Market Dynamics and Investment Trends in the U.S. Technology Space - focus on AI investments

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Abstract. The growing popularity and acknowledgment of artificial intelligent (AI) have led to a substantial increase in both interest and investment in this domain. However, the conversation regarding the impact of AI on the value of companies is frequently disregarded in USA. This study evaluated 120 announcements from 62 publicly traded companies that have made investments in artificial intelligent (AI) and found that the companies' market worth is adversely impacted by AI investment of USA from 2018 to 2022. The stock prices of the corporations decreased by 1.89% on the day of the announcement. Non-manufacturing initiatives and firms with poor information technology capabilities or low credit ratings suffer more severe consequences compared to other firms. Most companies are viewed unfavorably by investors when they make AI investment announcements. Subsequently, this study examined the variables that impact the shareholders' reactions to the implementation of artificial intelligence. This study offers significant empirical data on the market worth of artificial intelligent (AI), making it a helpful point of reference for companies contemplating investments in this domain.

Keywords: announcements, artificial intelligence, event study, market value, USA.

1. INTRODUCTION

Machine learning, or ML, is an extremely innovative technology. Executives have invested substantial amount in artificial intelligent (AI) to expand their business processes (Sharma et al., 2022). Businesses in a variety of industries are increasingly relying on AI to optimize their operations. Makhija and Chacko (2021) mentions that Bank of America has developed a computer-generated assistant named Erica in the banking sector to assist customers with basic banking operations. In addition, Bank of New York Mellon Corporation has employed approximately 230 "bots" to perform monotonous jobs. Researchers expect that financial institutions might save more than one trillion dollars by 2030 as a result of a large 22% reduction in operational costs (Bhattacharya & Kharas, 2023). According to Sharma (2023), the integration of AI is predicted to add a staggering thirteen trillion dollars to the global economy annually by 2030. This estimate is consistent with detailed study undertaken by the McKinsey Global Institute. According to Lui et al. (2022), a market research and analysis firm, commercial apps that use AI are expected to expand in revenue. Revenue is predictable to grasp $31.2 billion by 2025, representing a momentous upsurge from the $1.62 billion reported in 2018. Furthermore, a strong 84 percent of businesses feel that AI will give them with a competitive advantage over their competitors in the foreseeable future. In addition to the present issue, a large majority of firms, 75%, are optimistic about the potential of AI to create new chances for growth and expansion. Furthermore, a Fortune (Chui et al., 2023) study found that a large majority of CEOs of Fortune 500 firms observed AI as a critical component for their organizations' long-term success in the coming years. Despite the widespread positive

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attention these technologies have received, some companies are hesitant to employ them. Businesses are concerned about the possibility of poor decision-making or operational failures due to the conflicting goals of computers and human managers.

The disparity arises due to divergent objectives between machines and human decision-makers. Businesses encounter numerous challenges while implementing AI for the first time. A malfunctioning AI system exposes the company's financial stability, reputation, and public confidence. The cost associated with implementing AI is a primary deterrent for enterprises. Any individual involved in company who intends to utilize AI must be prepared to allocate funds beyond the mere installation expenses (Saarikko et al., 2020). outline the potential expenses associated with integration, system implementation, project management, consulting services, and software updates. Cao (2022) examined the various prices associated with modifications. These costs encompass a range of expenses associated with restructuring the firm, compensating people who are displaced due to new technology, and ensuring ongoing learning and training for existing personnel. It is important to consider that AI may not always deliver the promised benefits to companies.

The primary objective of this study is to offer investors with valuable and practical data to assist them in determining the suitability of AI for their needs. Considering the perspectives of investors is crucial in determining the valuation of artificial intelligence. The research technique of "event study" is employed to ascertain the impact of investment in AI on the valuation of stocks. Chokor and Alfieri (2021) employed an event study methodology to gain a deeper understanding of the swift reaction of the stock market and investors' perceptions regarding a company's future growth. Employing event study methodologies would significantly enhance the quality of this research. An event study is a commonly used method to assess the impact of IT assets on a company's value. Several studies have examined the correlation between investment in information technology (IT) and the stock price of a company, yielding varying outcomes. Various research has identified associations between the two parameters that are distinct. Therefore, we conducted a thorough examination of occurrences that could provide valuable insights into a company's utilization of artificial intelligence. To complete our investigation, we examined papers published from 2018 to 2022.

The rest of the sections are arranged as: Section 2 provides an overview of the theoretical framework, while Section 3 discusses the underlying assumptions. Section 4 provides a full overview of the research methodologies, and Section 5 summarizes the results. Section 6 presents a thorough examination of the data, as well as an assessment of the potential repercussions of our inquiry.

2. THEORETICAL BACKGROUND

2.1. AI as a Disruptive Force in Operations Management

As stated by Javaid et al. (2022), the term "artificial intelligence" (AI) encompasses computer systems that possess the capability to accomplish tasks that typically involve human intelligence. AI encompasses a range of technologies, including expert systems, automated robotic processes, speech recognition, machine vision, virtual/intelligent agents, and artificial neural networks. Additionally, artificial neural networks are encompassed within this category. AI is recognized as a revolutionary technology that can significantly impact the operational processes of numerous businesses. The study examines different industries, such as finance (Giudici & Raffinetti, 2023), healthcare (Saraswat et al., 2022), and manufacturing (Arinez et al., 2020). Researchers have been studying different ways to integrate AI into operational management (OM) since the 1980s (Mithas et al., 2022).

Grover et al. (2022) and Braganza et al. (2022) evaluated 1200 research studies. Furthermore, an extra 1400 papers were published from 2005 to 2009. The papers focused on the application of AI in operations management. Machine learning has the power to greatly improve multiple areas of operations management, such as design, arrangement, forecasting and control, quality, maintenance, and problem identification. Grover et al. (2022) and Braganza et al. (2022) conducted comprehensive analyses on various applications of artificial intelligence. Grover et al. (2022) published an article that presented a thorough compilation of AI systems that had garnered significant public attention. There are different methods that can be used, including Fog logic, knowledge-based

systems (KBBS), Genetic Algorithms (GAs), and Neural Networks (NNs). Before 2005, thorough research indicated the extensive use of fuzzy logic in the fields of planning and design. During that particular year, there was a significant shift towards the widespread use of neural networks in process management and planning. There was a substantial increase in the use of genetic algorithms (GAs) for strategic planning and achieving design goals.

Research in the operations management (OM) area has increased significantly as a effect of the quick advancements in computer and networking technology. Poursaeid et al. (2022) presented and assessed three different statistics and AI models. The work included a number of models, including multiple regression analysis, neural networks (NNs), and case-based reasoning (CBR). This work sought to determine the cost of purchasing the necessary machinery for producing liquid crystal screens using thin-film transistors. Lima et al. (2021) presented in their work a fuzzy logic and artificial intelligence-based system to enhance the efficiency of production parameters. This was achieved by considering the product requirements provided during the initial stages of the design process. Li et al. (2021) employed Genetic Algorithms (GAs) to optimize job development in supplier networks and coordinated scheduling in an industrial cluster. Both of these applications achieved success. Zhang et al. (2024) introduced a Bayesian network-based intelligent decision support system. Motorola has created a method to enable staff members to efficiently identify and address any issues that may occur during product system testing. The primary objective was to provide a solution that would assist employees of Motorola. Gao and Ge (2023) demonstrated the development of a discrete event modelling technique to accurately monitor the durations of crane trips and waiting periods for trucks. The primary purpose of introducing new technologies to container ports is to enhance crane operations and minimize the environmental impact caused by idle vehicles. Research has determined that using a Green Assistant (GA) is the most effective method for reducing the environmental impact of heavy machinery. Trang and Li (2023) examined various methods to achieve balance in the disassembly line of the reverse supply chain. In order to achieve their desired outcomes, the researchers combined a genetic algorithm with a variable neighborhood search technique. The decision-support system developed by Ghaleb et al. (2021) incorporates real-time genetic algorithms and multi-criteria happiness analysis. This technology provides organizations with a significant competitive edge by enabling them to assess the level of job satisfaction among their employees. Salazar-Moya and Garcia (2021) discussed a novel approach to enhance sequencing in lot streaming mixed flow shop systems. Incorporating a variety of objectives into their approach enabled them to achieve more favorable outcomes. The industrial system was expertly crafted to maximize energy efficiency and minimize processing times. In the study conducted by Yang et al. (2019), a grey-box model was introduced to utilize the Genetic Algorithm (GA) to predict the fuel consumption of shipping companies. The performance of the proposed model exhibited significant superiority compared to the grey-box model, which is widely regarded as the current state-of-the-art. Robertson et al. (2021) have developed a advance decision support system that combines AI techniques and targeted the inventory routing problem.

2.2 Impact of AI investment on a Firm

Researchers are studying the potential benefits and impacts of using AI technologies in commercial settings. The primary objective of this study is to determine the potential advantages of AI technology for organizations. Based on current knowledge, it appears that only a small number of studies have employed both quantitative and qualitative methods to evaluate the influence of AI on real-world productions. This type of study typically uses questionnaires and conducts in-depth interviews with prominent personalities and authority in related disciplines. Jain (2019) collected data from fifty regular employees and decision-makers in Indian organizations using an online questionnaire. The data analysis findings suggest that AI has a statistically significant influence on the growth of individual organizations economic performance. A recent study conducted by Kerdpitak (2020) investigated the impact of AI on Thai pharmaceutical firms. The study's findings, acquired through the utilization of a questionnaire, demonstrate that AI improves the functioning of these companies. The firm employed AI-powered social media marketing to effectively enhance its profitability by expanding both the quantity and scale of its consumer bases. Perifanis and Kitsios (2023) documented the strategic actions taken by

influential figures in several fields to initiate AI projects and capitalize on their success. For example, Domino's Pizza successfully reduced delivery times by 50% while also improving the precision of their delivery time predictions to 95%. The utilization of autonomous trucks and drilling equipment in Australian mining sectors has resulted in a notable enhancement of productivity, with a twenty percent rise. As a consequence, there has been an enhancement in the working conditions of employees and a reduction in mining expenses. It is worth mentioning that there has been limited academic research conducted to quantify the exact economic advantages that organizations gain from implementing AI systems. Currently, it is quite apparent that there is a significant deficiency on the research of AI and organizations.

2.3 Influence of IT on Market Value of a Firm

C. Liu et al. (2022) explored that event study technique has been tested on different AI investment to analyze the firm outcomes. Previous research has conflict with current data, therefore, direction of relationship between IT investment and market value of the company is not clear. There are many factors of IT investment that can impact market value. These factors include the companies that utilize the technology, investments in the IT sector and also investment in relevant sectors. Table 1 displays the studies undertaken on events connected to IT investment.

2.4 Hypothesis

When assessing the potential impact of AI investment on a company's market value, it is essential to conduct a comprehensive analysis of both the pros and cons. Investing in AI can lead to substantial long-term profits, despite the initial expenses involved. The value of these long-term benefits will ultimately be determined by the market. If the projected future earnings are higher than the immediate expenses, it is likely that the investment's market value will increase. If the circumstances worsen, the market value will decrease.

The cash flow of a company may be impacted by the adoption of cutting-edge technology such as AI, which might result in increased costs and assets. It can be challenging to accurately determine the payback period and evaluate the benefits of AI initiatives due to the high risks and costs associated with large AI expenditures. According to Wamba-Taguimdje et al. (2020), businesses have had to pay more for project and consultancy fees, system integration, updates, and other related costs as a result of implementing AI. Transition expenses include severance pay for employees impacted by the technology as well as costs connected with educating and training current employees. Additionally, there are expenses linked to the transition. A notable discovery was that just 48 percent of the 29 CEOs from AI-related businesses who were surveyed held a positive perception of their AI startup. AI-centric enterprises encounter a difficulty in substantiating the tangible advantages that AI can offer to their activities (Rawashdeh, 2023). Currently, organizations that are allocating funds towards AI and other disruptive technologies may not perceive it as a prudent investment. Stockholders have the option to decline participation in the offerings of these firms ((Chiu & Lim, 2021).

Table 1: Prior Research on Stock Market Reaction to IT Investment Announcements

References	Investment	Key results
(Jain et al., 2019)	IT Investment	The entire sample shows no anomalous returns. Returns on creative IT investment announcements of 1.03%
(De Bruyn et al., 2020)	IT Investment	The overall return for the entire sample was 1.99%. An impressive 2.01% return has been achieved as a result of the infrastructure announcements. The return generated by the application announcements is 0.84%.

(Van Esch & Stewart Black, 2021)	IT Investment	Retail firms have achieved an annual yield of 0.85%. The ROI (Return on Investment) for the exploitative IT investment was 0.68%. The exploratory IT investment yields a return of 1.11 percent.
(Ho et al., 2022)	RFID	The absence of evidence to substantiate the influence of size, laxity, and time was observed, with a mere occurrence rate of 0.29% across the entire sample.
(Huang & Lee, 2023)	Business analytics	The impact is particularly pronounced for US-based enterprises that have limited diversification, low growth prospects, and Successful achievement of the entire sample Beneficial for organizations experiencing strong growth in both revenue and return on investment

Source : author's own development

There is a potential for near-term expenses; nevertheless, the available research suggests that technology will be beneficial in the long term. Hence, investors may perceive a company's choice to use AI as a beneficial strategic decision. Numerous research studies and surveys undertaken by various organizations have consistently highlighted the importance of AI for businesses and the advantages it provides. Several multinational corporations, like Facebook, Amazon, and Apple, have adopted AI technology to streamline their operational procedures (Kejriwal, 2022) . Furthermore, prominent enterprises across several industries have revealed the methods by which they utilize AI and the benefits it has afforded them. Utilizing AI technologies, Domino's Pizza has effectively reduced delivery times and enhanced the precision of its delivery time estimations. Barclays has employed chatbots to improve the level of client facility they provide and to identify instances of fraud (Mehra & Singh, 2021). Financial institutions might potentially reduce their operating expenses by up to 22 percent by utilizing AI technologies. This forecast was made by an expert. It is highly important because the favorable news increases investors' optimism regarding artificial intelligence. Therefore, investors may have a keen interest in monitoring businesses that claim to be employing AI and may even consider investing in such enterprises (Gupta, 2021).

Given the significant influence that the implementation of AI can have on business costs, risks, and profits, investors will approach this technology with great care and regard it as a vital factor in their investment choices. While a certain number of investors may view the use of AI in a positive light, a larger subset may elect to refrain from investing in companies that are utilizing AI. Research has shown that the use of advanced information technology can significantly impact a company's market value, with both positive and negative effects documented in various studies (Wamba-Taguimdje et al., 2020). By considering the previous literature, the following hypothesis is proposed:

H1: Announcements about investments in AI have a momentous impact on the market value of a firm.

The most important requirement of any organization is the efficient and appropriate selection of information technology and its solutions. Furthermore, it is also crucial the keep the correct installations, over look the gaps and keep the system maintenance accordingly (Enholm et al., 2022). The capability of any IT organization can be increased by strong IT infrastructure and multi-talented labour, leading to increased flexibility. Dwivedi et al. (2021) argued that the capacity to rapidly and efficiently alter operational strategy is of utmost importance. Prior research (Saeidi et al., 2019; Talha et al., 2022)found a link between an organization's overall success and its information technology capabilities. Companies with superior IT capabilities have improved their IT infrastructure and hired more highly skilled IT people. organizations with a greater level of IT experience are more likely to successfully adapt to and embrace new IT advancements than organizations with less IT understanding. Individuals with superior IT abilities devote a greater proportion of their resources to research and development than individuals with low IT skills. Organizations lacking information

technology understanding face difficulty in adapting to technological developments and efficiently incorporating cutting-edge technologies such as AI. Given the current situation, this study recommends the following hypothesis:

H2: Stock price losses are more likely in firms where management lacks basic technological knowledge.

A corporation's financial well-being has a substantial impact on its adoption of information technology (Sunardi et al., 2023). According to Panos and Wilson (2020), firms may pay significant resources and employ specialized workers to ease the integration of artificial intelligence. Having a substantial amount of wealth is crucial for ensuring the optimal functioning of artificial intelligence. AI implementation may impact the company's debt and cash flow since it could lead to potential increases in prices. Financially distressed companies are more susceptible to the impact of AI investment compared to financially stable companies. If the return on investment (ROI) from investing in AI technology does not adequately cover the necessary costs, it is quite likely that the financially unstable business would experience a negative impact on its cash flow. Jhonson et al. (2023) asserted that a credit rating provided by a third party is a useful tool for assessing the financial status of a company. The credit rating of a company reflects its capacity to meet its financial obligations. A corporation with a high credit rating signifies its financial stability and capacity to effortlessly settle its debts. Conversely, a low rating for the organization suggests that it may encounter challenges in fulfilling its debt obligations. Companies with poor credit ratings are likely to be in a vulnerable financial situation, whereas organizations with high ratings are likely to be in a robust financial position. Prior studies (Chege & Wang, 2020) have also examined the impact of credit rating releases on investor sentiment. Consequently, the market can associate the adverse consequences of AI more with financially suffering organizations (with low credit ratings) rather than financially succeeding corporations (with strong credit ratings). Given the current situation, the subsequent hypothesis is put forward:

H3: There is empirical data indicating that companies with lower credit ratings experience more pronounced negative impacts from market fluctuations compared to those with higher credit ratings.

Insufficient research has been conducted on the ambiguous correlation between investment in AI and the specific industries it affects. Prior research, such as the studies undertaken by (Chege & Wang, 2020; Sunardi et al., 2023) had found that the effect of information technology investments on corporate performance varies depending on the industry in which they operate. Zheng and Khalid (2022) conducted a study to ascertain the advantages that enterprise resource planning (ERP) systems provide to manufacturing firms. When considering the potential advantages of implementing AI, investors may assign a greater worth to industrial enterprises. The potential of AI to greatly enhance operational efficiency is immense, leading to increased worker productivity and quality. Qureshi (2022) argued that investors often believe that non-manufacturing enterprises are not reaping the advantages of AI. Non-manufacturing firms may encounter challenges in discerning improvements in profitability and efficiency following the integration of artificial intelligence. Furthermore, individuals may encounter difficulties in fulfilling the financial responsibilities associated with the utilization of AI technology. This study concluded the following hypothesis.

H4: Empirical evidence suggests that non-manufacturing enterprises experience a greater impact on market value compared to industrial businesses.

3. METHODOLOGY

Using the widely used event study methodology in accounting and finance, we first evaluated the stock market response to AI investment announcements (El Ghoul et al., 2023). This is a developing pattern in IT and OM spending. Using an event study, which yields good results even in less-than-ideal circumstances, investors can investigate the immediate impact of a company's activities rather than waiting for accounting measures to be assessed, which could take several months (Mashud, 2019). Investors can thus make better educated decisions. To start, we gathered press releases about business investments in artificial intelligence. Data collection was followed by processing and filtering before analysis. Subsequent analysis of the expected return with a regression model yielded the

abnormal returns (ARs) and cumulative abnormal returns (CARs) that occurred during the event study. This study investigated the significant values of CARs by means of several parametric and nonparametric data analysis methods. We divided the data into subsamples after much consideration in order to carry out a more in-depth analysis. The subsamples' ARs were computed, and at the conclusion of the procedure, the relative importance of the subsample components was assessed.

3.1. Data Collection and Processing

This study used Factiva to find the announcement news related to AI investments made by companies from 2018 to 2022 in USA market. The study focused on keywords like "AI" and "Artificial Intelligence" to find relevant information. Every release underwent thorough analysis to determine its connection to companies' investments in AI. The study excluded notifications that were not connected or relevant to unlisted companies. When multiple announcements of the same event were found, only the earliest one was taken into consideration. In addition, we have removed notifications for stocks that lack sufficient historical data or are infrequently traded. Each organization viewed the news of corporations collaborating on AI initiatives in their own unique way. Based on a thorough analysis of the data, we have retained a total of 120 genuine announcements from 62 different sample firms of USA from 2018 to 2022. Table 2 displays a selection of the announcements included in the sample of the study.

This study obtained stock price information from the Centre for Research in Security Prices (CSRP) and financial data from COMPSTAT. Based on previous studies (Hasan et al., 2021; Rahman & Zhao, 2020), the study examined whether a company's strong IT capabilities were a factor in its inclusion in the Information Week during the year of the announcement or any other year within our five-year research period. According to Hung et al. (2022), the credit rating of a firm can be described using the domestic long-term credit rating. Credit ratings that are A- or higher are considered strong. This study used SIC codes to determine whether the companies belonged to the manufacturing sector. A company is confidential as a manufacturing firm if its SIC code falls within the range of 20 to 39. Else, it is categorized as a non-manufacturing firm.

Table 2: Exemplary announcements

Firm	Date	News
Citigroup	01-01-2019	Citigroup is utilizing AI to check and track the payments made by their corporate clients.
Kraft Heinz	03-10-2017	Kraft Foods by employing AI in all areas, Heinz is able to accurately identify incompetence and enhance performance.
Mastercard	30-11-2016	"Mastercard today introduced Decision Intelligence which uses AI technology to help financial institutions increase the accuracy of real-time approvals of genuine transactions and reduce false declines." From Dow Jones Institutional News
Pfizer	03-05-2017	Pfizer is using Comp lexica's digital analyst tools, which utilize AI, to progress the pharmaceutical company's data-driven marketing and sales decision-making processes.

Table 3 provides a detail of the sample firms in the dataset. The distribution of the sample firms by year and industry can be observed in Panel A, while Panel B provides the breakdown by sector. Panel C displays the financial data of the sample companies, providing a breakdown of staff count, asset value, ROIC, cash on hand, and long-term debt.

3.2. Abnormal Stock Return

This study estimated abnormal stock returns using the most widely used computer market model, the capital asset pricing model (CAPM). One representation of CAPM is

$$E(RRA_{it}) = \beta_i + \lambda_i RRM_{vt}\mu_{it}, \quad (1)$$

This formula presents the following variables: The variable "RRA_{it}" represents the return rate of announcement i on day t. Similarly, "RRM_{vt}" represents the return rate of market index v on day t. The symbol β denotes the y-intercept. The slope for announcement i is denoted as u_{it}, which represents the error factor. The study conducted a regression analysis for each individual stock using multiple stock indexes. Then identified the market index with the highest R2 value. In order to evaluate the early market response to the proceedings, the Average Return (AR) was calculated one day prior, one day following, and one day subsequent to the release. The study utilized stock price data from the 200-day estimation period, which commenced thirty days before to the AI investment announcement, to construct the econometric model (Eq. 1) and determine the anticipated return for each firm in the sample.

Equation (2) demonstrates the calculation of the anomalous return (AR) during the event window by deducting the expected return from the actual return (RRA_{it}).

$$AR_{it} = RRA_{it} - (\alpha_i + d_i RRM_{vt}) \quad (2)$$

Equation (3) provides the cumulative abnormal return (CAR), which is obtained by summing the abnormal returns (AR_{it}) for the event window.

$$CAR_i = \sum_{t=-1}^{+1} AR_{it} \quad (3)$$

To study the significance level of CAR, as defined by Dos Santos et al. (1993), the study utilized the parametric Z-test and two nonparametric tests, namely, the sign test and the Corrado's rank test, to improve the robustness of the data.

Table 3: The description of the sample firms

Panel A: Distribution of the AI investment announcement by year			
Years	Number		%
2018	6		6.02
2019	22		15.71
2020	39		32.19
2021	38		29.35
2022	15		16.73
Total	120		100
Panel B: Distribution of AI investment announcements by industry			
SIC	Industry	Frequency	%
16	Building Contractors Not Involved in Heavy Structure Work	2	0.97

20	Diet & Associated Products	3	2.09
28	Substances & Similar Products	9	8.87
29	Gas Purifying & Correlated Industries	2	1.81
30	Gum & Various Pliable Products	2	0.92
35	Manufacturing & Marketable Equipment & Computer Equipment	1	2.01
36	Electrical & Other Equipment & Machineries	6	3.24
37	Carriage Equipment	3	4.01
42	Motor Consignment Carriage	1	0.83
48	Communications	3	2.12
52	Building Materials, Hardware, Garden Supplies & Mobile Homes	1	0.78
53	General Stock Stores	1	0.78
58	Consumption & Drinking Places	3	0.99
59	Assorted Retail	5	4.86
60	Depository Institutions	12	10.1
61	No depository Credit Institutions	11	11.01
62	Security & Commodity Dealers, Dealers, Exchanges & Services	13	9.45
63	Insurance Carriers	6	2.34
67	Holding & Other Investment Offices	1	0.87
73	Business Services	31	26.45
80	Health Services	2	1.8
87	No classifiable Institutions	1	1.8
99	Engineering, Accounting, Research, & Management Services	1	1.9
	Total	120	100

Panel C: Financial details of the firms making AI investment announcements

	Number of Worker*	Resources**	ROA	Long term liability**	Money**
Mean	167	410,234	0.15	45,970	12,567
Median	83	151,309	0.13	19,953	9178

Std. Dev.	7912,804	274	0.13	17,019	67,314
Minimum	1	1789	− 0.29	0	194
Maximum	2340	2734,785	0.46	259,743	53,760

Note: * = Thousands and ** = USD in Millions

Table 4: The overall stock price impact of an AI investment announcement over time.

	[− 1]	[0]	[1]	[− 1, 0]	[0, 1]	[− 1, 1]
Mean CAR	− 1.71%	− 1.89%	− 2.01%	− 4.10%	− 33.92%	− 5.11%
Z test	− 0.02	− 2.21	0.71	− 1.19	− 0.81	− 0.54
Z test (p Value)	0.53	0.08	0.33	0.19	0.35	0.38
Median CAR	0.21%	− 0.12%	− 0.07%	0.02%	− 0.22%	0.23%
No. of +ve: −ve returns	74:67	52:71	60:65	64:73	58:63	72:65
Sign test	0.74	− 1.71	− 0.48	0.19	− 0.48	0.74
Signed test (p value)	0.29	0.06	0.39	0.51	0.39	0.29
Corrado test	0.93	− 1.43	0.54	− 0.34	− 0.61	0.03
Corrado's Rank test (p value)	0.22	0.08	0.37	0.45	0.32	0.56

4. RESULTS

For information regarding a company's CARs, if the company has made their AI activities public, please refer to Table 4. Calculating the CARs for various event durations, such as single-day event windows ([1, 0], [0, 1], and [1, 1]), as well as multi-day event windows ([1, 0], [0, 1]. In this context, the days that preceded, coincided with, and followed the announcement are denoted by the symbols [1, 0], and [1], respectively. The data reveal that the most important impact has happened twenty-four hours following the announcement.

Both parametric and nonparametric tests suggest that the mean AR (1.89%) and median AR (0.12%) on day [0] display statistical significance and a negative trend. This is the case regardless of whether the tests are parametric or no. Because investors tend to react unfavorably to news of investments in artificial intelligence, and because they frequently do so early, this conclusion is relatively predictable. Due to the fact that the outcome was unremarkable on the day before the announcement, it can be inferred that no information was revealed in advance [1]. It is therefore H1 is accepted.

The findings of the study performed on the subsample of event days are presented in Table 5. These results are utilized in the evaluation of hypothesis -H4. According to the results of both the parametric and nonparametric tests, the company subsamples in Panel A that have inferior information technology skills demonstrated a drop of 10%. Companies that have substantial information technology departments, on the other hand, display substandard performance in both tests. The findings suggest that businesses that do not possess an adequate level of knowledge in information technology are exposed to considerable risks when it comes to the implementation of information technology systems. Consequently, H2 does not change in any way. The CARs of the companies in Panel B that

received unsatisfactory ratings had significantly lower mean and median values than the other enterprises. There is no difference in validity between parametric and nonparametric tests when the significance level is set at 10%. Those individuals, on the other hand, who have credit ratings that are exceptional do not observe any results that reach statistical significance. The idea that businesses with low credit ratings have a large negative effect is supported by this study, which gives evidence about the theory. According to Panel C, the AI investments that were disclosed by companies that were not involved in manufacturing on the day of the event [0] have been significantly damaged. The AR values for these non-manufacturing companies are not only statistically significant (at 10%), but they are also considered to be negative. The manufacturing companies, on the other hand, do not notice any particularly substantial changes. According to the findings of this study, investments in AI appear to have a major detrimental impact on businesses that do not engage in manufacturing. In light of the conditions, H4 is accepted.

Table 5: Influence of AI investment on stock price on different factors (announcement day) [0]

	Mean	t test (*p* value)	Median	Mann–Whitney test (*p* value)
Panel A: Influence of IT competence				
	Low	High	Difference in subgroup (Low–High)	
Sample size	71	48		
Mean CAR	− 3.45%	0.02%	− 3.11	0.08
Z test (p value)	0.03	0.51		
Median CAR	− 0.21%	− 0.04%		
Sign test (p value)	0.04	0.55		
Corrado test (p value)	0.10	0.49		
Panel B: Influence of credit assessment				
	Low	High	Difference in subgroup (Low–High)	
Sample size	37	84		
Mean CAR	− 0.47%	− 0.51%	0.21% 0.09	− 0.06
Z test (p value)	0.07	0.13		
Median CAR	− 0.16%	− 0.09%		
Sign test (p value)	0.05	0.23		
Corrado test (p value)	0.05	0.41		
Panel C: Influence of kind of industry				
	Non-manufactory	Manufactory	Difference in subgroups (Non-manufactory–manufactory)	
Sample size	92	31		
Mean CAR	− 2.41%	0.12%		
Z test (p value)	0.03	0.29	− 2.55% 0.10	− 0.28
Median CAR	− 0.14%	0.12%		
Sign test (p value)	0.04	0.43		
Corrado test (p value)	0.07	0.40		

5. DISCUSSION

The main objective of this study is to assess the influence of AI integration on a company's

market valuation. Based on our analysis, the announcement of AI implementation is anticipated to elicit significant market responses. Furthermore, there is speculation that the declaration of AI implementation will specifically disadvantage enterprises in nonmanufacturing industries, those with low credit ratings, or those lacking in IT proficiency. We evaluate our concepts by scrutinizing the stock market's response to AI deployment announcements made between 2018 and 2022, employing event research methodology. The extensive sample analytical findings demonstrate the significant association between AI adoption announcements and major ARs. Our research has discovered a significant association between the presence of negative annual returns (ARs) and the implementation of AI in enterprises operating in non-producing industries with inadequate IT skills and financial stability.

According to the data, it is clear that the market tends to undergo a substantial decrease in performance when investments in AI are revealed. Based on the data, the statement resulted in a decrease of 1.89 percent in investment in artificial intelligence. This study aligns with earlier research on IT-related events, which likewise emphasizes the negative effects reported on the day of the announcement (Rosati et al., 2022). Nevertheless, the results contradict the prevailing consensus of other studies regarding events associated to IT investment. These studies have reported either insignificant returns (ranging from 0.02% to 0.09%) or significant returns (ranging from 0.02% to 8.2%) (Georg-Schaffner & Prinz, 2022).

We also examine how different contextual elements impact the market's reaction to investments in AI. The variables of industry type, credit rating, and IT skills exert a substantial influence on the interaction between them. On the day of the announcement, a fraction of enterprises possessing robust IT capabilities (3.45%) and companies with poor credit ratings (0.47%) were responsible for the negative anomalous market value. The findings are logical as investors may be reluctant to engage in a business that lacks robust IT competence or has a weak credit rating, as this could impede the successful execution of the AI project. Furthermore, nonmanufacturing companies had a detrimental anomalous market value decline of 2.38% on the day of the incident, surpassing the performance of manufacturing organizations [0]. This discovery is consistent with earlier studies that indicated AI would have the most significant influence on the industrial sector (J. Liu et al., 2022). The subsequent parts demonstrate the abundance of theoretical and managerial knowledge that this study offers through its findings.

6. CONTRIBUTION AND POLICY IMPLICATION

This study presents some theoretical breakthroughs that contribute to the present literature in the fields of AI, Information Technology (IT), and Operations Management (OM) in USA. Primarily, our research offers empirical evidence linking AI announcements with unfavorable annual reports (ARs) in USA. From a business perspective, it is widely recognized that AI will have a substantial influence on the future growth of initiatives. However, it is worth considering if AI consistently provides advantages to companies. Multiple studies and publications, including Chui et al. (2023), Dwivedi et al. (2021) and Lima et al. (2021), highlight the benefits and importance of AI in operations. There is less research demonstrating the tangible financial benefits. An AI investment has a direct correlation with the market value of a business. This research is the primary to impartially assess the impact of AI investment on the market value of businesses that use AI technology. The research on the impact of AI investment on business models and firm value is growing, and this study adds to that body of knowledge. Another theoretical contribution is assessing the impact of specific contextual factors, such as IT competence, credit rating, and sector type, on the returns of AI investment announcements. The results demonstrate the significant of taking these factors into account when making investments in AI and provide a broader view of the operations management and information technology research domains. This work provides theoretical guidance for future research, enabling academics to gain a comprehensive understanding of the impact of disruptive innovation on market value. Researchers may conduct more studies to explore the impact of various disruptive technologies and external factors on corporate values.

This study will have significant practical and management implications for managers and practitioners. According to our research, a company's market value may be negatively

impacted by investments in AI. Those with an interest in AI should closely monitor any updates regarding new investments, since they have the potential to exert significant influence.

Investors and firm market values rely on it. Managers implementing AI technology should ensure that the higher authorities are informed about the potential negative market reaction to an announcement of AI investment. Emphasizing the importance of the problem, even if it results in temporary market losses, may incentivize senior management to fully dedicate themselves and help. Furthermore, by examining the contextual factors of AI investment, the subsample study provides a more comprehensive insight into how an AI investment might generate market value for the business that adopts it. Manufacturing firms generally elicit a more favorable response from the market compared to nonmanufacturing ones. Moreover, firms with low credit scores and limited IT skills may have significant challenges when investing in AI. Nonmanufacturing firms, entities with low credit scores, or those with insufficient IT experience should build effective risk management policies when considering AI adoption. These organizations would only consider investing in AI if their IT capabilities or financial stability have been enhanced. Furthermore, the findings of our research will be highly beneficial and relevant to operations managers who are currently implementing AI initiatives. The objective of managers' investment decisions will be to maximize business value. Typically, managers rely on accounting metrics such as profitability and productivity to make operational decisions. However, companies frequently obtain access to this data when AI project announcements are disclosed. In fact, the information may not be accessible for a period of several months. Furthermore, the manipulation of accounting data by management may complicate the accurate assessment of the impact of an event on a company's value, potentially leading to an underestimation of its immediate implications. While event analysis findings may not provide a comprehensive assessment of the actual success of AI deployment, they can alleviate investors' concerns regarding the risks associated with adopting AI. This research offers crucial data on the market's response to AI projects, enabling managers to make informed decisions regarding investments in disruptive innovations. The financial evaluation of an AI venture is conducted utilizing the event study approach.

6.1. Constraints and Potential Areas for Future Research

Similar to other studies that utilized the event study methodology, this study also had significant limitations. The sample is initially restricted to publicly traded corporations in the United States. Small and medium-sized organizations may encounter less pertinent outcomes. Prospects for conducting research in this field may be feasible in the future. In addition, our study does not include firms that utilize AI but did not publicly disclose their efforts. Furthermore, despite our diligent attempts to exclude them within a five-day period, we are unable to provide a comprehensive explanation for all the factors that could have influenced the study. It is important to mention that competing corporate events were not considered (Makhija & Chacko, 2021). Ultimately, the study mostly focuses on the immediate outcomes of AI investments. It would be wise to assess the potential impacts of AI on long-term operational efficiency. Surveys and case studies are two exemplars of the various methodologies employed to examine the outcomes of AI projects.

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