations will be significantly more simpler than now which will help business people and small medium enterprises to find and to create all the more effectively and which organizations will profit by to put resources into more explores, advancement and licenses for propelling fresh items and innovations (Abosedra, Shahbaz, & Sbia, 2015). IMF, The World Bank and European Commission provided several studies like it is normal that financing and encouraging small medium enterprises will meet the expansion, gross domestic product development and jobless proportions' objectives in numerous nations, in European Association and in the US (Rolston, 1988). The utilization of Bit coin type of computerized type of cash (e-cash) will be a banks major adversary and National banks which will adhere greater instability in the monetary framework and in the economy (Nilsson, 1969). Incomes and sign or age misfortunes of (National) Banks will happen if not universally controlled. In light of the new patterns like man-

made consciousness, semantic investigations, apply autonomy and mechatronics advancements, enormous information and mining, distributed computing, neural systems or fundamental patterns, for example, online networking and through the upcoming bearings of banking and budgetary administrations, mankind and business situations inclusive of yet not restricted to administrations and relevant associations will search for fresh chances to bring down expenses and to expand incomes, by effectiveness and efficiency as Watchman referenced in his study "Worth Creation and Upper hand Hypothesis" (Jennings, 1996). Organizations could accomplish greater benefit and supportability just by following two alternatives: Limiting expenses or boosting esteem (Agyapong, Agyapong, & Poku, 2017).

The improvements in innovations, various disciplines and controls, by assistance of union amid them can bolster attempts to accomplish such objectives and clearly revelations could be found in future which can create troublesome business life alteration in worldwide economy (Manyika et al., 2013). Organizations enduring by little incomes in their salary articulations or by decline in their benefit and profit for proportion of capital will search for and pursue more efficiency, effectiveness, ease generation techniques or assets and attempt to react rivalry and client requests brought about by new advancements on the logical and innovative side (Ainembabazi et al., 2017). When and in the event that wares are rare and level of costs goes up, at that point chiefs in these organizations will likewise go to search least expensive and boundless such may quicken "Space Economy". Work interstellar revelations to outsider new earth and life planets by different legislative associations like the united states national air transportation Organization or space of European office and private fresh business organizations have just been begun (Knod Jr, Wall, Daniels, Shane, & Wernimont, 1984). Such activities and requirements quickened the passage way to the tenure of space economy (Dirican, 2015). Numerous looks into for connecting more planets and a long way past to close planetary system and having upper hands in the military powers in a roundabout way help organizations to utilize the majority of these advancements, development and answers for business and exchange purposes. Vehicle producers and car industry that are utilizing Equation race discoveries actualize them into business vehicles. (US Guard Propelled Exploration Undertaking Office), the dad or web and web advancements, for encouraging the mystery correspondence needs of the military, ABS (Non-freezing stopping mechanism) arrangement of vehicles for all of a sudden restrict needs of hustling autos and Teflon, the most popular brand name of recipes Partnership aggravate art's going to climate, a portion of such discoveries and instances of business employments (Al Shaar, Khattab, Alkaied, & Manna, 2015).

NASA with Washington College together and 11 different research foundations and colleges make a working gathering to look for extraterrestrial life on different planets. The scholastic and business ways will develop all the more new innovations (Dirican, 2015). Different two speculations of new military are that the comprehension with digital societies of mankind will require fresh guidelines and insurance just fresh legislative issues, other than will alter the everyday urbanization and life structures (Dirican, 2015; Kelly, 2017). Along these lines, Bureaucratic Flying Organization of USA has just distributed numerous and fresh guidelines on business space transit (DeSousa, McConatha, & Lynch, 2011). Although National Air Transportation and Space outsider can be caught in near future, for spending plan via administration 2008 restricts spending, analyzing Atlantic and Pacific railways foundations in Lloyds and US lines in United Kingdom, individual segment ventures on transportation which

began circulation of organizations securities and invoices that were the start of New York stock trade and capital markets or circulation of hazard protection strategies that was the start of protection area demonstrate space that, apply autonomy and man-made reasoning logical advances would be increasingly created and be quicker under the business exercises of divisionally private as opposed to the legislatures (Miiller, 1990). Amazon is an innovator for mechanical autonomy and space that advances by utilizing rambles for request conveyance and his President which is intending to begin first administration of space transport.

There are different organizations like Air Vironment, Google, Northrop Grunman, Lockheed Martin and Boeing that put resources into ramble innovations (Chen & Yin, 2018). At such point, a few elaborations ought to be given for apply autonomy that lay behind the automatons. At Prague the machines right off the bat presented, the possibility of old Persian researcher Ibn e Sina ever are some robotic human like arrival (Bischoff et al., 2010). The meaning of Apply autonomy is given as human like is a wise robot or a machine animal that can work unanimously (Lima & Custodio, 2004). Characterized mechatronics as begat mix of accuracy building, designing, programming building and frameworks structure of items and assembling forms (Velásquez, 1998). Mechatronics is the mix of mechanics and hardware and is a case of innovative combination where a few distinct ventures are involved (Searchinger et al., 2008). The most grounded speculations are that robots of human like will supplant power of human work in numerous places of corporate and business life. Another methodology named "Human versatile mechatronics" suggested by the 21st century focal point of greatness in 2003 at college of Tokyo Denki imagined that a framework remembering the human for the circle of control in an organized interference of manmade machine would help the operational abilities of human work force (Allen, Ellis, & Petridis, 2010). Plenty of occupation seats in advertising, relationship of clients the executives areas including however not constrained to, even directors and a plenty of security monitors, generation lines, activities, sales and call focus specialists will be influenced by mechatronics and apply autonomy enhancements. Toshiba partnership created Aiko Chihira named as a female robot, offers direction of six minutes to clients with Japanese data about the retail establishment retail chain in Mitsukoshi in Nihonbashi (Levitt, 1990). In assistance of clients other humanoid robots, along with bank of Tokyo can make discussion or react to speaking inquiries. By the emergency of 2008 the financial businesses generally get influenced, still assumed for higher gainfulness and effectiveness. In number of divisions, even at front closures without much stretch robots could be executed. Cashiers and specialists focuses could be superseded by the robots that are being fortified and bolstered by the man-made consciousness (Al-Mulali, Ozturk, & Lean, 2015).

Moreover, in administrative positions computerized reasoning and robots would be used for demonstrating that affirmation. Limiting the expense of conveyance of interior archives between branches and head office by automatons can be another approach to cost limits (Riaz, Arif, Nisar, Ali, & Sajjad, 2018). Then again, ramble administrators will be contracted by the organizations and banks as an Amazon for it. Responses using meanders aimlessly for work explanation behind pertaining are crucial discourse centers (Bialowolski & Weziak-Bialowolska, 2014). Self-sufficiency and mechanical money related angles endeavor to extract answers for modernly machines in view of present laws with flight rules which simply empower government dispatch, rocket flying, robots or craft's (Nawaz & Hassan, 2016). Government Aeronautics Organization in USA has just proposed and has finished up certain guidelines for the use of

automatons industrially and secretly (FAA, 2015). All inclusive, attempting to discover arrangements and to settle on the usual understandings, activities are going on simply as Zurich facilitated January gathering of one day, Automatons: From Innovation to Strategy, Security to Morals (Miller, 2008). Computerized reasoning and Mechanical autonomy are the most recent features during the discussion of world financial that have been examined and adhered in their examinations the dangers on the ascent of joblessness with advancements or robots, for example, man-made consciousness, could be adjusted by more effectiveness and efficiency made by robots and PCs (Hussain, Mosa, & Omran, 2018). Man-made consciousness is characterized as the logical investigations that PCs can think, do, connect and activity numerous place individuals great (Rich, 1987). Analyzing distribution web stationed or system stationed stockpiling condition that empowers and encourages information sharing, data, records or assets. Working meaning of distributed analyzing is generally registering as mentioned via foundation of national innovations and guidelines. Crude well known man-made brainpower is a learning woman that helps the apple's phone proprietors (Hussain et al., 2012).

An android variant of man-made brainpower named is additionally created programming engineer of turkey at center (Bernardes & Hanna, 2009). Characterized man-made consciousness and semantic hunt in web search tools alluding to book of Charles Morris "Establishments of the Hypothesis of Signs" which likewise symbiotically characterized and utilized by PC architects or programming fashioners. Semiotics includes sentence structure, semantics and pragmatics (Waldrop, 1987). To look in web crawlers Yahoo and manmade thinking a manmade reasoning which appreciates the fundamental by the finders to consider the arrangement in fact the inquiry importance (Bezobrazov, Sachenko, Komar, & Rubanau, 2016). Different Neural Systems that condensed blend offer information, hunt, web, computerized reasoning and distributed analyzing can learn and retain in the event that are bolstered with relevant models and can deliver legitimate and right or organized queries from immense measure of information (Koenig & Liu, 2001). Another proposal could be that automations and robots that utilize enormous measure of data named large information from numerous associations and databases with distributed analyzing and oversight by man-made brainpower would be underway lines and hierarchical outlines of organizations just like on the administrative sheets and HR the executives plan (Knod Jr et al., 1984). Prior phases of this attestation could be found in capital and cash markets. Prospects analyzed wearable brilliant gadgets are a portion of different improvements and organizations like E-Exchange, the greatest web based exchanging stages, embraced their applications to these shrewd gadgets all the while (Lopes & Connell, 2001). Plenty of drugs are picking up pace to battle with plenty of disease through computer generated reality for mental sickness like issue, fears, nervousness (Thrun, Fox, Burgard, & Dellaert, 2001). Finding moon or mining would be with mechanical innovation proposed by exploration community of Germany for Computerized reasoning in Germany and takes a shot at the machines likewise chimpanzee planned for lunar missions (Hussain, Musa, & Omran, 2019). On the basis of these literature current study developed the following hypotheses:

H1: Economic growth has playing positive role in the adoption of artificial intelligence in the ASEAN countries.

H2: Financial Development has playing positive role in the adoption of artificial intelligence in the ASEAN countries.

H3: Financial Performance has playing positive role in the adoption of artificial intelligence in the ASEAN countries.

H4: Capital Growth has playing positive role in the adoption of artificial intelligence in the ASEAN countries.

RESEARCH METHODS

The foremost aim of current paper is to examine the role of EG, FD, FP, and CG on the adoption of artificial intelligence in the ASEAN countries of the world. For the hypotheses testing, this study extracted the data from the database of World Bank of the banking working in the context of ASEAN countries from 2001 to 2017. Random effect model was employed for the hypotheses testing after checking its appropriateness through Hausman test. EG is measured by the GDP of the country while FD is measured by the foreign direct investment (FDI). In addition, FP is measured by the ROA while CG is measured by the increase in Share capital. Finally, the dependent variable such as adoption of artificial intelligence (AAI) is measured by the increase in the efficiency of the operations and size of banks used as control variable and measured by logarithm of total assets (LNTA). On the basis of these variables the current study develops the following equation:

$$AAI_{it} = \beta_0 + \beta_1 EG_{it} + \beta_2 FD_{it} + \beta_3 FP_{it} + \beta_4 CG_{it} + \beta_5 LNTA + e_{it}$$

Research Findings

The aim of the present article is to examine the role of EG, FD, FP, and CG on the adoption of artificial intelligence in the banking sector of ASEAN countries. The result section includes the explanation of the constructs such as mean, maximum values, standard deviation and minimum values, correlation matrix, all the assumptions of regression, Hausman test and random and fixed models. The descriptive statistics show the explanation of the variables such as mean, maximum values, standard deviation and minimum values. Table 2 shown below exposed the descriptive statistics of the constructs.

Variable	Orbs	Mean	Std. Dev.	Min	Max
AAI	170	1.618	0.567	-0.179	3.437
EG	170	1.191	0.205	0.021	1.771
FD	170	0.249	0.256	0	0.846
FP	170	0.158	0.214	0	0.983
CG	170	4.974	0.841	2.862	6.399
LNTA	170	10.541	0.214	201.212	321.025

The correlation matrix explains the correlation among the constructs and also verify the multicollinearity issue in the study. The statistics show that constructs are correlated but no issue

with multicollinearity assumption. Table 3 shown below exposed the correlation matrix of the constructs.

Variables	AAI	EG	FD	FP	CG	LNTA
AAI	1					
EG	-0.173	1				
FD	0.099	0.241	1			
FP	-0.054	0.005	0.064	1		
CG	0.013	0.179	0.161	-0.106	1	
LNTA	0.249	0.137	-0.405	-0.363	-0.09	1

The variance inflation factor is used to verify the first assumption regarding the multicollinearity of the variables. The statistics show that multicollinearity assumption is full filled because the VIF meet the standard criteria. Table 4 shown below exposed the VIF of the article.

	VIF	1/VIF
AAI	1.579	0.633
EG	1.241	0.806
FD	1.217	0.822
FP	1.169	0.855
CG	1.096	0.912
LNTA	1.26	0

The Skewness and Kurtosis test is used to verify the second assumption regarding the normality of the variables. The statistics show that normality assumption is not full filled because the Skewness and Kurtosis does not meet the standard criteria. Table 5 shown below exposed the Skewness and Kurtosis of the article.

Variable	Orbs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
AAI	170	0.311	0.036	5.42	0.066
EG	170	0.208	0	27.66	0
FD	170	0	0.002	26.13	0
FP	170	0	0	64.41	0
CG	170	0	0.003	20.61	0

LNTA	170	0	0	.	0
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The Wooldridge and Breusch-Pagan test are used to verify the third and fourth assumptions regarding the autocorrelation and homoscedasticity. The statistics show that autocorrelation and homoscedasticity assumptions are not full filled because the Wooldridge and Breusch-Pagan test do not meet the standard criteria.

Following the present study run the fixed and random models before testing of appropriateness of the model for the study. Table 6 and Table 7 given below show the fixed and random models.

AAI	Coef.	S.E.	t-value	p-value	L.L	U.L.	Sig
EG	1.037	0.201	5.16	0	0.641	1.433	***
FD	-0.138	0.337	-0.41	0.683	-0.801	0.526	
FP	0.951	0.251	3.8	0	0.458	1.445	***
CG	-0.368	0.095	-3.87	0	-0.555	-0.18	***
LNTA	0.014	0.002	7.65	0	0.01	0.018	***
Constant	1.909	0.547	3.49	0.001	0.832	2.987	***
R-squared	0.46		Prob > F		0		
*** $p < .01$, ** $p < .05$, * $p < .1$							

AAI	Coef.	S.E.	t-value	P-value	L.L.	U.L.	Sig
EG	0.95	0.188	5.06	0	0.582	1.319	***
FD	0.439	0.201	2.19	0.046	0.433	0.355	***
FP	0.597	0.197	3.03	0.002	0.211	0.983	***
CG	-0.032	0.062	-0.51	0.611	-0.154	0.091	
LNTA	0.015	0.002	8.5	0	0.012	0.019	***
Constant	0.357	0.436	0.82	0.413	-0.498	1.212	
Overall r-squared	0.312		Prob > chi2		0		
*** $p < .01$, ** $p < .05$, * $p < .1$							

The Hausman test is used to check the appropriateness among the fixed and random models and statistics show that the random model is appropriate because the p-value is higher than 0.05. Table 8 show the Hausman test mentioned under:

TABLE 8	
HAUSMAN TEST	
	Coef.
Chi-square test value	11.743
P-value	0.068

The random model show that positive link among the EG, FD, FP of the ASEAN countries with the adoption of artificial intelligence in the banking industry except the CG. The findings also explained that significant link among the EG, FD, FP of the ASEAN countries with the adoption of artificial intelligence in the banking industry except the CG. Table 9 given below show the random model regression.

TABLE 9							
RANDOM EFFECT MODEL							
AAI	Coef.	S.E.	t-value	p-value	L.L.	U.L.	Sig
EG	0.95	0.188	5.06	0	0.582	1.319	***
FD	0.439	0.201	2.19	0.046	0.433	0.355	***
FP	0.597	0.197	3.03	0.002	0.211	0.983	***
CG	-0.032	0.062	-0.51	0.611	- 0.154	0.091	
LNTA	0.015	0.002	8.5	0	0.012	0.019	***
Constant	0.357	0.436	0.82	0.413	- 0.498	1.212	
Overall r-squared		0.312			Prob > chi2		0
*** $p < .01$, ** $p < .05$, * $p < .1$							

CONCLUSION

The purpose of the present article is to inspect the role of EG, FD, FP, and CG on the adoption of artificial intelligence in the ASEAN countries. The results indicated that EG, FD and FP have positive nexus with the adoption of artificial intelligence in the ASEAN countries. The possible reason behind these outcomes that the organization and countries have comprehensive EG, FD and FP are able enough to adopt the innovation as well as artificial intelligence in the organizations. Thus, the banking institutions of the ASEAN countries have strong EG, FD and FP that is the reason they are adopted the artificial intelligence in their institutions.

Policy Recommendations

These outcomes provided the guidance to the regulation making and implementation authorities that they much focus on the economic, financial and non-financial condition of the firms that enhance the ability of the firms to adopt the artificial intelligence in the organization.

Limitations and Future Directions

The current study has some directions for upcoming researchers and limitations. The present study's results are generalized only on the banking industry and within the territory of ASEAN countries and future study should include other industries and countries in their examinations.

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