Challenges Faced by Technology Companies: A summarize of risk and mitigation methods

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Abstract. Companies involved in AI, such as Google, Microsoft, Amazon, Apple, IBM, Tesla, NVIDIA, Facebook, Intel, and Alibaba, faced a couple of risks during their operation, as referred by their annual reports for the year 2023. Of all the risks mentioned by more than one company, including collectibility risk, commodity price risk, credit risk, cybersecurity risk, equity price risk, exchange rate risk, inventory risk, residual risk, risk related to debt obligations, risk related to intellectual property, risk of product defects, errata, or other product issues, risk related to labors, risk related to legal and regulatory, risk related to ownership of company's stock, and supply chain risk, foreign exchange risk is the risk that all mentioned companies identified. In contrast, the least identified risks among the mentioned companies are the commodity price risk, residual risk, and risk related to debt obligations. They mitigated them by entering into hedging activities and performing risk assessments. During the process of business operation, development, and expansion, risks are inevitable. This research selected ten companies and organized the risks they bore and the approaches and procedures they have been implementing to reduce the risks. For example, to reduce exchange and interest rate risk, chosen companies entered into derivatives and risk assessments to maximize their economic effectiveness position.

Keywords: Risks, mitigation, financial statement analysis, corporate governance.

1 Introduction

AI, or artificial intelligence, is a recent and rapidly thriving field after the establishment of AI models, such as OpenAI. This research aims to analyze the risks of technology companies and how they deal with them. This research chooses ten companies involving AI, including Google, Microsoft, Amazon, Apple, IBM, Tesla, NVIDIA, Facebook, Intel, and Alibaba. This research will also analyze and organize the risks mentioned in their financial statement and find how they mitigated them, providing business managers the ways to mitigate the risks their companies are undertaking. This research also offers investors approaches to determine and analyze what are the

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risks of the company that they want to invest on undertaking, and this research will also provide methods for managers to control, reduce and eliminate the business risks.

2 Risk analysis

According to the financial statements of the year 2023 of ten candidate companies, seventeen significant risks were mentioned in their financial statement. This section will introduce these risks and companies' reactions to reduce, mitigate, and eliminate these risks. (Table 1)

Table 1. Risk summary of the selected companies.

Types of Risks	**Google**	**Microsoft**	**Amazon**	**Apple**	**IBM**	**Tesla**	**NVIDIA**	**Facebook**	**Intel**	**Alibaba**
Collectibility Risk				√	√		√			
Commodity Price Risk	√								√	
Credit Risk	√	√		√	√	√	√	√	√	
Cybersecurity Risk						√	√	√		
Equity Price Risk		√	√					√	√	√
Exchange Rate Risk	√	√	√	√	√	√	√	√	√	√
Interest Rate Risk	√	√	√	√	√		√	√	√	√
Inventory Risk	√		√	√	√		√	√	√	√
Residual Risk					√	√				
Risk Related to Debt Obligations							√		√	
Risk Related to Intellectual Property						√	√	√		
Risk Related to Operations			√			√				√
Risk of Product Defects, Errata, or Other Product Issues				√				√	√	
Risk Related to Labor						√			√	√
Risk related to legal and regulatory			√	√			√	√		√
Risk Related to Ownership of Company's Stock	√							√		√
Supply Chain Risk						√	√		√	

2.1 Collectibility Risk

Collectability risk refers to the possibility that a company may not collect customer payments after providing goods or services [1]. If not effectively managed, this risk can lead to, but is not confined to, cash flow disruptions, increased bad debt, and a direct impact on the company's profitability and financial health. In the selected companies, Apple, IBM, and NVIDIA have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk that are to utilize the data of customers to analyze and determine their payment patterns and behaviour, establish access to communicate with customers to react promptly to related issues, set up flexible payment options to ensure that payment methods are not confined in only a few options. These strategies helped companies to mitigate accounts receivable risk and ensure financial stability and business continuity.

2.2 Commodity Price Risk

Commodity price risk refers to the impacts on companies and buyers caused by fluctuations in commodity price [2]. If not effectively managed, this risk can lead to, but is not confined to, write-downs of inventory, cash flow disruptions, and affecting the company's profitability and financial performance. In the selected companies, Google and Intel have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk: managing the forecasted transaction risk, using commodity derivatives contracts, such as commodity swaps, and making sourcing plans to analyze and determine the commodities. These strategies helped companies mitigate the risk related to the fluctuations of commodity prices and ensure financial stability and business continuity.

2.3 Credit Risk

Credit risk refers to the possibility that the lender will not receive payback from the borrower or due to other losses [3]. If not effectively managed, this risk can lead to, but is not confined to, increased bad debt, cash flow disruptions, increased cost of borrowing and investments, and liquidity risk. In the selected companies, Google, Microsoft, Apple, IBM, Tesla, NVIDIA, Facebook, and Intel have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk, that are to master netting and collateral security arrangements; assessing the creditworthiness, credit limits and use of collateral management of counterparty of companies; performing ongoing evaluations to determine customers' credit and to limit the amount of credit companies offer; performing ongoing evaluations to determine customers' credit and to limit the amount of credit companies offer; using credit default swap contracts; transferring credit risk to third parties, including credit insurance, financial guarantees, nonrecourse secured borrowings, and transfers of receivables; purchasing highly-rated fixed income securities; performing ongoing evaluations of credit of company's customers. These strategies helped companies mitigate the risk related to failures of payments and ensure financial stability and business continuity.

2.4 Cybersecurity Risk

Cybersecurity risk refers to the losses from data breaches or cyberattacks [4]. If not effectively managed, this risk can lead to, but is not confined to, data breaches, the cost of responding to an incident and subsequent recovery, IP rights risk, and disclosures of confidential information. The selected companies, Tesla, NVIDIA, and Facebook, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk: preparing, detecting, and analysing a cybersecurity incident; Containment, eradication and recovery of the cybersecurity incident; and establishing privacy policy about how companies deal with customer data and how customers deal with their data. These strategies helped companies to mitigate the risk of cyberattacks and ensure financial stability and business continuity.

2.5 Equity Price Risk

Equity price risk refers to the volatility and fluctuations of the price of securities [5]. If not effectively managed, this risk can lead to, but is not confined to, a decrease in the company's profitability, dilution of shareholders' ownership stakes, and scrutiny from shareholders. The selected companies, Microsoft, Amazon, Facebook, Intel, and Alibaba, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk: determining fluctuations in the value of investments through liquidity events using swap contracts. These strategies helped companies mitigate the security price volatility risk and ensure financial stability and business continuity.

2.6 Foreign Exchange Risk

Foreign exchange risk refers to losses due to exchange rate fluctuations of currencies in a financial transaction [6]. If not effectively managed, this risk can lead to but is not confined to, additional hedging costs, translational and transactional exposures, change in a competitive position, repatriation costs, and cash flow disruptions. All the selected companies mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risks, that are to use foreign currency contracts, such as currency forward contracts, currency interest rate swaps, option contracts, or cross-currency swaps; monitoring foreign currency exposures to maximise the economic effectiveness of company's foreign currency positions; entered into hedging activities, such as cash flow hedges, or other financial activities. These strategies helped companies mitigate the risk related to fluctuations in exchange rates and ensure financial stability and business continuity.

2.7 Interest Rate Risk

Interest rate risk refers to the depreciation of securities' values caused by the fluctuation of interest rates [7]. If not effectively managed, this risk can lead to, but is not confined to, additional hedging costs, cash flow disruptions, change in a competitive position, and change in income from securities. In the selected companies, Google, Microsoft, Amazon, Apple, IBM, NVIDIA, Facebook, Intel, and Alibaba have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk, that is to perform value at risk (VaR) assessment to manage the company's interest rate exposure, using option, futures, and swap contracts - where these contracts may or may not be designated as hedging instruments, such as cash flow or fair value hedges - to manage the average maturity of company's portfolio; using interest-rate swaps to convert specific fixed-rate debt issuances into variable-rate debt, and to convert variable-rate debt issuances into specific fixed-rate debt. These strategies helped companies mitigate the risk related to fluctuations in interest rates and ensure financial stability and business continuity.

2.8 Inventory Risk

Inventory risk refers to losses driven by the depreciation of inventory stored in a company [8]. If not effectively managed, this risk can lead to, but is not confined to, surplus and shrinkage of inventory, obsolescence, impact on the company's profitability, and supply chain disruptions. The selected companies, Google, Amazon, Apple, IBM, NVIDIA, Facebook, Intel, and Alibaba, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk that are to avoid overstocking or understocking products, and the company may be charged the cost of sales for inventory provisions to write down their inventory to the lower of cost or net realizable value or for obsolete or excess inventory, and for excess product purchase commitments. These strategies helped companies manage inventory holding and ensure financial stability and business continuity.

2.9 Residual Risk

Residual risk refers to the risk remaining after mitigating inherent risks [9]. If not effectively managed, this risk can lead to, but is not confined to, unavoidable and remaining risk and uncertainty, operational disruptions, and additional cost of monitoring the remaining risk. In the selected companies, IBM and Tesla have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this risk: utilizing risk assessment, such as FAIR (Factor Analysis of Information Risk), and performing ongoing risk management and monitoring to minimize the potential risk. These strategies helped companies to mitigate the residual risk and ensure financial stability and business continuity.

2.10 Risk Related to Debt Obligations

Risk related to debt obligations refers to the potential losses due to the obligation to repay borrowed money [10]. If not effectively managed, this risk can lead to but is not confined to, liquidity risk, impact on the company's credit rating, collateral risk, dilution of shareholders' ownership stakes, and impact on the company's profitability. In the selected companies, NVIDIA and Intel have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk: performing ongoing management, monitoring debts, and reserving an appropriate and sufficient amount of cash to respond to emergencies. These strategies helped companies mitigate the risk related to debt obligations and ensure financial stability and business continuity.

2.11 Risk Related to Intellectual Property

Risk related to intellectual property refers to potential risks related to a company's IP, such as copyright and patent [11]. If not effectively managed, this risk can lead to but is not confined to, infringement risk, disclosures of confidential information, and impact on the company's ability to protect its intellectual property rights. The selected companies, Tesla, NVIDIA, and Facebook, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policy to mitigate this type of risk: performing ongoing risk analysis, treatment, and monitoring. This strategy helped companies mitigate the risk related to IP rights and ensure financial stability and business continuity.

2.12 Risk Related to Operations

Operational risk refers to losses caused by a company's internal and external issues [12]. If not effectively managed, this risk can lead to, but is not confined to, legal and regulatory risks related to labour and the inefficiency of the company's operation. The selected companies, Amazon, Tesla, and Alibaba, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk: performing SOPs to stabilize business operations and enter into hedging activities. These strategies helped companies to mitigate the risk when operating their business and ensure financial stability and business continuity.

2.13 Risk of Product Defects, Errata, or Other Product Issues

Risks of product defects, errata, or other product issues refer to losses caused by issues with products [13]. If not effectively managed, this risk can lead to, but is not confined to, a decrease in the quality of products, customers' dissatisfaction, and a direct impact on the company's reputation. The selected companies, Apple, Facebook, and Intel, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policy to mitigate this risk: developing software and firmware updates. This strategy helped companies to mitigate product issues and ensure financial stability and business continuity.

2.14 Risk Related to Labor

Risks Related to Labor refer to the inability of companies to either attract, retain, or improve the staff in companies [14]. If not effectively managed, this risk can lead to, but is not limited to, impact on the quality of employees, labour shortages, skill mismatches, safety issues, and reputation damage. The selected companies, Tesla, Intel, and Alibaba, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk: offering benefits, such as welfare, to attract or retain workers and providing staff training to improve their ability. These strategies helped companies to mitigate the risk related to labour and ensure financial stability and business continuity.

2.15 Risk Related to Legal and Regulatory

Risks related to legal and regulatory refer to losses due to non-compliance with local laws and regulations [15]. If not effectively managed, this risk can lead to, but is not confined to, risk and uncertainty of litigation, intellectual property, credit rating, reputation, and data privacy. The selected companies, Amazon, Apple, NVIDIA, Facebook, and Alibaba, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policy to mitigate this type of risk: to analyze and monitor laws to maximize the effectiveness of the company's current position. This strategy helped companies to mitigate risks related to laws and regulations and ensure financial stability and business continuity.

2.16 Risk Related to Ownership of Company's Stock

Risks related to ownership of a company's stock refer to losses due to changes in the company's common stock price [16]. If not effectively managed, this risk can lead to, but is not confined to, liquidity risk, reputational damage, dilution of shareholders' ownership stakes, and scrutiny from shareholders. The selected companies, Google, Facebook, and Alibaba, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policy to mitigate this type of risk: investing in various kinds of securities to facilitate portfolio diversification. This strategy helped companies mitigate risk related to the volatility of the company's common stock price and ensure financial stability and business continuity.

2.17 Supply Chain Risk

Supply chain risk refers to disruptions of goods and services flow within a supply chain network due to unexpected factors [17]. If not effectively managed, this risk can lead to, but is not confined to, demand and supply mismatches, inventory risk, and transportation risk. The selected companies, Tesla, NVIDIA, and Intel, have mentioned this risk in their financial reports for the year 2023. They have implemented the following policies to mitigate this type of risk: entering into long-term payment contracts with suppliers to supply specific components or other needed materials performing value at risk (VaR) assessment. These strategies helped companies to mitigate the supply risk and ensure financial stability and business continuity.

3 Summary

Of all the mentioned risks, foreign exchange risk is the risk that all selected companies mentioned. This type of risk is a high possibility among all selected companies because all chosen companies are involved in international transactions and operations. When foreign currencies are traded goods or services, companies undertake repatriation while bearing risks and uncertainties due to fluctuations in exchange rates. Selected companies that undertook this risk mitigated it by entering into hedging activities and monitoring their foreign currency exposures. Selected companies, including Microsoft, Amazon, Apple, Tesla, and Alibaba, deemed this risk severe.

The second most identified risk is interest rate risk. This risk was highly possible among all selected companies because of ever-changing and unpredictable interest rates. Companies become vulnerable to fluctuations of interest rates when they undertake borrowing, lending, assets and liabilities mismatches, and interest rate derivatives. Selected companies that undertook this risk mitigated it by performing VaR assessment and entering into hedging activities. Selected companies, including Apple and Tesla, deemed this type of risk severe.

The least identified risks are commodity price risk, residual risk, and risk related to debt obligations. Commodity price risk occurs in a low possibility among all selected companies because the chosen companies engaged in long-term contracts with their supplier to ensure a stable supply chain. Residual risk occurs in a low possibility among all selected companies because the chosen companies have employed mitigation strategies to cope with inherent risks. Risk related to debt obligations occurs in a low possibility among all selected companies because the chosen companies have implemented conservative debt management policies.

4 Conclusion

According to the development of artificial intelligence, increasing numbers of companies, including Google, Microsoft, Amazon, Apple, IBM, Tesla, NVIDIA, Facebook, Intel, and Alibaba, are involving AI to promote their development. However, during the development, risks are inevitable. This research selected these ten companies and used their financial reports for the year 2023 to determine the risks they were undertaking and how they were mitigating them. There were seventeen risks mentioned by plural companies, including collectibility risk, commodity price risk, credit risk, cybersecurity risk, equity price risk, exchange rate risk, inventory risk, residual risk, risk related to debt obligations, risk related to intellectual property, risk of product defects, errata, or other product issues, risk related to labors, risk related to legal and regulatory, risk related to ownership of company's stock, and supply chain risk. For instance, companies entered into hedging activities and risk assessments to mitigate exchange rate and interest rate risk. To some extent, this research comprehensively organized potential risks that companies might be undertaking and how to address them. It offers businesses thoughts on risk mitigation. To be more specific, all the risks mentioned in this research are found in the financial statement of ten selected companies. Therefore, several risks and uncertainties might remain undiscovered or mentioned in the financial reports, while those risks are still significant to the companies. For some specific risks of particular companies, case study is an effective approach to determine and analyze those undiscovered risks. Furthermore, this research do not include very specific and detailed procedures and approaches to mitigate risks, most of them still remain too broad and even vague and unclear. Hence, more detailed ways can be analyzed in future studies.

Reference

1. Salima T N, Aripin A S A. Analysis of the Effect of Management of Receivables Risk with Credit Scoring on Credit Collectibility. Applied Business and Administration Journal, 2024, 3(1): 26-38.
2. Park E, Kim W H. The Effect of Inventory Turnover on Financial Performance in the US Restaurant Industry: The Moderating Role of Exposure to Commodity Price Risk. Tourism Economics, 2021, 27(7): 1417-1429.
3. Zhang X, Yu L. Consumer Credit Risk Assessment: A Review from the State-of-the-Art Classification Algorithms, Data Traits, and Learning Methods. Expert Systems with Applications, 2023: 121484.
4. Florackis C, et al. Cybersecurity Risk. The Review of Financial Studies, 2023, 36(1): 351-407.
5. Dutta A, et al. Assessment and Optimisation of Clean Energy Equity Risks and Commodity Price Volatility Indexes: Implications for Sustainability. Journal of Cleaner Production, 2020, 243: 118669.
6. Lin H, Sun Q, Chen S Q. Reducing Exchange Rate Risks in International Trade: A Hybrid Forecasting Approach of CEEMDAN and Multilayer LSTM. Sustainability, 2020, 12(6): 2451.
7. Drechsler I, Savov A, Schnabl P. Banking on Deposits: Maturity Transformation Without Interest Rate Risk. The Journal of Finance, 2021, 76(3): 1091-1143.
8. Hou C, Lu M. Allocating Inventory Risk in Retail Supply Chains: Risk Aversion, Information Asymmetry, and Outside Opportunity. Manufacturing & Service Operations Management, 2024.
9. World Health Organization. Risk Assessment[R]. 2020.
10. Tang H, et al. Quantum Computation for Pricing the Collateralized Debt Obligations. Quantum Engineering, 2021, 3(4): e84.
11. Grimaldi M, Greco M, Cricelli L. A Framework of Intellectual Property Protection Strategies and Open Innovation. Journal of Business Research, 2021, 123: 156-164.
12. Araz O M, et al. Data Analytics for Operational Risk Management. Decision Sciences, 2020, 51(6): 1316-1319.

13. Ji X, Gao Q, Wang H. A Bilevel-Optimization Approach to Determine Product Specifications During the Early Phases of Product Development: Increase Customer Value and Reduce Design Risks. Expert Systems with Applications, 2022, 188: 116012.
14. Bui D G, et al. Labor Unions and Bank Risk Culture: Evidence from the Financial Crisis. Journal of Financial Stability, 2020, 51: 100782.
15. Watney M M. Artificial Intelligence and Its' Legal Risk to Cybersecurity[C]//European Conference on Cyber Warfare and Security. Academic Conferences International Limited, 2020.
16. Hou C, Liu H. Institutional Cross-Ownership and Stock Price Crash Risk. Research in International Business and Finance, 2023, 65: 101906.
17. Pournader M, Kach A, Talluri S. A Review of the Existing and Emerging Topics in the Supply Chain Risk Management Literature. Decision Sciences, 2020, 51(4): 867-919.