E-ISSN: 2708-4523
P-ISSN: 2708-4515
AJMC 2025; 6(2): 421-432

www.allcommercejournal.com
Received: 18-05-2025
Accepted: 21-06-2025

Majid Mohammed Saeed Jaber
University of Fallujah, Anbar, Iraq

Corresponding Author:
Majid Mohammed Saeed Jaber
University of Fallujah, Anbar, Iraq

The impact of technology risk on corporate financial performance: An event study in Microsoft company

Majid Mohammed Saeed Jaber

DOI: https://www.doi.org/10.22271/27084515.2025.v6.i2e.673

Abstract
The study aimed to analyze the impact of technology risk on financial performance, by examining the impact of a technology disruption on Microsoft's financial performance, measured by its daily stock returns, for the period from the beginning of 2024 until August 30, 2024, representing 169 business days, during an event window extending from day 138 to day 30+, focusing on the day the company announced the technology disruption on July 19, 2024, using the Event Study model. The results showed that the company's financial performance and rapid response to surrounding conditions, including the technology disruption event, were affected. This indicates the importance of the company paying special attention to enhancing crisis management strategies related to technological risks such as technical disruptions, with a focus on rapid response and transparent and effective communication with the market, which may help reduce the severity of negative return volatility following such events.

Keywords: Technology risk, corporate financial performance, event study, crowdstrike company, Microsoft company

Introduction
The use of technology by businesses has become an absolute necessity, not only to facilitate and complete their work, but also to enable them to compete in today's competitive business environment. However, technology is not without a certain degree of risk, represented by the possibility of its failure to perform the functions for which it was designed. The existence of these risks is an undeniable reality, no matter how small the probability. The seriousness of the damage caused by technological risks is further underscored by businesses' widespread reliance on them, which leads to the widening of the damage caused by failure when it occurs, despite the low probability of such failure. This was confirmed by the software glitch that struck Microsoft, a leading software company, on July 19, 2024, due to a flaw in an update provided by CrowdStrike a cybersecurity company. This disruption disrupted the electronic systems of various organizations that rely on Microsoft systems in their operations around the world. These organizations included airlines, land transport management companies (train and railway stations), ports, oil and gas sector institutions, media outlets, hospitals, banks, and financial markets. This led to a direct decline in Microsoft stock returns. Accordingly, this research aims to review the risks of technology and its impact on companies' financial performance.

Theoretical framework
Technology Risk
The 2024 CrowdStrike Cybersecurity incident resulted in a worldwide IT disruption impacting Millions of Microsoft Windows systems. In July 2024, there was a faulty update of CrowdStrike's Falcon Endpoint. Detection and Response (EDR) software caused widespread system crashes known as the "Blue Screen of Death" (BSOD). The event caused severe disruptions to major industries, including aviation, financial services, healthcare, and emergency response systems, resulting in operational shutdowns, financial setbacks, and global safety concerns. (Venkata, 2025) [29]. As the study (Schmidt, 2023) [20] sought to clarify the importance of studying the causes and mechanisms of previous cases of information technology failure in alleviating the regular risks of technology projects, in a way that enhances the use of digitization, avoiding the exhaustion of the resources caused by technological failure, and the study also aimed to identify the factors and causes that lead to

the failure of information technology projects and diagnose the continuity of those causes over time, and to reveal the mechanisms that lead to that failure, In addition to the advantages of information technology projects, this comes intending to use this knowledge of the study in hedging from the risks of technology streets. The study showed that the factors of the failure of information technology projects are: (objectives, senior management, planning, requirements, implementation, supervision, technology, and the method of developing software, involving users and work in the project, contractors, risk management, and others), while the causes of technological failure were according to the results of the study as follows: (lack of realism, clarity, steadfastness and defects in the involvement, commitment, support, lack of realism and accuracy of planning. And the pressure of time for completion, lack of clarity and stability of the requirements, inappropriate implementation and control, and the lack of mastery of the change of change technology, excessive allocation, defects in systems engineering, undue complexity, imbalance in the involvement of users, training, managing their experiences, deficiency in human resources skills and expertise, small number, weak impulsion, motivation, weak performance of the undertakes, advisors, estimates, and lack of knowledge in managing management The contractors and the deficit in managing and analyzing risk management in addition to external change, organizational complexity, and imbalance in the ability to manage dilemmas)**.** In comparison, it showed that the financial impact of the incident has been huge. Airlines lost money on canceled flights and turnaround operations, while banks suffered losses from delayed transactions and system outages. Additionally, the disruption of services costs millions of dollars in revenue for the media companies. From CrowdStrike's side, this was a huge reputational risk. Not only did the core software update failure strain client trust, but it also put a question mark on the ability of company to manage and deploy updates. This incident brought about the need for strict quality assurance procedures and had a potential effect on CrowdStrike's standing in the cybersecurity space. The use of digital technology (digitization) has made the global financial ecosystem change rapidly. This happens because people's demand for digital services continues to increase. This opens opportunities for the banking industry to increase customer numbers and boost profits. However, on the other hand, there are several channels through which banking institutions have the potential to experience potential losses because cybercrime will continue to increase. The authors therefore suggest that banking institutions continue to seek to reinvent their risk management function, especially through the development of digital risk management, to protect themselves, their customers, and their place in the market. In Indonesia, the Financial Services Authority (OJK) has created a blueprint and road map that helps the banking industry implement digitalization and develop digital risk management in a targeted and effective manner. (Mazayo *et al*., 2023) [13]. Whatever mode it takes—centralized or decentralized, staff-led or boarded—IT Governance must be actively embraced by the Board if the organization is to be responsible to its stakeholders (Premakanthan, 2024) [28].

Financial Performance

The financial performance is assessed using seven financial ratios: current ratio (CR), total asset turnover ratio (TATO), debt-to-equity ratio (DER), net profit margin (NPM), return on assets (ROA), return on equity (ROE), and earnings per share (EPS). (Yunus & Lukum, 2021). The firm size has a positive and significant effect on financial performance, while leverage and liquidity have a positive and insignificant effect on financial performance. (Fernando & Yanti, 2024) [8] Good financial performance rewards the shareholders for their investment (Ongore & Kusa, 2013) [17]. Financial performance, being one of the major characteristics, defines competitiveness, potential of the business and economic interests of the company's management and reliability of present or future contractors (Abdi, 2010) [1]. Financial markets are considered one of the determining factors of company performance, through project financing. Financial companies are affected by asymmetry of information (Valdivieso & Guerrero, 2024) [22]. Financial performance could be measured through various financial measures such as profit after tax, return on assets (ROA), return on equity (ROE), earnings per share, and any market value ratio that is generally accepted (Yenesew, 2014) [27]. and somehow got along with him (Albertini, 2013) [3] that considers financial performance a meta-construct that emphasizes a firm’s profitability, distinguishing between market-based measures (e.g., price-earnings ratio, price per share, share price appreciation) accounting-based measures (e.g., return on equities (ROE), return on assets (ROA), return on investment (ROI), return on capital employed (ROEC), and organizational measures (e.g., cost or revenue advantage or disadvantages due to change in strategy). while (Brealey, 2025) [26] confirmed that all measures of financial performance based on accounting information and therefore are known as book rates of return. (Kanzari *et al*., 2022) [10] argue that performance measurement is critical in a control system and claim that “the object of the measurement is typically the performance of an organizational entity or an employee in a specific time period.” Performance measurements could be objective or subjective and address financial or non-financial aspect (Barrett, 2016) [25]. (Padake & Soni, 2015) [18] investigated the financial performance of the best 12 Banks operating in India over six years using DuPont Analysis. As a result of their studies, they revealed that the performance of banks cannot be evaluated only with profitability. The findings of this study are based on the multiple linear regression analysis, there are three elements: (net profit margin (NPM), assets turnover (AT), and equity multiplier (EM)) have positively and significantly influenced the ROE. Through analysis that aimed to enhance the understanding of financial performance in the technology sector. (Husna & Abd Kadir, 2024) [9]. Furthermore, the information from 107 technology start-up firms which represent 85% response rate, the variables considered were able to explicate 38.7% of variation on financial performance. it was observed that there was an inversely relationship between equity financing and financial performance of technology start-up firms in Kenya (Mwasi & Aluoch, 2023) [15]. The implementation of good corporate governance leads to the improvement of the financial performance of companies measured by the return on equity. (Affes & Jarboui, 2023) [2]. According to (Tudose *et al*., 2022) [21] Financial performance–determinants and interdependencies between measurement indicators

researchers focus on increasing the value of the company, i.e., increasing value for shareholders. Thus, there is a fourth generation of indicators that measure the economics added value, both for the company (through economic value added– EVA – or market value added) and for shareholders, investors, or other interested parties (by shareholders' value added, free cash flow or cash flow return on investment).

Satisfactory performance reflects the company's ability to utilize its resources to achieve its business objectives, including generating sustainable profits. Therefore, assessing company performance is critical for the company itself and external parties interested in investing or cooperating with the company (Astuti, 2013) [4]. (Nguyen & Nguyen, 2025) [16] found that revenue growth can significantly increase firm performance; and firm size, investment in fixed assets and choice of equity sources could create higher profits. (Sar & Panigrahi, 2025) [19] show that net non-performing assets, net interest margins, and return on capital have a significant negative impact on share price growth. The capital adequacy ratio and the current and savings account deposit ratios have a positive insignificant impact. The IT sector has recently become one of the most active sectors for investors and policy makers. This interest stems from the fact that the sector is at the heart of innovation, competitiveness and economic growth. (Tutcu *et al*., 2024). Audited financial statements and a web-based survey provided data reached to one hundred and thirty employees from 13 credit unions, results of the multiple regression tests confirmed a statistically significant relationship between IT risk management, institution size, and the financial performance of Jamaican credit unions, F (2, 99) = 46.861, p = 0.000, R_2 = .486. Institution size was a statistically significant predictor of financial performance (beta = -.637, p = .000). IT risk management initiatives did not provide any significant variation (beta = .139, p = .074) in financial performance.

Event Study

Over the last fifty years, event studies have been extensively used by researchers to quantify the reaction of a capital market to the release of information. An event study is seen as a tool or a technique. Event study methodology enables a researchers to choose the correct approach for a particular situation (Kurek, 2020) [11]. These studies are widely used that models in empirical analyses in a range of contexts, having been applied to (among many other themes) automotive plant closures and opioid overdoses (Venkataramani *et al*., 2020) [23].The overall market reaction is clear and coherent in the announcement date event, since both models agree that Cumulative Abnormal Return (CAR) (−1, 1) is significantly positive for the passing/adverse sample and the failing/baseline sample, and negative for the failing/adverse banks (Valdivieso & Guerrero, 2024) [22]. In the event study also, but on another level related to military events, (Yousaf *et al*., 2022) [24] paper's which included analysis of the abnormal returns (AR) before and after the launch of the 'special military operation' by Russian military forces on the 24th of February 2022 revealed a strong negative impact of this military action on a majority of the stock markets, especially on the Russian market, the aggregate stock market analysis indicates a significant and negative impact of the Russia–Ukraine conflict on the event day and post event days. The event study methodology is often used to put the efficient business hypothesis to the test. In the event study theory and many other financial econometric methods, market models and other models are used to calculate the expected return according to the Efficient Market Hypothesis (EMH). Early according to (Brown & Warner, 1980) [5]. And in an approach era (MacKinlay, 1997) [12] put forward that the event study methodology is designed to test market efficiency. Systematically non-zero abnormal security returns that persist after a particular event are inconsistent with the hypothesis that security prices adjust quickly to reflect new information fully. In most applications, the focus is on the impact of an event on the price of a particular class of the firm's shares, most often common equity.

Event studies examine the relationship between an event that affects securities and the return on those securities. Some events, such as a regulatory reform or an economic shock, have an immediate impact on many securities; other events, such as a change in dividend policy or a stock split, are unique to individual securities. However, there are several applications in other areas. For example, in the fields of law and economics, event studies are used to assess the effect of regulatory changes on firm value, and in legal liability cases, event studies are used to determine damages (Campbell *et al*., 1998) [6]. Event studies researchers are necessarily making decisions. This raises risks of bias due to systematic (if perhaps unconscious) model selection processes, committed by the researcher. Despite these risks, these decisions are unavoidable. There is no "button to push" that can automate the necessary judgment calls. For now, the best practice should be to increase transparency through bringing clarity about the specification decisions made (and the reasons for those decisions) and discussing robustness to alternative decisions, along with providing both estimation code and (whenever possible) data for replication (Miller, 2023) [14]. Many studies estimate the impact of exposure to some quasi-experimental policy or event using a panel event study design. These models, as a generalized extension of "difference-in-differences" designs or two-way fixed-effects models, allow for dynamic leads and lags to the event of interest to be estimated, while also controlling for fixed factors (often) by area and time (Clarke & Tapia-Schythe, 2021) [7].

Methodology

Research Statement: With the increasing reliance on technological systems and digital infrastructure to manage operational processes within companies, technology risk has emerged as a significant threat to the stability of financial and institutional performance. Technology risk refers to the potential for companies to incur financial losses or decline in revenues because of technical failures or cyberattacks affecting the electronic systems upon which these companies rely for their daily operations, leading to operational disruptions and negative repercussions for the financial market**.** In this context, the current study focuses on the following two questions:

What is the reality of the financial performance of Microsoft shares considering the technical glitch affecting its operating systems, in terms of its earnings***?***

What is the impact of the technological glitch affecting Microsoft's systems on its financial performance, in terms of its earnings?

Significance of the Research: Based on the above, and given the direct impact technological disruptions can have on the stability and financial performance of companies, particularly companies with complex digital infrastructures such as Microsoft, shedding light on the reality of this impact and analyzing the behavior of returns in the face of such events is an important topic that can contribute to understanding market responses to technology risks. It also represents a helpful tool for decision-makers in the fields of financial management, risk management, and information technology, to develop proactive policies that reduce the extent of damage and support market stability in the face of various sudden crises, including technological crises.

Research objectives: The research aims to shed light on the nature of technology risk, and to clarify the impact of unsystematic risks that may turn into systemic risks, including technology risk, on the financial performance of the companies under study. It also provides a descriptive analysis of the reality of financial performance in terms of the behavior of Microsoft's stock returns considering the technological glitch that affected its operating systems. This is achieved by analyzing the trend of abnormal returns and cumulative abnormal returns during the event window period, in addition to measuring the effects of the technological glitch on its financial performance.

Research limits: The research is related temporally to the daily revenues of Microsoft Company for the period from the beginning of the year 2024 until August 30, 2024, representing 169 working days. The number of days preceding the induction was (138) working days, while the number of days following the event was (30) working days in addition to the day of the event, which is July 19, 2024. While the spatial limits of the research were Microsoft Company.

Research Hypothesis: The research hypothesized the following main hypothesis:

The technology risk that affected Microsoft had a negative impact on financial performance during the event period, as measured by the company's accumulated abnormal returns.

The following sub-hypotheses branch out from this:

1. Technological risk causes changes in Microsoft's stock price, as reflected by the indicator.
2. Technological risk causes changes in Microsoft's actual return, as reflected by the indicator.
3. Technological risk causes changes in Microsoft's expected return, as reflected by the indicator.
4. Technological risk causes changes in Microsoft's abnormal return, as reflected by the indicator.
5. Technological risk causes changes in Microsoft's cumulative abnormal return, as reflected by the indicator.

Results

First: Analysis of Microsoft's stock prices and realized returns before and after the event

Table No. (1) displays Microsoft's stock prices and realized returns during the year 2024, the study sample, within an event window of (-138, 30+) days from the date of the technical glitch that affected the company's systems on July 19, 2024, following a failed security update provided by Crowdstrike, the company responsible for Microsoft's cybersecurity. Daily closing prices were used in the analysis.

Table 1: Analysis of Microsoft's stock prices and actual returns before and after the event

Days before the event	Date	Actual return before the event	Date	Closing price Day of the event	Days after the event	Date	Actual return after the event
-138	2023/12/29		2024/07/19	-0.00743	+1	2024/07/22	0.01325
-137	2024/01/02	-0.01384			+2	2024/07/23	0.0043
-136	2024/01/03	-0.00073			+3	2024/07/24	-0.0365
-135	2024/01/04	-0.0072			+4	2024/07/25	-0.0248
-134	2024/01/05	-0.00052			+5	2024/07/26	0.01629
-133	2024/01/08	0.018696			+6	2024/07/29	0.00343
-132	2024/01/09	0.002931			+7	2024/07/30	-0.009
-131	2024/01/10	0.018404			+8	2024/07/31	-0.0109
-130	2024/01/11	0.004848			+9	2024/08/01	-0.003
-129	2024/01/12	0.009934			+10	2024/08/02	-0.0209
-128	2024/01/16	0.004623			+11	2024/08/05	-0.0332
-127	2024/01/17	-0.00205			+12	2024/08/06	0.01122
-126	2024/01/18	0.011234			+13	2024/08/07	-0.003
-125	2024/01/19	0.012113			+14	2024/08/08	0.01064
-124	2024/01/22	-0.00543			+15	2024/08/09	0.00824
-123	2024/01/23	0.006009			+16	2024/08/12	0.00194
-122	2024/01/24	0.009133			+17	2024/08/13	0.01754
-121	2024/01/25	0.005722			+18	2024/08/14	0.00686
-120	2024/01/26	-0.00232			+19	2024/08/15	0.00995
-119	2024/01/29	0.014232			+20	2024/08/16	-0.0061
-118	2024/01/30	-0.00276			+21	2024/08/19	0.00729
-117	2024/01/31	-0.02732			+22	2024/08/20	0.00773
-116	2024/02/01	0.015474			+23	2024/08/21	-0.0016
-115	2024/02/02	0.018258			+24	2024/08/22	-0.0205
-114	2024/02/05	-0.01364			+25	2024/08/23	0.00298
-113	2024/02/06	-0.00039			+26	2024/08/26	-0.0079
-112	2024/02/07	0.020891			+27	2024/08/27	0.00085

-111	2024/02/08	0.000145			+28	2024/08/28	-0.0079
-110	2024/02/09	0.015432			+29	2024/08/29	0.00612
-109	2024/02/12	-0.01266			+30	2024/08/30	-0.0008
-108	2024/02/13	-0.02176				max	0.01754
-107	2024/02/14	0.007771				min	-0.0365
-106	2024/02/15	-0.00718				stdv	0.01386
-105	2024/02/16	-0.00617				mean	-0.0019
-104	2024/02/20	-0.00315					
-103	2024/02/21	-0.00152					
-102	2024/02/22	0.023274					
-101	2024/02/23	-0.00319					
-100	2024/02/26	-0.00685					
-99	2024/02/27	-0.00015					
-98	2024/02/28	0.000589					
-97	2024/02/29	0.014415					
-96	2024/03/01	0.004487					
-95	2024/03/04	-0.0014					
-94	2024/03/05	-0.03002					
-93	2024/03/06	-0.00139					
-92	2024/03/07	0.017381					
-91	2024/03/08	-0.00716					
-90	2024/03/11	-0.00419					
-89	2024/03/12	0.026252					
-88	2024/03/13	-0.00043					
-87	2024/03/14	0.024087					
-86	2024/03/15	-0.02091					
-85	2024/03/18	0.002159					
-84	2024/03/19	0.009753					
-83	2024/03/20	0.009024					
-82	2024/03/21	0.009689					
-81	2024/03/22	-0.00147					
-80	2024/03/25	-0.01381					
-79	2024/03/26	-0.00287					
-78	2024/03/27	-0.00052					
-77	2024/03/28	-0.00169					
-76	2024/04/01	0.009109					
-75	2024/04/02	-0.0074					
-74	2024/04/03	-0.00235					
-73	2024/04/04	-0.00613					
-72	2024/04/05	0.018118					
-71	2024/04/08	-0.00219					
-70	2024/04/09	0.003972					
-69	2024/04/10	-0.00711					
-68	2024/04/11	0.010973					
-67	2024/04/12	-0.01419					
-66	2024/04/15	-0.01977					
-65	2024/04/16	0.00227					
-64	2024/04/17	-0.00663					
-63	2024/04/18	-0.01855					
-62	2024/04/19	-0.01282					
-61	2024/04/22	0.0046					
-60	2024/04/23	0.016351					
-59	2024/04/24	0.003649					
-58	2024/04/25	-0.0248					
-57	2024/04/26	0.018079					
-56	2024/04/29	-0.01007					
-55	2024/04/30	-0.03265					
-54	2024/05/01	0.014307					
-53	2024/05/02	0.007316					
-52	2024/05/03	0.021928					
-51	2024/05/06	0.016777					
-50	2024/05/07	-0.01021					
-49	2024/05/08	0.002927					
-48	2024/05/09	0.004326					
-47	2024/05/10	0.005852					
-46	2024/05/13	-0.00246					
-45	2024/05/14	0.006841					
-44	2024/05/15	0.015531					

-43	2024/05/16	-0.00495					
-42	2024/05/17	-0.00185					
-41	2024/05/20	0.012134					
-40	2024/05/21	0.008661					
-39	2024/05/22	0.003444					
-38	2024/05/23	-0.00821					
-37	2024/05/24	0.007373					
-36	2024/05/28	0.000372					
-35	2024/05/29	-0.00268					
-34	2024/05/30	-0.03437					
-33	2024/05/31	0.001109					
-32	2024/06/03	-0.00389					
-31	2024/06/04	0.006148					
-30	2024/06/05	0.018904					
-29	2024/06/06	0.001202					
-28	2024/06/07	-0.00158					
-27	2024/06/10	0.00944					
-26	2024/06/11	0.011179					
-25	2024/06/12	0.019182					
-24	2024/06/13	0.001178					
-23	2024/06/14	0.002239					
-22	2024/06/17	0.01302					
-21	2024/06/18	-0.00454					
-20	2024/06/20	-0.00143					
-19	2024/06/21	0.009112					
-18	2024/06/24	-0.0047					
-17	2024/06/25	0.0073					
-16	2024/06/26	0.00268					
-15	2024/06/27	0.001525					
-14	2024/06/28	-0.01311					
-13	2024/07/01	0.021646					
-12	2024/07/02	0.005568					
-11	2024/07/03	0.003239					
-10	2024/07/05	0.014629					
-9	2024/07/08	-0.00283					
-8	2024/07/09	-0.01447					
-7	2024/07/10	0.014496					
-6	2024/07/11	-0.02508					
-5	2024/07/12	-0.00253					
-4	2024/07/15	0.000904					
-3	2024/07/16	-0.00983					
-2	2024/07/17	-0.01344					
-1	2024/07/18	-0.00713					
	Max	0.026252					
	Min	-0.03437					
	Stdv	0.012024					
	Mean	0.001153					

The table was prepared by the researcher based on the results of the Excel program**.**

It is clear from Table No. (1), which includes data on the company's stock prices and the returns achieved based on the event date, that (138) actual trading days were adopted before the event and (30) days after it, excluding official holidays and trading suspensions. The results indicate that the average returns before the event amounted to about (0.001153), but it decreased after the event to reach (-0.0019), which may reflect a negative impact of the event on the stock's performance.

Second: Data test for natural distribution and stability of the Microsoft Time Series

Before starting the estimation of the study variables, it was necessary to verify the extent to which Microsoft's stock returns were subjected to the event window of 169 days, for natural distribution, and this was done using the Kolmogorov-Smirnov test, which is based on the hypothesis that the data follows a natural distribution.

As for the Time Series, its stability is related to the stability of both the mean and the variance over time, with the assumption that the covariance between two periods depends only on the time gap (LAG) between them, not on the time itself. To verify the stability of the timetable chains of the study variables, the unit root test was applied using the Augmented Dicken-Fuller test, as shown in Table (2).

Table 2: Results of testing the normal distribution and stationarity of the time series of Microsoft data

P-statistic value Test	Significance level	Distribution	Value calculated at level	probability P-Value	Result
10.81797	0.004476	normal	-12.80545	0.0000	Stable at the level

The table was prepared by the researcher based on the results of the (Eviews 10) program**.**

The results of Table (2) show the following

1. Stock returns during the study period followed a normal distribution, according to the results of the Kolmogorov-Smirnov test, with the probability value (P-value) being greater than 0.05, supporting the hypothesis that the returns data are normally distributed.
2. The Augmented Dickey-Fuller time series stationarity test for the company's stock price variable showed that the series was stationary at the level, as the P-value was less than the significance level of 0.05, indicating the absence of a unit root in the series.

Third: Calculating the Company's Expected Return

The expected return for the research into the sample company's shares is estimated based on the market model, which assumes that security returns are directly related to market portfolio returns, which can be represented by the following mathematical formula:

$$Rjt = aj+\beta jRmt+ejt$$

Table 3: Expected return on Microsoft shares

a	β	Rm	Expected return
-0.000249	0.852616	0.00094324	0. 00055515

The table was prepared by the researcher based on the results of the (Eviews 10) program.

Table No. (3) indicates that the asset, despite being an investment with lower market risk (beta less than 1), suffered from poor performance (negative alpha, which means that the asset performed worse than expected based on its market risk) and a low expected return due to the technological failure, which shows that this technical failure had an immediate and tangible impact on the company's returns, which was clearly reflected in the financial figures during that period.

Fourth: Microsoft's Abnormal Return and Cumulative Abnormal Return

Table (3) displays Microsoft's actual return, expected return, abnormal return, and cumulative abnormal return over the event period of (169) days. Abnormal return is defined as the difference between the actual return and the expected return of a security. This measure is essential for assessing the impact of company-specific events in this study. It should be noted that abnormal returns can also reflect exceptional returns achieved by insiders due to their informational advantage due to their position in the company or prior knowledge of management decisions.

It is noted from Table No. (4) that there was a large fluctuation in the value of the abnormal returns during the entire period. There are days that show positive abnormal returns (e.g., day -136: 0.011237, day -131: 0.011046, day +9: 0.020447) and other days that show large negative abnormal returns (e.g., day -114: -0.0115, day -34: -0.02334, day +8: -0.03672), indicating no clear trend before the event in the period leading up to day 0, as the abnormal returns fluctuate between positive and negative without a clear pattern, which may indicate information leakage before the event (on day 0), while it shows significant negative abnormal returns after the event on some days, especially large negative returns on days +4 (-0.01534), +8 (-0.03672), +14 (-0.01746), +19 (-0.01299), and +20. (-0.00807) and +25 (-0.01143), This may indicate a negative market reaction after the event (the technology risk that hit Microsoft), and a continued negative impact, which is reflected in a similar fluctuation in the cumulative abnormal return. While there are some periods of high abnormal returns, there are sharp declines that lead to negative values, especially in the days immediately following the event (Day 0). This indicates that the technical failure had an intermittent but significant negative impact on Microsoft stock prices. There was no sustained positive market response to the event, but rather a negative trend in the cumulative abnormal performance at critical times after the event.

Table 4: Microsoft's Actual Return, Expected Return, Abnormal Return, and Cumulative Abnormal Return over the Period of Event 169

Day	Actual Return	Expected Return	Abnormal Return	Cumulative Abnormal Return
-138				
-137	-0.01384	-0.01661	0.002765	0.002765
-136	-0.00073	-0.01197	0.011237	0.014002
-135	-0.0072	-0.00576	-0.00144	0.009798
-134	-0.00052	0.000807	-0.00132	-0.00276
-133	0.018696	0.021612	-0.00292	-0.00424
-132	0.002931	0.000797	0.002135	-0.00078
-131	0.018404	0.007358	0.011046	0.01318
-130	0.004848	-0.00011	0.004953	0.015999
-129	0.009934	3.13E-05	0.009903	0.014856
-128	0.004623	-0.00204	0.006661	0.016564
-127	-0.00205	-0.00609	0.004038	0.010699
-126	0.011234	0.013222	-0.00199	0.002051
-125	0.012113	0.01666	-0.00455	-0.00653
-124	-0.00543	0.003072	-0.0085	-0.01305
-123	0.006009	0.00412	0.001889	-0.00662
-122	0.009133	0.003478	0.005655	0.007545
-121	0.005722	0.001702	0.00402	0.009675

-120	-0.00232	-0.0037	0.001374	0.005395
-119	0.014232	0.01096	0.003273	0.004647
-118	-0.00276	-0.00772	0.00496	0.008233
-117	-0.02732	-0.02267	-0.00464	0.000317
-116	0.015474	0.012796	0.002678	-0.00196
-115	0.018258	0.017094	0.001164	0.003842
-114	-0.01364	-0.00214	-0.0115	-0.01033
-113	-0.00039	0.000584	-0.00098	-0.01247
-112	0.020891	0.009264	0.011626	0.010648
-111	0.000145	0.002207	-0.00206	0.009564
-110	0.015432	0.012241	0.003191	0.001129
-109	-0.01266	-0.00315	-0.00951	-0.00632
-108	-0.02176	-0.01829	-0.00348	-0.01298
-107	0.007771	0.012765	-0.00499	-0.00847
-106	-0.00718	0.002817	-0.01	-0.01499
-105	-0.00617	-0.00837	0.002204	-0.00779
-104	-0.00315	-0.00936	0.00621	0.008414
-103	-0.00152	-0.00334	0.00182	0.00803
-102	0.023274	0.028974	-0.0057	-0.00388
-101	-0.00319	-0.00293	-0.00025	-0.00595
-100	-0.00685	-0.00143	-0.00542	-0.00567
-99	-0.00015	0.003545	-0.00369	-0.00911
-98	0.000589	-0.00561	0.0062	0.002508
-97	0.014415	0.008851	0.005565	0.011764
-96	0.004487	0.011158	-0.00667	-0.00111
-95	-0.0014	-0.00429	0.002892	-0.00378
-94	-0.03002	-0.01679	-0.01322	-0.01033
-93	-0.00139	0.005606	-0.007	-0.02022
-92	0.017381	0.014818	0.002564	-0.00443
-91	-0.00716	-0.01177	0.004604	0.007168
-90	-0.00419	-0.00424	4.49E-05	0.004649
-89	0.026252	0.015107	0.011144	0.011189
-88	-0.00043	-0.00555	0.005119	0.016264
-87	0.024087	-0.00319	0.027274	0.032393
-86	-0.02091	-0.00981	-0.0111	0.016172
-85	0.002159	0.007975	-0.00582	-0.01692
-84	0.009753	0.003781	0.005972	0.000156
-83	0.009024	0.012303	-0.00328	0.002693
-82	0.009689	0.001836	0.007852	0.004574
-81	-0.00147	0.001501	-0.00297	0.004883
-80	-0.01381	-0.00284	-0.01097	-0.01394
-79	-0.00287	-0.00434	0.001477	-0.00949
-78	-0.00052	0.004979	-0.0055	-0.00402
-77	-0.00169	-0.00136	-0.00032	-0.00582
-76	0.009109	0.000918	0.008191	0.007869
-75	-0.0074	-0.00971	0.002315	0.010507
-74	-0.00235	0.002133	-0.00449	-0.00217
-73	-0.00613	-0.01426	0.008126	0.003641
-72	0.018118	0.012198	0.00592	0.014046
-71	-0.00219	0.000194	-0.00238	0.003538
-70	0.003972	0.003092	0.00088	-0.0015
-69	-0.00711	-0.00853	0.001416	0.002296
-68	0.010973	0.016515	-0.00554	-0.00413
-67	-0.01419	-0.0165	0.002313	-0.00323
-66	-0.01977	-0.01822	-0.00155	0.00076
-65	0.00227	-0.00139	0.003655	0.002102
-64	-0.00663	-0.01166	0.005029	0.008684
-63	-0.01855	-0.00537	-0.01318	-0.00815
-62	-0.01282	-0.02081	0.007991	-0.00519
-61	0.0046	0.010866	-0.00627	0.001725
-60	0.016351	0.015598	0.000753	-0.00551
-59	0.003649	0.000884	0.002765	0.003518
-58	-0.0248	-0.00658	-0.01822	-0.01545

-57	0.018079	0.019888	-0.00181	-0.02003
-56	-0.01007	0.003314	-0.01338	-0.01519
-55	-0.03265	-0.02068	-0.01196	-0.02535
-54	0.014307	-0.00349	0.017793	0.005828
-53	0.007316	0.014822	-0.00751	0.010287
-52	0.021928	0.019554	0.002374	-0.00513
-51	0.016777	0.011718	0.005059	0.007433
-50	-0.01021	-0.00116	-0.00905	-0.00399
-49	0.002927	-0.00196	0.004892	-0.00415
-48	0.004326	0.002521	0.001805	0.006697
-47	0.005852	-0.00047	0.006322	0.008127
-46	-0.00246	0.002751	-0.00521	0.001109
-45	0.006841	0.007326	-0.00048	-0.0057
-44	0.015531	0.013752	0.001779	0.001294
-43	-0.00495	-0.00277	-0.00218	-0.0004
-42	-0.00185	-0.00088	-0.00097	-0.00315
-41	0.012134	0.006358	0.005776	0.004801
-40	0.008661	0.002102	0.006559	0.012335
-39	0.003444	-0.00199	0.005431	0.01199
-38	-0.00821	-0.00404	-0.00417	0.001265
-37	0.007373	0.010828	-0.00345	-0.00762
-36	0.000372	0.005693	-0.00532	-0.00878
-35	-0.00268	-0.00599	0.003311	-0.00201
-34	-0.03437	-0.01103	-0.02334	-0.02002
-33	0.001109	-0.00026	0.001373	-0.02196
-32	-0.00389	0.005434	-0.00932	-0.00795
-31	0.006148	0.001543	0.004605	-0.00472
-30	0.018904	0.019278	-0.00037	0.004231
-29	0.001202	-0.001	0.002202	0.001828
-28	-0.00158	-0.00247	0.00089	0.003093
-27	0.00944	0.003317	0.006123	0.007013
-26	0.011179	0.008597	0.002582	0.008705
-25	0.019182	0.015003	0.00418	0.006762
-24	0.001178	0.003208	-0.00203	0.00215
-23	0.002239	0.001064	0.001175	-0.00085
-22	0.01302	0.009311	0.003709	0.004885
-21	-0.00454	0.000151	-0.00469	-0.00098
-20	-0.00143	-0.00804	0.006603	0.001915
-19	0.009112	-0.00196	0.011072	0.017675
-18	-0.0047	-0.01107	0.006372	0.017444
-17	0.0073	0.01239	-0.00509	0.001283
-16	0.00268	0.004782	-0.0021	-0.00719
-15	0.001525	0.002858	-0.00133	-0.00343
-14	-0.01311	-0.00722	-0.0059	-0.00723
-13	0.021646	0.00809	0.013555	0.00766
-12	0.005568	0.008176	-0.00261	0.010947
-11	0.003239	0.008661	-0.00542	-0.00803
-10	0.014629	0.008852	0.005777	0.000354
-9	-0.00283	0.00263	-0.00546	0.000319
-8	-0.01447	0.001245	-0.01572	-0.02118
-7	0.014496	0.011616	0.00288	-0.01284
-6	-0.02508	-0.01984	-0.00525	-0.00237
-5	-0.00253	0.006126	-0.00866	-0.0139
-4	0.000904	0.003876	-0.00297	-0.01163
-3	-0.00983	0.001846	-0.01167	-0.01465
-2	-0.01344	-0.02819	0.014751	0.003077
-1	-0.00713	-0.00714	1.62E-05	0.014767
0	-0.00743	-0.00824	0.000809	0.000825
+1	0.013249	0.015551	-0.0023	-0.00149
+2	0.004303	-0.00071	0.005011	0.002709
+3	-0.03651	-0.03718	0.000662	0.005673
+4	-0.02479	-0.00944	-0.01534	-0.01468
+5	0.016286	0.01005	0.006236	-0.00911

+6	0.003427	0.000568	0.002859	0.009095
+7	-0.00897	-0.01304	0.004069	0.006928
+8	-0.01086	0.025852	-0.03672	-0.03265
+9	-0.00297	-0.02342	0.020447	-0.01627
+10	-0.02088	-0.02473	0.003845	0.024292
+11	-0.0332	-0.03505	0.001849	0.005694
+12	0.011224	0.010092	0.001132	0.00298
+13	-0.00296	-0.01064	0.00768	0.008811
+14	0.010635	0.028092	-0.01746	-0.00978
+15	0.008235	0.00496	0.003275	-0.01418
+16	0.001944	0.001964	-2E-05	0.003255
+17	0.017544	0.023801	-0.00626	-0.00628
+18	0.00686	0.000149	0.006711	0.000454
+19	0.009954	0.022945	-0.01299	-0.00628
+20	-0.0061	0.00197	-0.00807	-0.02106
+21	0.007286	0.013649	-0.00636	-0.01443
+22	0.007728	-0.00349	0.011218	0.004855
+23	-0.00155	0.005565	-0.00712	0.004098
+24	-0.02046	-0.01699	-0.00347	-0.01059
+25	0.00298	0.014407	-0.01143	-0.0149
+26	-0.00795	-0.00867	0.000723	-0.0107
+27	0.000846	0.001495	-0.00065	7.42E-05
+28	-0.00786	-0.01139	0.00353	0.002881
+29	0.006119	-0.0024	0.008515	0.012045
+30	-0.00082	0.003987	-0.00481	0.003705

The table was prepared by the researcher based on the results of the Excel 2010 program.

Fifth: Analysis of the Cumulative Abnormal Return for the Event Window

This section presents the results of the event study across the various time periods within the event window, which was divided into eleven periods. A one-sample t-test was applied to analyze whether the average abnormal return for each day, and for each time group, differed significantly from zero. Based on the null hypothesis that (the average abnormal return is equal to zero during these periods), which means that there is no statistically significant impact of the event under study, Table No. (5) displays the estimated values of both the abnormal return and the cumulative abnormal return of the company's shares during the event window extending from day (-138) to day (+30) from the date of announcing the technological failure that the company experienced.

Table 5: Abnormal Return Rate and Cumulative abnormal Return of the Company's Shares During the Event Window Extending from (-138) to (+30) Days from the Date of Announcing the Technology Outage

cumulative average	Statistical significance	Price	Average abnormal return	Std. Deviation	t	Sig. (2-tailed)
-120	significant	-0.008504926	$0.00826	$0.00780	13.634	.000
-105	significant	-0.009506758	$0.00926	$0.00790	15.289	.000
-90	significant	-0.013224129	$0.01298	$0.00782	21.426	.000
-75	significant	0.001477405	-$0.00172	$0.00787	-2.846	.005
-60	significant	0.00502921	-$0.00528	$0.00780	-8.710	.000
-45	significant	0.004892005	-$0.00514	$0.00790	-8.484	.000
-30	significant	-0.023335505	-	-	-	-
0	significant	-0.004810187	-	$0.00787	-	-
+10	significant	0.011071956	-$0.01132	$0.00780	-18.687	.000
+20	Not significant	0.00080888	-$0.00106	$0.00790	-1.743	.083
+30	significant	0.003275241	-$0.00352	$0.00782	-5.815	.000

The table was prepared by the researcher based on the results of the SPSS 26 program.

Based on the results of the One-Sample t-test presented in Table (5), which analyzes the impact of the technology risk that struck Microsoft on its financial performance during the event window, and by testing whether the abnormal returns are statistically different from zero or other reference values, the analysis indicates that all values for “Sig. (2-tailed)” were less than 0.05 in almost all time windows, except for one window (60) in which the value was 0.083, indicating that the abnormal return is statistically different from the assumed value (test value), which indicates the presence of a significant impact of the event, as it indicates the presence of a negative abnormal return in most periods, reflecting a direct and negative financial impact after the occurrence of the technology risk, which is explained by the negative market reaction to the event.

Microsoft's daily and cumulative abnormal returns

The figure was prepared by the researcher based on the results of the Mini Tab 16 program

Figure (1) shows the cumulative distribution function (CDF) of Microsoft's daily and cumulative abnormal returns. The two curves in the figure represent the empirical CDFs of Microsoft's stock returns, The dashed red line in the figure represents the average daily abnormal returns (RI), which exhibit a clear negative trend, while the black line illustrates the cumulative abnormal returns (NRI) curve, which reflects a negative and volatile behavior over the event period. This behavior is attributed to the high level of volatility in daily returns, as evidenced by the standard deviation value, which results in the cumulative returns curve not matching the daily returns curve and shifting towards negative values. Although some positive daily returns were recorded, the magnitude and volatility of these returns were small compared to the negative returns, making the cumulative outcome negative, reflecting a negative market response to the event under study.

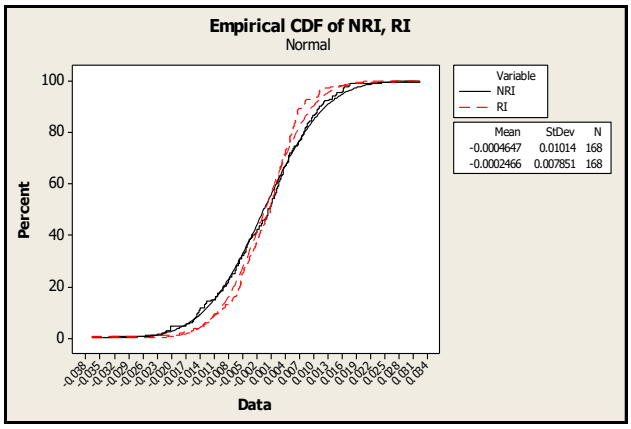

Fig 1: The cumulative distribution function (CDF) of Microsoft's daily and cumulative abnormal returns

Table 6: Testing the significant differences of Microsoft's stock price averages

The significant difference	Independent Samples Test	
	t-test for Equality of Means	
	Sig. (2-tailed)	T
Not significant	.0987	-.016
significant	.000	-12.902
significant	000.	.505-

The table was prepared by the researcher based on the results of the SPSS 26 program.

Based on the results of the independent sample test, it is clear that the Microsoft company outage had a statistically significant and substantial effect on the company's stock price averages in most comparisons (two out of three cases, Sig. (2-tailed) = 0.000), indicating that the price changes following the technical outage were not random but were the result of a real effect of the event, Also, the large absolute value of t in the second case (-12.902) confirms the large negative effect size, while in one of the cases, the difference was not statistically significant, which may indicate that there was (one period) in which the average stock price did not show a statistically significant difference, meaning that this period was not affected as much negatively or that its effect faded away quickly.

Discussion

1. The analysis results showed that Microsoft stock returns were irregular and volatile during the study period (including the technology disruption period), indicating that stock prices were affected and rapidly responded to surrounding conditions, including the technology disruption event, in addition to other factors that had an impact during the study period.
2. The analysis of abnormal and cumulative abnormal returns, according to the Event Study methodology, also showed that the general trend was negative in the periods following the announcement of the technical failure, indicating a negative market reaction to the technological failure event, which is consistent with the study's hypothesis that "the technology risk that befell Microsoft had an impact on its financial performance in the event period as measured by its returns."
3. Analysis of Microsoft's actual stock returns, particularly following the technology disruption, showed that most of them were negative, indicating a recurring decline in stock prices during that period. This could be interpreted as an indication that investors decided to sell or avoid the stock in response to the technology disruption.
4. By analyzing the event duration and event window (which spans from -138 to +30 days), a significant difference emerged between the full time period of the study window and the actual event days associated with the technological disruption, indicating that the event window is wide enough to capture potential impacts before and after the main event (the technological disruption).

Suggestions

1. The company should pay special attention to strengthening crisis management strategies related to technological risks such as technical failures, with an emphasis on rapid response and transparent and effective communication with the market, which may help reduce the severity of negative return volatility following such events.
2. Investors should be aware that the returns of all stocks, even large companies like Microsoft, can be significantly affected by environmental, economic, and company-specific events (such as technological disruptions), which require continuous monitoring and careful risk analysis.
3. It is essential for company management to develop robust contingency plans for technological disruptions, not only for the technical aspect, but also for the media and public relations aspect to allay investor fears and limit the deterioration of their confidence. It is also important to consider mechanisms to compensate or reassure investors to absorb the negative shock, as investors may react negatively and quickly to bad news such as technological disruptions. Therefore, management must be proactive in addressing problems, present clear recovery plans, and perhaps even consider proactive policies to boost investor confidence (such as share buyback programs, if possible and appropriate).
4. Directing regulatory authorities and financial analysts to the importance of event studies as an effective tool for assessing the extent to which large companies are affected by technological disruptions and their impact

on the market as a whole and perhaps setting guidelines for transparency and rapid reporting of such disruptions.

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