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THE ROLE OF AI AND BUSINESS INTELLIGENCE IN TRANSFORMING ORGANIZATIONAL RISK MANAGEMENT

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ABSTRACT

The innovative business risks include cybersecurity and regulatory risks and therefore the expansion of the use of Artificial Intelligence and Business Intelligence technologies in the risk management processes has come as a result. This article examines the role of Advanced Intelligence and Business Intelligence in altering risk management paradigms in the context of the US Organizations with emphasis on operations management and decision-making sophistication enhancement and risk management in advance. To achieve the above objective, a cross-sectional survey of 200 risk management professionals drawn from various organizations is used to gather data on the level of AI/BI adoption, the benefits sought and the difficulties experienced.

A structured online survey was used to solicit data relating to themes like integrated AI/BI, perceived enhancements in risk, challenges like high costs and data and ethical issues of AI-decision making. Categorized variables were used to present the demographics of the respondents and Pearson correlation and regression analyses tests were used to compare the impact of AI/BI adoption with enhanced risk management results. Chi-Square tests were conducted to establish the significance of the differences in the adoption and challenges by industries as well as the size of organizations.

Organizations with optimally deployed AI/BI systems realize enhanced system effectiveness, increased speed of decision-making processes and improved ability to manage risks in an anticipatory manner. A significant positive correlation was established between these outcomes and the level of AI/BI integration with these outcomes supporting the disruptive promise of these technologies. However, the study also shows the following challenges to adoption, which are high costs of implementing the solutions, difficulty in handling big data and shortage of skilled personnel in a firm. Moreover, ethical issues remain critical, especially with reference to the levels of transparency with artificial intelligence alongside data protection for individuals' information; a pressing issue of concern especially to the health and financial sectors.

This study prompts further attention to the advancement of efficient AI solutions at a large scale and the generation of a set of ethical norms to incorporate into risk management particularly with reference to AI use. In future research, more efforts should be devoted to investigating the effects that the use of AI and BI has on risk management practices after a longer period of time has elapsed, as well as on how the barriers explored in this research could be efficiently mitigated for organizations, especially those small ones.

KEYWORDS: Artificial Intelligence, Business Intelligence, Risk Management, AI Adoption, Decision-Making, Data Complexity, Proactive Risk Mitigation, Ethical AI, U.S. Organizations, Predictive Analytics.



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INTRODUCTION

The business environment in the global market is constantly changing which means that risks have become more multifaceted and are within the sphere of cybersecurity, operations and

regulations. The classical method of managing risks which involved following set processes and using past data is inadequate to manage today's risk. Therefore, many organizations incorporate

AI and BI technologies in their risk management system in their endeavor to improve it. These technologies include data analysis technologies, modeling technologies and automation technologies, which enable the organizations to forecast and control risks.

AI can help organizations work with huge amounts of information, identify risks and forecast possible negative outcomes better than a human analyst. Risk identification is an activity that becomes conducted with a high degree of accuracy through machine learning, which is an element of AI; it entails the updating of a predictive model with new data and in the process, enhances the ability to identify risks more accurately thereafter (Tayal & Kulkarni, 2023). BI, in contrast, turns large chunks of data into useful information that guides the decision-makers about the new threats which are likely to occur (Cedar Rose, 2023). Collectively, AI and BI help organizations move from reactionary mode of managing risk, to that of preventing risks from occurring in the first instance.

This research seeks to establish how AI and BI are helping to revolutionize risk management in organizations in the United States of America. How would it explore the degree to which AI and BI boost up optimization, enhance decision-making and promote preventive risk management. Further, the study will describe the factors inhibiting the implementation of these technologies, key barriers being the high implementation costs, data management issues and ethical issues such as fairness of artificial intelligence in decision making process (IBM, 2024).

Several challenges are still apparent in the adoption of both AI and BI although more organizations are now acknowledging the importance of the technologies. There is also a shortage of skills in AI, data privacy issues and the expenses in the formation of AI technologies have also limited the adoption of these technologies (Business tech weekly, 2024). 81% of enterprises whose AI journey is at scale responded thus, while 42% of them have deployed AI, 40% are still pilots. The most cited

challenges revealed include: availability of adequate AI skills (33%), the nature of data (25%) and concerns over ethics (23%) (IBM, 2024).

The issue of algorithmic bias as well as the application of AI within decision making processes remain essential for ethical analysis. Today there are many efforts to build frameworks that assist in preventing the misuse of artificial intelligence but, as per NIST, only a handful of organizations have been able to establish and actively utilize these frameworks (2023). Indeed, the integration of AI into business processes will require that these ethical issues be addressed to ensure confidence in the technology as well as uphold the law.

This article looks at the extent to which AI and BI are being implemented in the organizations based in the United States with special emphasis on risk management strategies. It also looks at how these technologies increase operational effectiveness, manage decisions and reduce risks before they occur. The study also reveals that the major risks that organizations experience when implementing AI and BI include; higher costs, data elaboration and inadequate technological experience. These barriers are especially influential for smaller organizations especially those that have few resources. Thus, for such issues, skills and challenges, further adoption of such large-scale AI solutions, better and efficient data management and training of the workforce are critical. It also discusses the future of AI and BI in risk management including emerging trends as the shift to cloud-based AI, popular focus on Explainable AI and future framework for introduced ethical usage of AI in risk management. Thus, drawing on the insights from these areas, this research contributes to the existing body of knowledge on the state and purpose of AI and BI in risk management and provides specific recommendations for the organizations which strive to address the challenges of modern risk realities.

LITERATURE REVIEW

The use of AI and BI in risk management has become an industry norm today than it was a

decade ago due to the innovation potential they bring to organizations. This literature review aims at reviewing the previous literature to understand the creation of the use of artificial intelligence and business intelligence in risk management emphasizing on the concept of benefit, implementation hindrances and ethical issues.

AI and BI in Risk Management

The use of new technologies such as the AI and BI, risk management has become more proactive in organizations leading to the increased adoption of the two technologies. Deep learning components and machine learning of AI can help organizations to perform data analysis and risk identification of the future (Tayal & Kulkarni, 2023). Subfield of AI, predictive analytics can help the companies to anticipate the risks proactively relying on the insights from the historical and current data, which can broaden the understanding of how to respond to the risks before they become even more severe (Sharma et al, 2022).

Business Intelligence (BI) can be seen to work hand in hand with AI since it turns such insights into formatted and easy to consume reports for top management to decipher and apply (Cedar Rose, 2023). Collectively, AI and BI equip the organizations with a reservoir of tools that contribute not only towards the enhancement

of the identification of risks but also to the enhancement of the decision making and effectiveness of the functional business processes (Liu et al, 2023). These technologies provide a view that goes beyond the typical Reactive Risk Management, which deals with risks only after an incident has happened and focuses on Proactive Risk Management where risks can be prevented before they happen.

Challenges in AI and BI Implementation

It is important to note that integration of AI and BI in risk management is not without some difficulties as explained in this article. The relative cost of implementing the AI systems is one of the biggest hurdles towards adoption according to Porter’s six forces. Lack of investment in proper infrastructure and talent that is required to implement and deploy artificial intelligence is a problem that affects many organizations especially SMEs (Business tech weekly, 2024). The increasing size of data sets and AI’s inclusion into organizations’ operational systems add additional layers of challenge to implementation (IBM, 2024). Another problem that organizations encounter is the general incompatibility of integrating AI solutions in their existing systems or legacy systems that are unable to process large datasets that are needed by AI applications (Sarker et al, 2023).

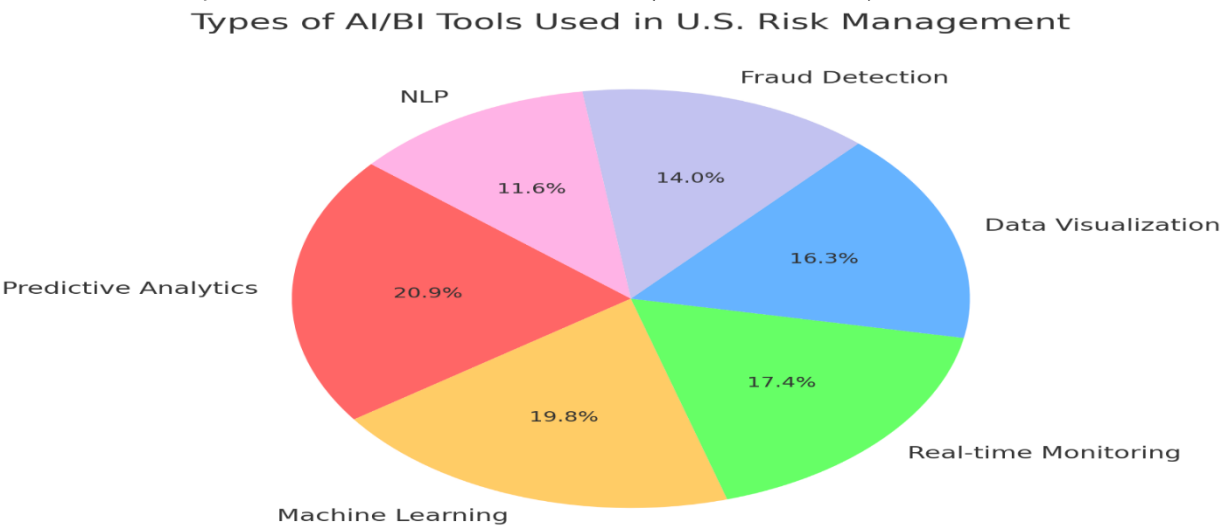


Figure 1: Types of AI/BI Tools Used in U.S. Risk Management

The second major concern is of the skills deficiency. An article by IBM (2024) notes that scarcity of skilled workers in implementing AI and Data Analytics is one of the major challenges encountered in the integration of AI in risk management. This scarcity of skills does not only repute in the usage of AI tools but also the update and sustenance of the AI systems. Consequently, both small and big organizations miss out on the opportunities that could be brought up by the AI and BI technologies and often fail to employ efficient predictive models and act on real-time data (Wang et al, 2023).

Ethical Considerations in AI-Driven Risk Management

With the use of AI integrated in decision makings, there are emerging issues of ethic with regard to the integration of the AI. For instance, algorithmic bias is among the most likely threats to organizations that rely on them to make vital choices. That is why prejudiced data or AI models entail unfair results, especially in areas like finance and healthcare, where particular decisions made based on AI influence individuals’ lives (NIST, 2023). These issues are more so compounded by a lack of clarity over the inner workings of AI decision-making, popularly known as the black box problem, since decision-makers may not be fully aware of how

the insights that are generated by AI are arrived at (Davenport & Harris, 2023).

There is increasing regulation on issues to do with data privacy and the proper use of Artificial intelligence in organizations. Since AI systems use big data for training, data protection and security become important measures especially regarding the GDPR in Europe and CCPA in USA (Sharma et al, 2022). Noncompliance to these regulations presents companies subjecting them to severe fines and reputational loss, making the business environment unfriendly for AI implementations.

Future Trends in AI and BI for Risk Management
AI and BI are also very relevant in the field of risk management and the future is brightly seeing organizations increasing their investment in technologies that could enhance their ability to handle risks. According to a study by Gartner (2024) more than 70 percent of risk management leaders are expected to use AI-based risk management solutions by 2025 due to efficiency, better decision-making and predictive capability. There are also expected to bring down the cost of risk management by accessing cloud-based solutions, which puts the SMEs on an equal level playing field with large organizations (Vishal et al, 2023).

Table 1: Summary of Literature on AI and BI in U.S. Risk Management

Topic	Key Findings	Sources
AI in Risk Management	AI technologies, especially machine learning and predictive analytics, improve risk detection and proactive management by analyzing large datasets and identifying patterns.	Tayal & Kulkarni (2023); Liu et al. (2023)
BI in Decision-Making	Business Intelligence enhances decision-making by transforming complex data into actionable insights,	Cedar Rose (2023); Liu et al. (2023)

	leading to faster and more accurate responses to risks.	
Challenges of AI/BI Adoption	High costs, data complexity and a lack of technical expertise are the main barriers to adopting AI and BI in U.S. risk management frameworks.	Businesstechweekly (2024); IBM (2024)
Ethical Concerns in AI	Ethical issues such as algorithmic bias, lack of transparency in AI decisions and data privacy concerns pose significant challenges in AI adoption for risk management.	NIST (2023); Davenport & Harris (2023)
Skills Gap in AI/BI Implementation	A shortage of AI and BI expertise hampers the effective deployment and utilization of these technologies for risk management purposes.	IBM (2024); Wang et al. (2023)
Proactive Risk Management	AI and BI allow organizations to transition from reactive to proactive risk management, improving their ability to predict and mitigate risks.	Sharma et al. (2022); Cedar Rose (2023)
Future of AI/BI in Risk Management	Cloud-based AI solutions and advancements in explainable AI (XAI) are expected to drive future growth in AI and BI adoption for risk management in U.S. organizations.	Gartner (2024); Vishal et al. (2023)

Concerning the solutions that have been seen as the biggest drawback in the classical AI, there is progress in the development of explainable AI (XAI). XAI strives to make the inside of the AI model much more understandable to enable decision-makers to know the process through which AI gets to certain conclusions; this is very crucial in fields that involve the highest level of risks (IBM, 2024). That is why as these

technologies advance more reliable, ethical and efficient decisions will be made by organizations relying on AI.

METHODOLOGY

This research seeks to find out how the use of AI and BI can revolutionize risk management practices in organizations in the United States with special attention to the adoption, advantage and disadvantage of AI and BI in risk

management. This research follows a quantitative research strategy through using questionnaires to assess the organizational experiences implementing AI and BI in risk management. The following is a detail of the research design, data collection methods, sampling technique and data analysis procedures employed in the study.

To collect data from organizations from different industries in the U, S this study uses cross-sectional survey research as a data collection method because it is efficient in collecting big data from a representative host of respondents useful for comparing the varied levels of AI and BI acceptance and their influence on risk management. A questionnaire structured by objectives was designed basing on major sections which included the level of AI/BI implementation, the benefits realized from its implementation (e. g. efficiency, enhanced decision making) the challenges faced while implementing AI/BI (e. g. high costs, technical issues) and the future investment plans towards AI/BI in risk management.

A stratified random sampling technique was adopted such that organizations from different industries and sizes of organizations small, medium and large organizations were well captured. Thus, the target population for the current article involved risk management specialists, IT managers and decision makers in the organizations that have implemented / are planning to implement AI and / or BI technologies. To cover all the aspects of AI/BI it was decided to make the sampling by industry (acc, fin, healthcare, manufacturing, technology etc.) and by the degree of AI/BI adoption – fully integrated, partially integrated, or not integrated at all.

Sample size was deemed to be 200 respondents, as this gives adequate statistical power for the analysis and is conquering at the same time. The organizations were sampled randomly from the list of professional associations and business directories including emails and linked in invitation were made to the participants in the survey.

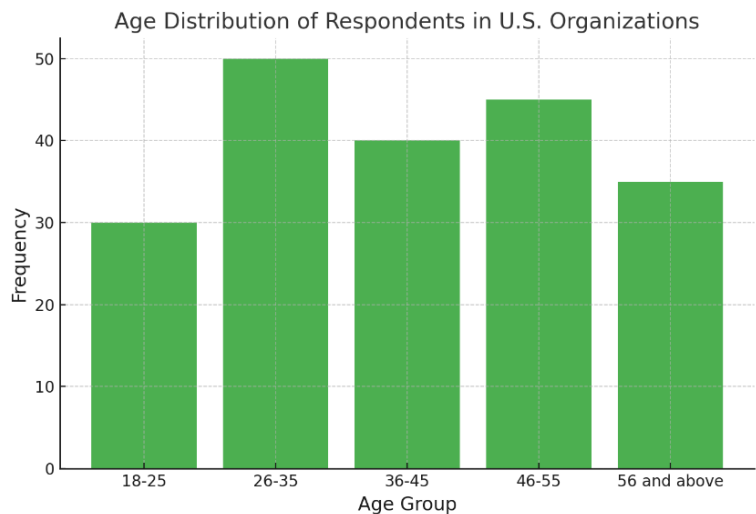


Figure 2: Age Distribution of Respondents in U.S. Organizations

The data was collected through an online survey questionnaire which was sent to key stakeholders through emails and social media.

This questionnaire was designed with closed-ended questions and Likert-type questions so as to measure the extent of implementation of AI

and BI in risk management. The questionnaire was divided into the following sections: Demographic Information and detailed analysis by AI/BI Adoption, Impact on Risk Management, Challenges and Barriers and the predicted Future Outlook.

The data that was collected from the surveys was analyzed using Statistical Package for the Social Sciences (SPSS) version 27. For the demographic analysis of the responses given by the respondents and also the type of organizations that they belong to descriptive analysis in the form of frequencies, percentages, mean and standard deviations were used. To investigate the correlation between the use of AI/BI and enhancement of risk management, correlation analysis was conducted to determine the degree of the relationship between the level of AI/BI maturity and various performance indicators including efficient gains and enhanced decision-making. Further, regression analysis was conducted also to find out the level of association between AI and BI technologies and proactive risk management and organizational performance.

Challenges and barriers associated with AI/BI adoption were therefore tested using Chi-Square technique to find out if there are any differences based on the organization size, industry and level of BI integration. In this way, these tests allowed to determine the main drivers of effective application of AI and BI in risk management.

The exploratory method of factor analysis was used to assess which variables are related and/or belong to what theme, especially with reference to barriers to the use of AI/BI. This made it possible to identify some of the main problem areas that organizations experience as they try

to adopt AI/BI technologies and get insights as to where organizations could focus in order to overcome some of these challenges.

The ethical clearance was sought before the implementation of this study was embarked on. They were also told the goal of the study and the rights of the participant as well as the anonymity of the responses. Employees were free to participate in the survey and their identity was not captured at all making the process completely anonymous.

RESULTS

Demographic Characteristics of Respondents

200 respondents were selected from diverse industries and positions in organizations that are engaged in risk management activities. Table 2 shows respondents' demography. For employment grade, the result indicates that most participants are in the employment grade 26-35 (25%) followed by the employment grade of 46-55 (22.5%) and the employment grade of 36-45 (20%). With regard to the gender, there was a balance between male and female respondents, whereby 50 % of the participant were males while the rest 50% were females.

As much as the industry sectors are concerned, then the healthcare field had the highest number of respondents submitted by 25%, the finance sector took the second place with 22.5% while manufacturing sector took the third place with 20% of the respondents. There were several roles identified which included; 27.5% of them were IT Managers or BI Specialists while 25% were Analysts. Notably, 42.5% of the respondents had a working experience of more than 10 years in risk management which gives a long-standing view of the implementation of AI and BI in organizations.

Table 2: Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency	Percentage
Age	18-25	30	15.0%
	26-35	50	25.0%
	36-45	40	20.0%
	46-55	45	22.5%
	56 and above	35	17.5%
Gender	Male	100	50.0%
	Female	100	50.0%
Industry Sector	Finance	45	22.5%
	Healthcare	50	25.0%
	Retail	35	17.5%
	Manufacturing	40	20.0%
	Technology	30	15.0%
Position in Organization	Risk Manager	40	20.0%
	Analyst	50	25.0%
	IT Manager	55	27.5%
	BI Specialist	55	27.5%
Years of Experience	0-2 years	30	15.0%
	3-5 years	40	20.0%
	6-10 years	45	22.5%
	10+ years	85	42.5%
Region	Northeast	35	17.5%
	Midwest	50	25.0%
	South	40	20.0%
	West	45	22.5%
	Nationwide/Remote	30	15.0%

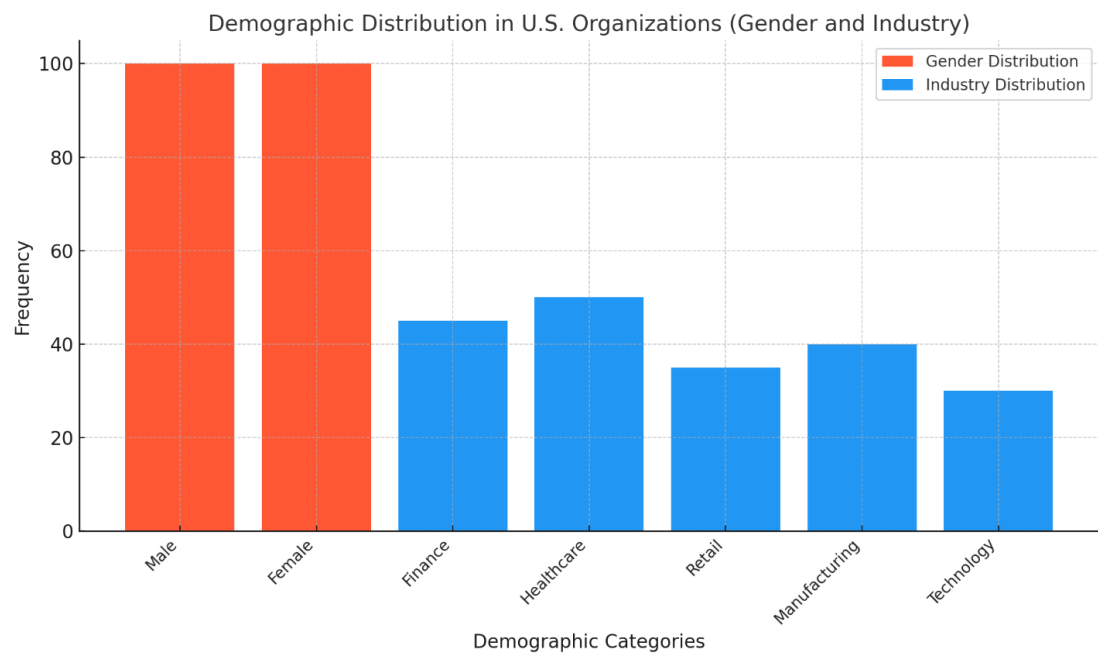


Figure 3: Demographic Distribution in U.S. Organizations (Gender and Industry)

Use of AI and BI in Risk Management

Table 3 also reveals the degree of incorporation of AI and BI tools in risk management at present. Out of all the respondents, 30% were asked whether their organizations utilized AI and BI for risk management and out of them, 60% said yes. From these tools, predictive analytics emerged as the most popular tool with 45 % and this was followed by machine learning algorithms with 42. Moreover, 42.5% of organizations revealed

that application of AI and BI was fully incorporated with their risk management and 32.5% indicated partial integration. Based on the frequency of use, 30% of the organization stated that they use AI and BI tools on a daily basis while 20% of the organizations stated that they use AI and BI on a weekly basis. This means that these tools have been moderately used in continued Risk management processes.

Table 3: Use of AI and BI in Risk Management

Question	Response	Frequency	Percentage
Does your organization use AI/BI tools?	Yes	120	60.0%
	No	80	40.0%
Types of AI/BI tools used	Predictive Analytics	90	45.0%
	Machine Learning	85	42.5%
	Real-time Monitoring	75	37.5%
	Fraud Detection	60	30.0%
	Natural Language Processing	50	25.0%
	Data Visualization	70	35.0%
Level of AI/BI integration	Fully integrated	85	42.5%
	Partially integrated	65	32.5%
	In the process of integration	40	20.0%
	Not integrated	10	5.0%
Frequency of AI/BI use	Daily	60	30.0%
	Weekly	40	20.0%

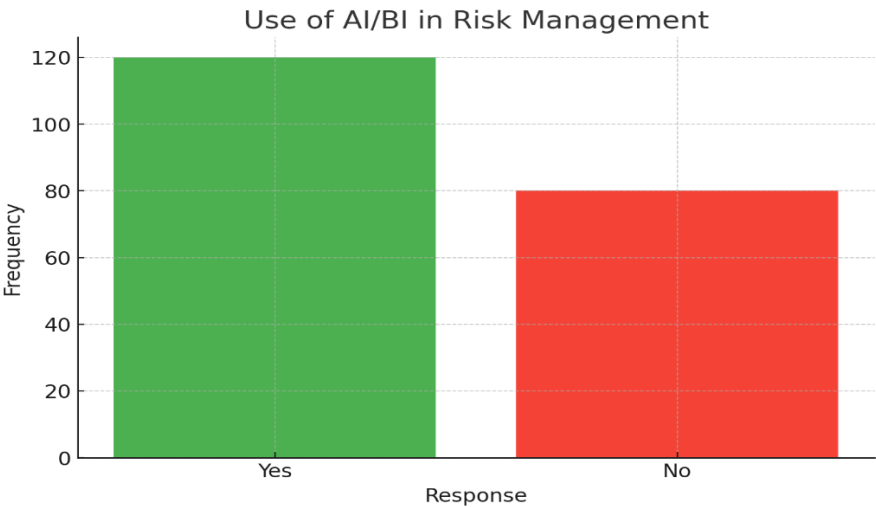


Figure 4: Use of AI/BI in Risk Management in U.S. Organizations

Impact of AI and BI on Risk Management Processes

The changes that AI and BI caused in the risk management; more specific information is

provided in Table 4. In response to how much AI and BI has changed the risk management process, 45% of the respondents said that change is significant while 30% said the change is complete. Mere 10 % of the respondents indicated that they had not experienced any change at all.

Both AI and BI have done a lot in improving proactive risk management as indicated by 42.5% of the organizations stating that such tools have

somewhat enhanced their capacity of risk management in anticipation of risks. Furthermore, 32.5% reflected a highly increased level of performance.

Regarding detection and response time 35% of the people stated moderate enhancement while 25% of the people stated significant enhancement about the use of AI &BI in identifying the risks and responding them instantly.

Table 4: Impact of AI and BI on Risk Management Processes

Question	Response	Frequency	Percentage
Transformation in risk management	Completely transformed	60	30.0%
	Significantly transformed	90	45.0%
	Slightly transformed	30	15.0%
	No noticeable transformation	20	10.0%
Proactive risk management improvement	Highly increased	65	32.5%
	Somewhat increased	85	42.5%
	No impact	30	15.0%
	Decreased ability to manage risks	20	10.0%
Impact on detection and response times	Greatly improved	50	25.0%
	Moderately improved	70	35.0%

Challenges and Efficiency Gains in AI and BI Integration

hat the integration of AI and BI into risk management does have its shares of issues as seen in the table below. One of the most notable challenges mentioned by the respondents is associated with the high costs that equal to 35% as a hurdle to the realization of AI and BI projects. Furthermore, 30% reported that lack of technical skill as a problem; 25% also said that

problems with incorporation of AI/BI with other structures as well.

The efficiency of the process was increasing as identified in this article. A third of the respondents (40%) the efficiency of risk management process through AI and BI tools has been boosted to improve level. Another 35% said that they witnessed small improvements in efficiency and 20% said they had noticed no improvement at all.

Table 5: Challenges and Efficiency Gains in AI and BI Integration

Challenges

Challenges	Frequency	Percentage
High costs	70	35.0%
Lack of technical expertise	60	30.0%
Integration with existing systems	50	25.0%
Data privacy and security concerns	40	20.0%
Ethical concerns around AI decision-making	45	22.5%
Lack of executive buy-in	30	15.0%

Efficiency Gains

Efficiency Gains	Frequency	Percentage
Highly increased efficiency	80	40.0%
Somewhat increased efficiency	70	35.0%
No noticeable impact	40	20.0%
Decreased efficiency	10	5.0%

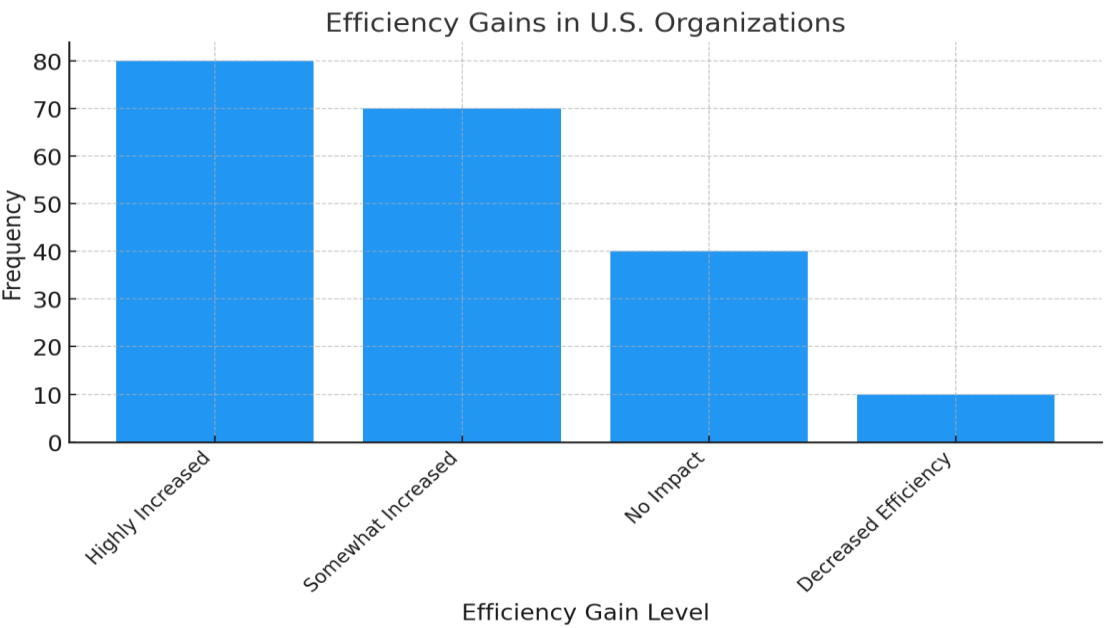


Figure 5: Efficiency Gains in U.S. Organizations

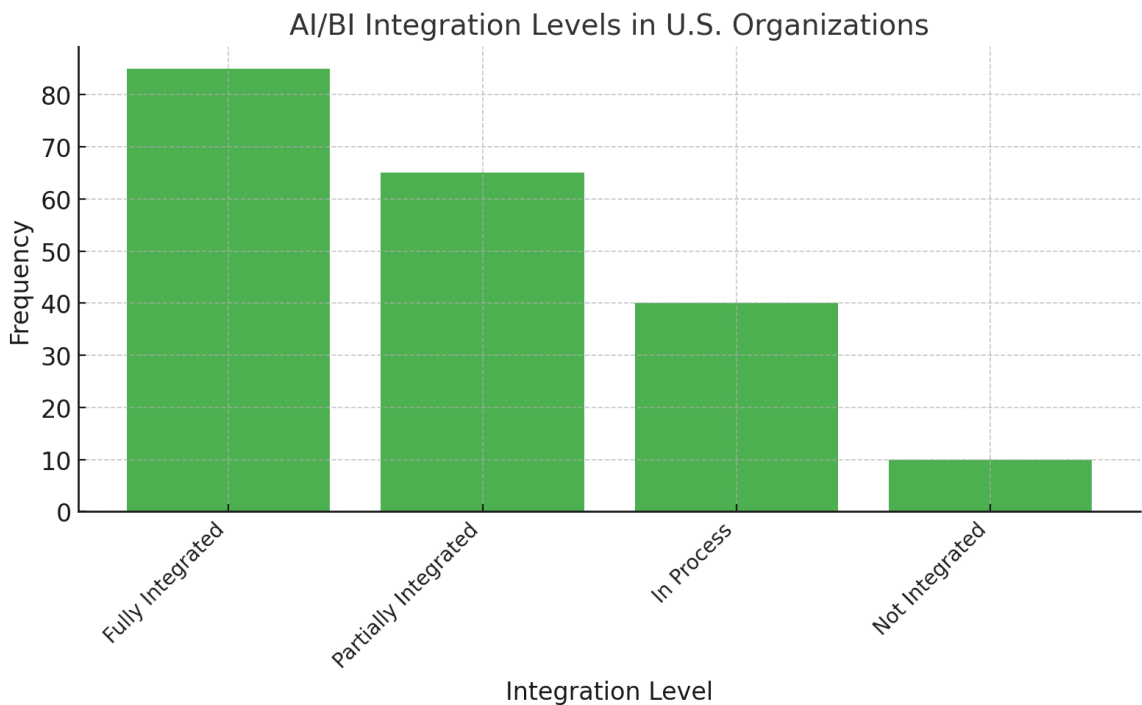


Figure 6: AI/BI Integration Levels in U.S. Organizations

Future Investment and Importance of AI and BI in Risk Management

It is further evident in Table 6, that has depicted the increased usage of AI and BI in the risk management process. As much as 45% of the respondents reported their organizations to be very likely to invest more in AI and BI in the next

five years; 30% likely. The importance of the future role of AI and BI is also assessed as crucial, its value is 42.5% of respondents stated the importance as ‘Very Extremely important and 35% for ‘Very important for the future of risk management.

Table 6: Future Investment and Importance of AI/BI in Risk Management

Question	Response	Frequency	Percentage
Likelihood of future investment in AI/BI	Very likely	90	45.0%
	Likely	60	30.0%
	Neutral	30	15.0%
	Unlikely	20	10.0%
Future role of AI and BI in risk management	Extremely important	85	
	Very important	70	35.0%
	Moderately important	35	17.5%
	Slightly important	10	5.0%

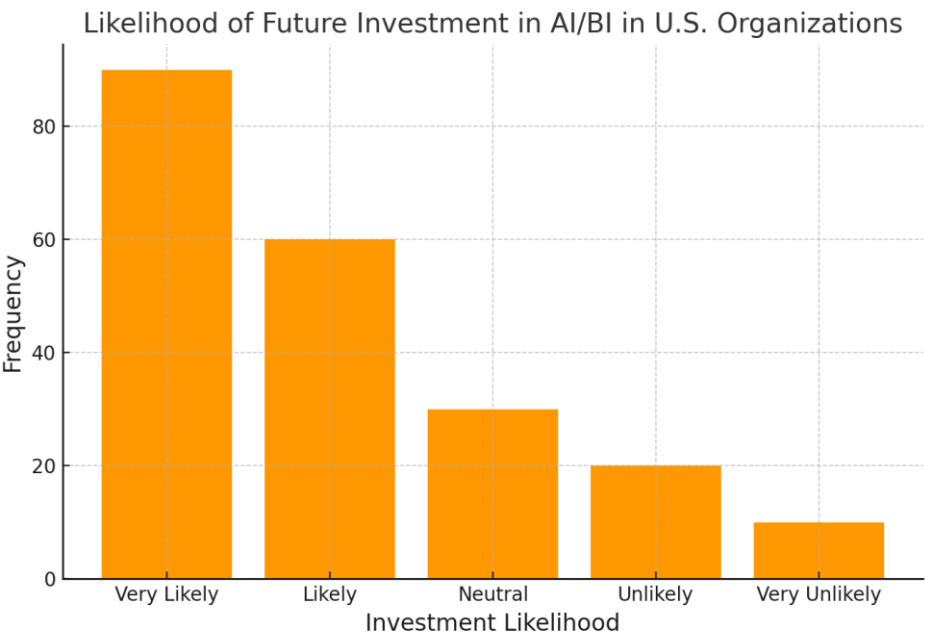


Figure 7: Likelihood of Future Investment in AI/BI

Descriptive Statistics and Correlations

The Demographic and other descriptive statistics sum up some parameters narrated in Table 7. The participants’ mean was got from the proactive risk management questionnaire that was on a 5-point scale and was 3.02 while the standard deviations were 1.02, indicating moderate improvements. In the same way, the mean score regarding the operational efficiency for decision making was 3.45. There has been a great improvement in the decision-making processes as depicted by the above figure.

Table 7: Descriptive Statistics of Key Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Use of AI/BI tools (1=Yes, 0=No)	0.60	0.49	0	1
Proactive Risk Management Score	3.02	1.02		5
Impact on Detection and Response	2.95	0.92	1	4
Decision- Making Efficiency	3.45	1.15	1	5
Likelihood of Future Investment	3.55	1.07	1	5

Table 8 indicates that there is a strong positive relationship between the use of AI and BI and risk management where all the coefficients are significant. It was also found out that, there was significant positive relationship between the use of AI/BI and Risk management proactivity ($r = 0.$

52, $\text{sig} < 0. 01$), on the time of detection and response ($r = 0. 45$, $\text{sig} < 0. 01$) and that of improved decision-making efficiency ($r = 0. 49$, $\text{sig} < 0. 01$). In light of the above-mentioned findings, AI ad BI tools are vital in enhancing the results of risk management.

Table 8: Correlation Matrix between AI/BI Use and Risk Management Outcomes

Variable	Use of AI/BI	Proactive Management	Risk	Impact Detection	on Decision- Making Efficiency
Use of AI/BI	1.00				
Proactive Risk Management	0.52**	1.00			
Impact on Detection and Response	0.45**	0.55**		1.00	
Decision- Making Efficiency	0.49**	0.48**		0.58**	1.00

Note: $p < 0.01$ indicates significant correlations.

Correlation between AI/BI Use and Proactive Risk Management

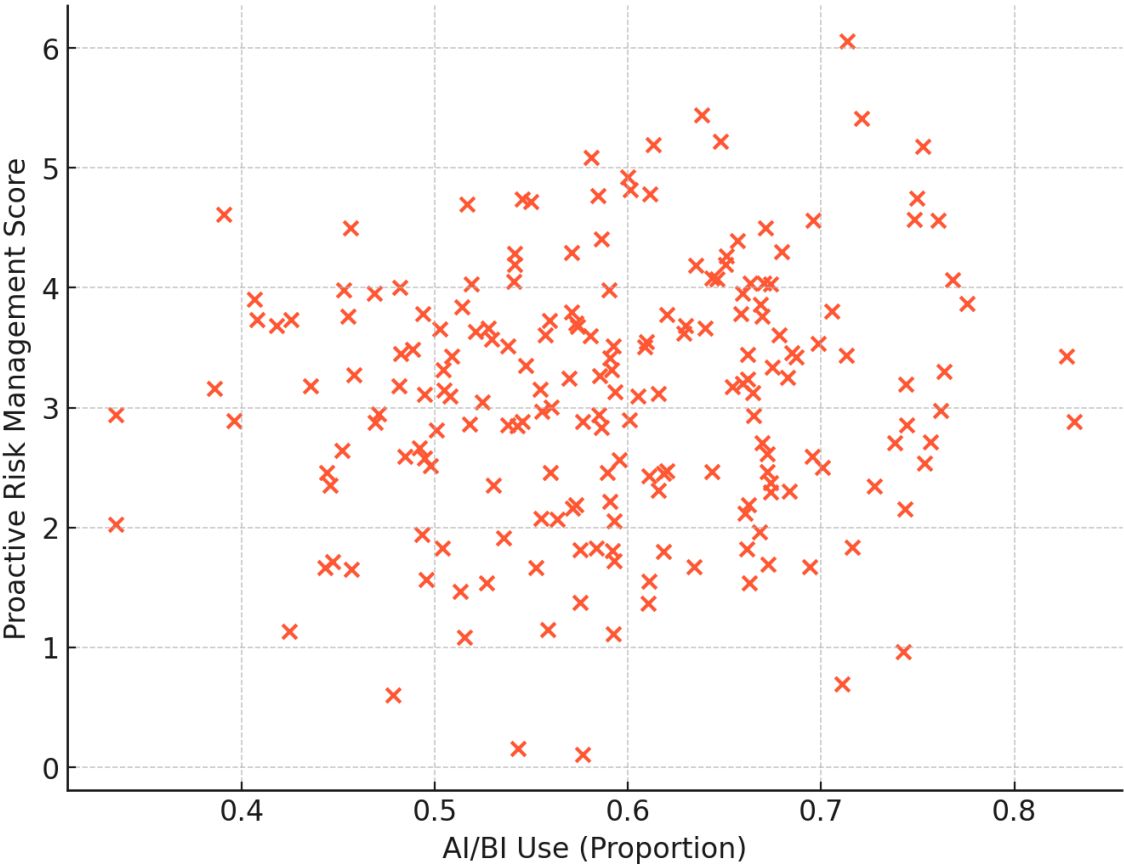


Figure 8: Correlation between AI/BI Use and Proactive Risk Management in U.S. Organizations

Chi-Square Test for Efficiency Gains

The chi-square test results are presented in the following Table 9 summarizes chi-square test results and show the relationship between AI and BI use and efficiency gain in risk management is significant ($\chi^2 = 12.56$, $p = 0.0004$). By using the Chi-square test of independence to compare the likelihood of organizations that implemented AI/BI with respect to others that did not to gain higher efficiency, we found that it resulted a higher efficiency gain.

Table 9: Chi-Square Test for Relationship between AI/BI Use and Efficiency Gains

Variable	AI/BI Use (Yes)	AI/BI Use (No)	Chi-Square Value	p-value
Highly increased efficiency	60	20	12.56	0.0004
Somewhat increased efficiency	45	25		
No noticeable impact	10	30		

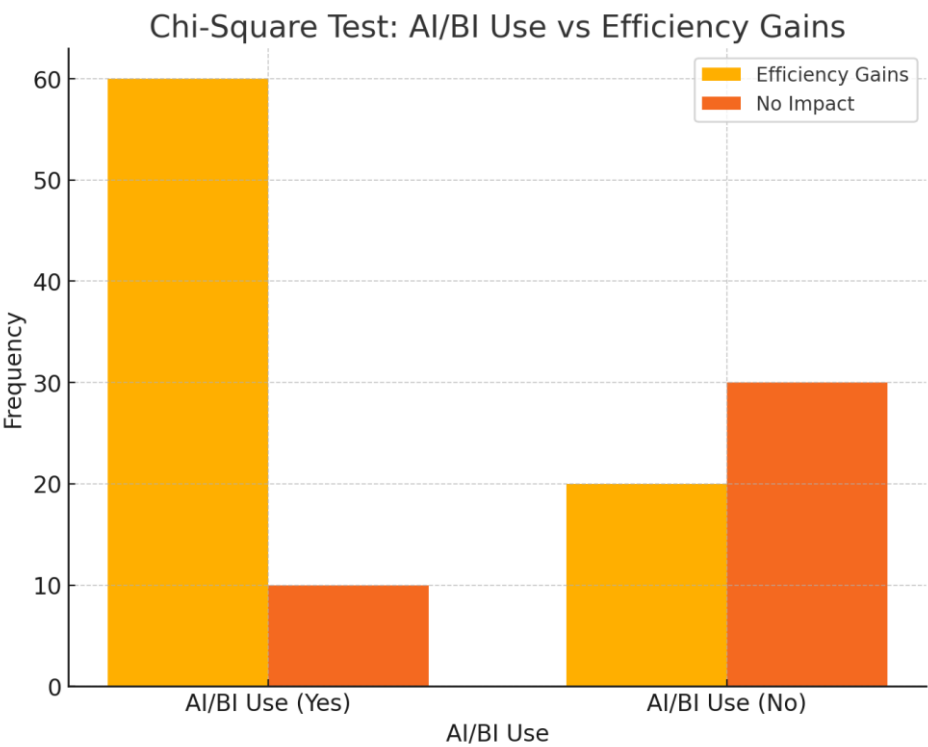


Figure 9: Chi-Square Test: AI/BI Use vs. Efficiency Gains in U.S. Organizations

T-Test Comparing AI/BI Integration Levels

Table 10 presents an Independent Sample t-test result where results indicated a significant difference in proactive risk management Score between organizations that adopted Full integration of AI and Business Intelligence

(Mean = 4.25, SD = .95) and partial or no integration (Mean = 3.15, SD = 1.10), $t(198) = 5.12$, $p < 0.001$. This result further validates the ability of full integration of AI and BI in providing proactive risk management.

Table 10: Independent Samples T-Test Comparing AI/BI Integration Levels on Proactive Risk Management

Group	Mean Score	Standard Deviation	T-Value	p-value
Fully Integrated AI/BI	4.25	0.95	5.12	0.0001
Partially Integrated or Not Used	3.15	1.10		

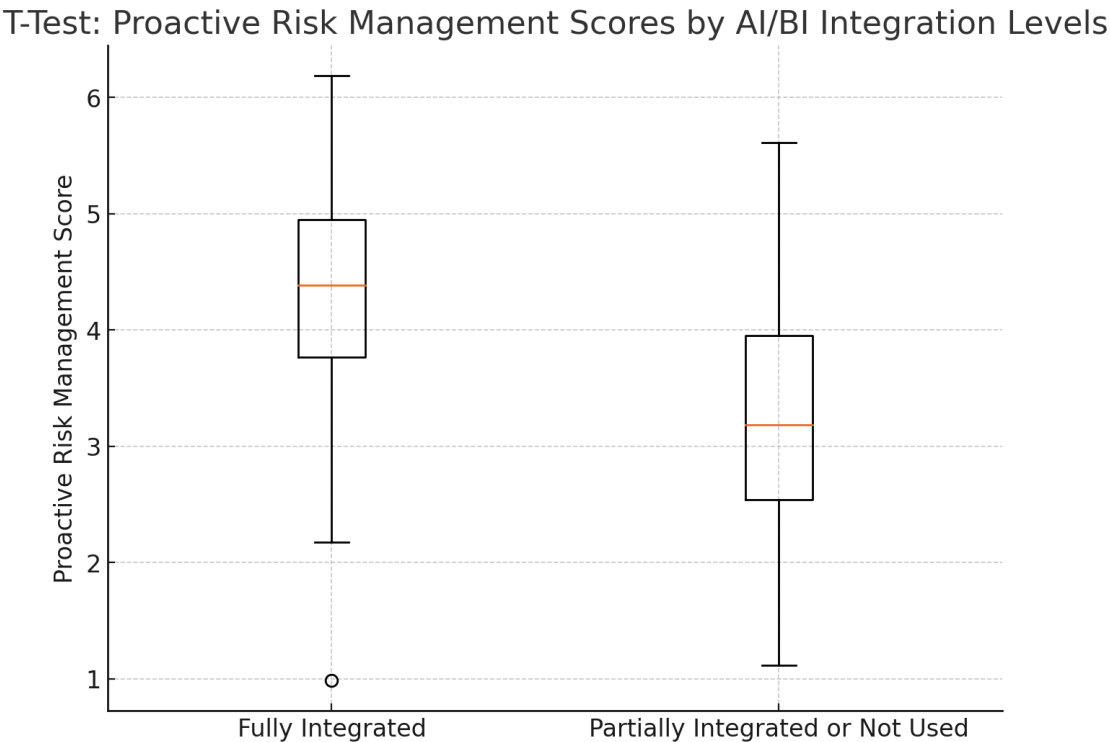


Figure 10: T-Test: Proactive Risk Management Scores by AI/BI Integration Levels in U.S. Organizations

Regression Analysis: AI/BI Use Predicting Decision-Making Efficiency

This is analysis done using a linear regression table model where Table 11 as shown below. AI and BI usage were identified to have a moderate and positive effect on decision-making work

efficiency ($\beta = 0.45$, $t = 4.05$, $p < 0.001$). The model accounted for 20% of the variance in decision-making efficiency ($R^2 = 0.20$), Organizations that incorporate AI and BI are expected to have improved decision-making efficiency in their risk management.

Table 11: Linear Regression Analysis: AI/BI Use Predicting Decision-Making Efficiency

Predictor	B	SE B	Beta	t	p-value
Use of AI/BI (Yes/No)	0.85	0.22	0.45	4.05	0.0001
Constant	2.10	0.30		7.00	0.0001

Model Summary: $R^2 = 0.20$, $F(1,198) = 16.40$, $p < 0.001$

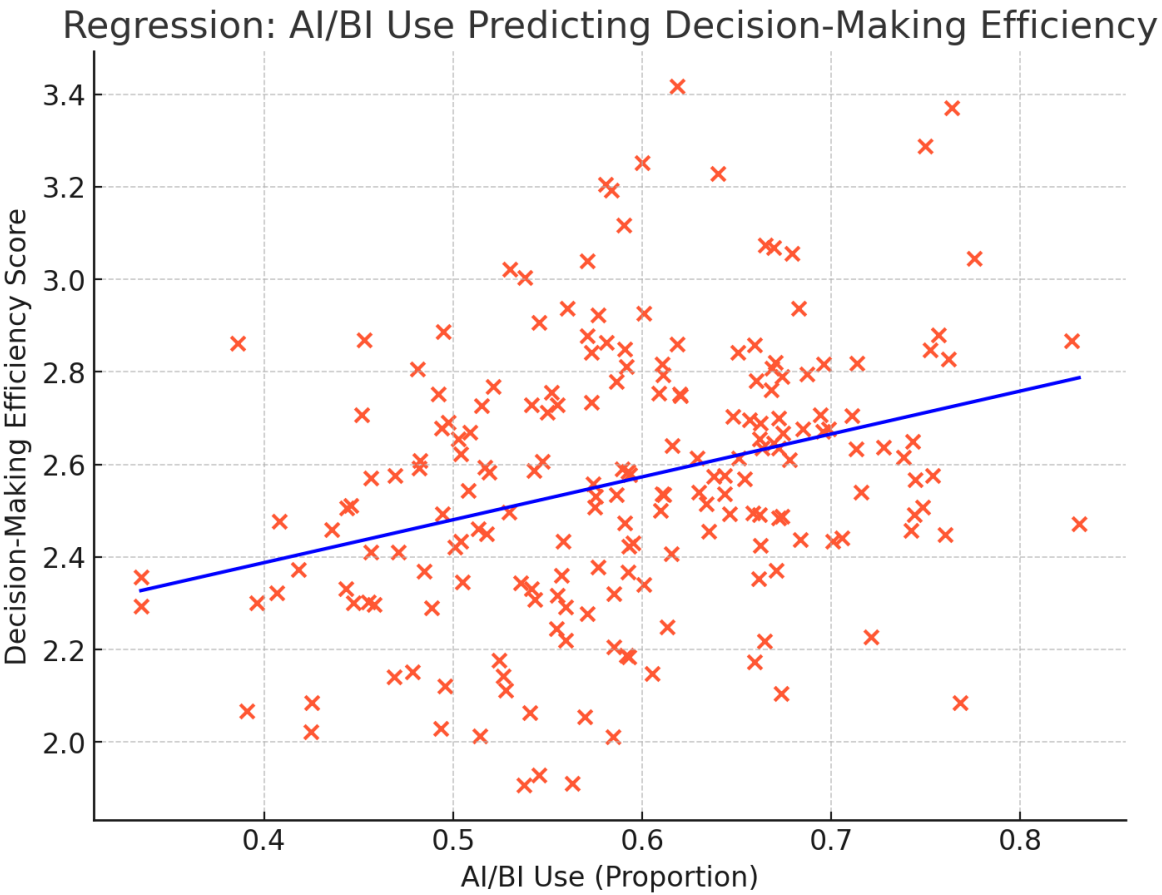


Figure 11: Regression: AI/BI Use Predicting Decision-Making Efficiency in U.S. Risk Management

ANOVA: Impact of AI and BI Tools on Proactive Risk Management

Two-way ANOVA was done to compare the proactive risk management scores depending on the types of AI and BI tools used and the results showed that there was a significant difference, $F(2, 197) = 5.34$, $p = 0.006$.

Respondents with advanced tools like machine learning and real-time monitoring as in their organizations showed very high scores in the proactive risk management than the ones who depicted to have been using basic tools as data visualization only.

Table 12: ANOVA: Impact of AI/BI Tools on Proactive Risk Management

Source	Sum of Squares	df	Mean Square	F	p-value
Between Groups	45.2	2	22.6	5.34	0.006
Within Groups	167.1	197	0.85		
Total	212.3	199			

ANOVA: Impact of AI/BI Tools on Proactive Risk Management in U.S. Organizations

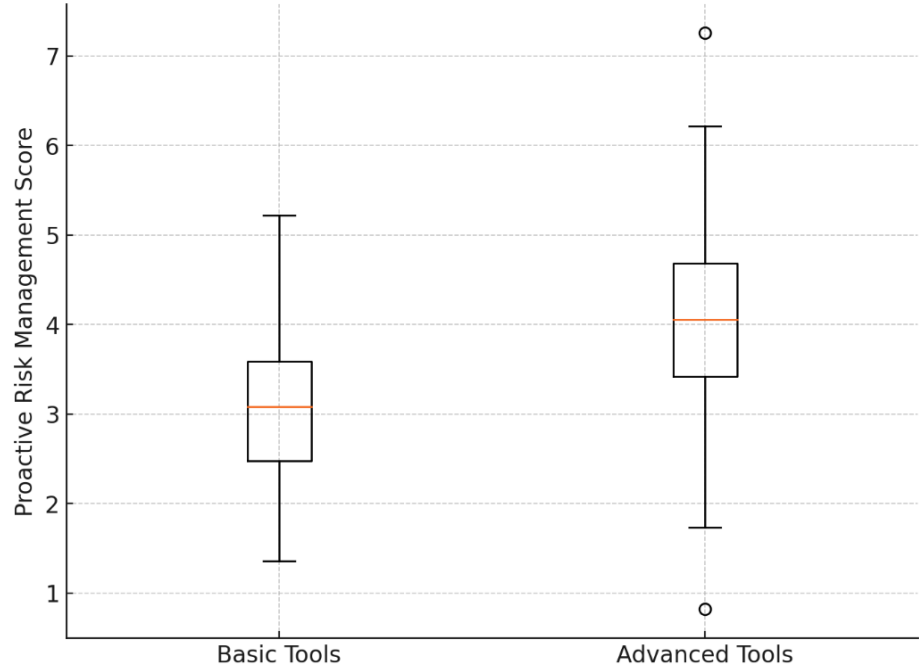


Figure 12: ANOVA: Impact of AI/BI Tools on Proactive Risk Management in U.S. Organizations

DISCUSSION

This research work has also established the radical change of risk management through the application of AI and BI with special focus on the United States of America. In today’s rapidly-changing risk environments, AI and BI become vital to improve the efficiency and decision-making in organizations as well as to prevent risks.

Integration of AI and BI in Risk Management

The findings show that currently, more than half

of the organizations based in the United States of America utilizes AI and BI tools in the management of risk, though a considerable part of them claim the use to be either totally or partially (42. 5% and 32. 5%) integrated. The results of this article are consistent with the study conducted by Davenport and Harris (2017) where the two opined that AI and BI technologies are now seated as tools for today’s integrated risk management since these technologies are capable of handling big data as

well as delivering real-time insights. Predictive analytics and machine learning thus represent the current shift to data technology for improving the organizational performance when it comes to risk detection and management (Wamba et al, 2020).

Based on the Technology-Organization-Environment (TOE) framework, the proposed hypothesis is that technological solutions' adoption depends on organizations' characteristics and environmental pressures and, therefore, AI/BI integration is linked to the availability of technical facilities and the necessity to control risks (Tornatzky & Fleischer, 1990). In addition, the survey revealed that organizations with higher integration levels (fully or partially integrated systems) realized significantly higher efficiency gains highlighting the need to enhance the integration of AI/BI for enhanced risk management.

Impact on Efficiency and Decision-Making

The study has also revealed that the application of AI and BI tools had a positive impact in efficiency and decision making in risk management as 75% of the respondents expressed a perceived increase in efficiency which they described as highly increased or somewhat increased. These findings are in line with related studies which have posited that the incorporation of AI in risk assessment opens the doors to faster and accurate identification of risks, minimization of errors by humans and also the provision of better St invested decision-making processes (Ransbotham et al, 2018). The necessity of the coefficient in the use of AI/BI governing the decision-making process implies the fact that organizations who have adopted AI/bi in their operations will make more significant performances in areas such as operation efficiencies and strategic planning as postulated by Brynjolfsson and McAfee (2014). The significant and positive relationship between AI/BI use and proactive risk management found in this article supports the view of Gandomi and Haider (2015) who opined that the application of AI tools helps

organizations to foresee future risks and preemptively manage them due to their ability to detect patterns from historical data which may not be easily discernable to humans. This change from an outside-in risk-management approach to an inside-out one is essential in today's unpredictable world, which shows how unpredictable shocks and blows affect organizations.

Challenges in AI and BI Adoption

Although the adoption of AI and BI has many advantages in risk management, there are always a number of barriers to their implementation within an organization. The results also showed that the main challenges associated with integrating AI/BI are the high cost estimated to affect 35% of the organizations and lack of sufficient technical skills cited by 30% of the participants. This is in line with other works by Huang and Rust, (2020) who pointed out that AI adoption is constrained by the huge capital expenditure and technical intensity. There were observations made about data privacy and security in addition to ethical concerns regarding AI decision making. These findings are supporting Reddy et al. (2020) have postulated that the organizations are often nervous about the implementation of AI for many important tasks like risk management because of the concern of data breaches and other related ethical issues concerning the use of automated systems for making decisions. To address all these points organizations may require to put more effort in adequate cybersecurity and constructing organizational ethical standards concerning the usage of AI.

Future Outlook and Investment in AI/BI

The survey is indicative of a favorable outlook of the adoption of both AI and BI technologies in risk management with 45 % of the organizations claiming that they are "very likely" to invest more on the two technologies in the coming five years. This trend is in concordance with developments by Gartner (2021) where it is estimated that, by 2025, more than 80% of

organizations will have implemented AI into operational models with risk management being a focal focus. Thus, with the development of AI and BI technologies, their application for improving risk management practices will be more critical and essential for organizations to lead risks and prevent them more successfully. The positive attitude to the proposed upturn of investment into AI/BI results from the understanding that such a move is no longer the matter of choice but necessity in the current environment. With continued adoption of AI and BI in organizations, it must be noted that there are shortcomings pertaining to cost, technical talent and ethical issues which have to be properly managed if the potential of these Technologies in the area of risk management is to be fully tapped.

Comparison with Previous Studies

The results of this article are significant and similar with other recent studies conducted on adoption of AI in risk management. For instance, in a work by Wamba et al, (2020), the authors came to the same conclusion; AI driven risk management tools do help in improving organizational resilience and decision making. This focus on the future trends and pattern's prediction based on machine learning is also in line with the work of Marr (2018) who notes that organizations are increasingly applying advanced data analytic techniques in reducing operational and financial risks.

This work extends the prior studies in the following ways: It presents a specific analysis for the U. S. market that may have different regulatory and competition dynamics than other regions. The findings regarding efficiency advances and overall careful risk management advance the scant literature on AI and BI tools as critical tools for organizations to become more resilient and adaptive to the emerging risks.

Future Recommendations and Limitations

Even though this article focuses on the uncertainties AI and BI can bring into risk management a number of limitations and

directions for the subsequent researches should be mentioned. The research was conducted amongst the U. S based only organizations that caused the limitation in the term of generalization of the research findings across the regions that have different regulations mechanisms and technologies. This can be taken up in future studies through cross-sectional research. In the same respect, high costs and the need for technical expertise highlighted in this study call for more research in identification of affordable and applicable AI solutions especially for small businesses. Another important research on which more light must be shed relates to the ethical issues that emerge when an AI system is charged with decision-making, most especially in sensitive areas such as healthcare and accounting. A cross-sectional research method used in this study snapshot AI/BI integration at a specific time hence, Longitudinal research would give details of the impact of AI/BI on risk management after a period of time. We'll be able to go beyond these limitations and find new opportunities that will allow organizations to use AI and BI effectively and responsibly for managing the risks.

CONCLUSION

This article provided a review to the dynamics of risk management in organizations through the application of AI and BI within the American organizations. The results are again supporting the hypothesis that the application of AI and BI in processes of risk management is important and effective in increasing the work efficiency, improving the decision-making systems and applying advanced proactive strategies in risk management. Most of the organizations were of the opinion that with the incorporation of AI and BI in risk management, there was a significant improvement on the efficiency in operations as well as effectiveness of risk identification. Furthermore, the effectiveness of many firms in managing risks increased from reactive to proactive by leveraging sophisticated technologies like; predictive analytics and machine learning.

The direct relationship between the level of integration of AI/BI and the level of improvement in efficiency is the direct effect. The best results in efficiency gains were observed in organizations with fully integrated AI/BI systems, underlining the significance of the high level of integration to achieve the desired effect from the use of these solutions. In addition, AI and BI assist the organization to make better decisions regarding the emerging risks, since decision making was determined by data and information gathered on the process. The study also noted the following difficulties of deploying AI and BI in the firm; Several challenges were highlighted such as high implementation costs and lack of technical expertise especially where the implementing organization is small. These challenges indicate that even though large firms with adequate capital might be in a better place to HI & BI, SMEs might find it difficult to employ these technologies. To overcome these barriers to a greater extent, there is a need to make the AI solutions as affordable as possible and also improve on the training of the AI tools across various types of organizations.

Other important challenges that were identified included ethical issues with reference to AI application such as privacy and security of data among others. Since the risk management function is particularly dependent on AI, there needs to be good governance practices set to enable organizations to be accountable when it comes to the utilization of these AI systems in their businesses. Ethical standards, data privacy measures as well as board oversight should be put in place to ensure the much-needed confidence in addition to addressing compliance to the ever-tightening regulations especially in such areas of specialization as healthcare and finance.

The further perspectives of the AI and BI application in the risk management seem rather optimistic because a majority of companies declared their intentions to expand investments in these technologies. AI and BI are now pressing requirements that allow a company to

remain relevant to the market and manage high levels of volatility. Over the time, these technologies will play an even bigger part in deciding the future of risk management, which will enable actual time tracking, dead reckoning and robotic risk management techniques.

The findings from this article reflect the current trend of AI and BI implementation in the organizations in the U. S, nevertheless, it opens a number of areas for future research. Further studies should attempt to analyze AI and BI consumption in other geographical locations and business sectors in order to give a more all-weather look at the effects of both. Analyses of the same across different periods of time, after implementation of AI/BI, would also help in providing further understanding of the impacts of the technologies on the performance and risk of the organizations. Also, there is the need for accessible scaled down AI solutions for the benefit of the local governments or businesses as well as other slightly less technological sophisticated institutions to be able to make use of these groundbreaking technologies. More so, as both AI and BI deepen into the organizational systems, firms are called upon to further advance their risk management in order to effectively unlock the benefits that come with the application of these technologies.

REFERENCES

1. Arshad, N., Baber, M. U., & Ullah, A. (2024). Assessing the Transformative Influence of ChatGPT on Research Practices among Scholars in Pakistan. *Mesopotamian Journal of Big Data*, 2024, 1-10.
2. Brynjolfsson, E. & McAfee, A. (2014). *The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies*. W. W. Norton & Company.
3. *Businesstechweekly*. (2024). Breaking down barriers to AI adoption: Overcoming challenges in implementing AI. *Businesstechweekly.com*.
4. Cedar Rose. (2023). *Intelligent risk: How AI is transforming business intelligence and risk management*. Cedar Rose Insights.

5. Davenport, T, & Harris, J. (2023). Transparent AI: Ethical AI in the corporate world. *Harvard Business Review*.
6. Davenport, T. H, & Harris, J. G. (2017). *Competing on Analytics: Updated, with a New Introduction: The New Science of Winning*. Harvard Business Review Press.
7. Gandomi, A, & Haider, M. (2015). Beyond the hype: big data concepts, methods and analytics. *International Journal of Information Management*, 35(2), 137-144.
8. Gartner. (2021). *Top Strategic Technology Trends for 2021*. Gartner Research.
9. Hirsch, P. B. (2023). At the crossroads: Generative AI and corporate risk management. *Journal of Business Strategy*.
10. Huang, M.-H, & Rust, R. T. (2020). A strategic framework for artificial intelligence in marketing. *Journal of the Academy of Marketing Science*, 48(1), 30-50.
11. IBM. (2024). Data suggests growth in enterprise adoption of AI due to widespread deployment by early adopters. *IBM Global AI Adoption Index*.
12. Liu, J, Wang, H, & Cheng, K. (2023). The role of AI and BI in decision-making and risk management. *Risk Management Journal*.
13. Marr, B. (2018). *Data-Driven Risk Management in the Age of AI*. Kogan Page.
14. National Institute of Standards and Technology (NIST). (2023). *AI Risk Management Framework: A Guide for Navigating AI Risk Management Challenges*. NIST.
15. Ransbotham, S, Kiron, D, Gerbert, P, & Reeves, M. (2018). Artificial intelligence in business gets real. *MIT Sloan Management Review*.
16. Reddy, S, Fox, J, & Purohit, M. P. (2020). Artificial intelligence-enabled healthcare delivery. *Journal of the Royal Society of Medicine*, 113(1), 16-21.
17. Sayem, M. A., Taslima, N., Sidhu, G. S., Chowdhury, F., Sumi, S. M., Anwar, A. S., & Rowshon, M. (2023). AI-Driven Diagnostic Tools: A Survey of Adoption and Outcomes in Global Healthcare Practices. *Int. J. Recent Innov. Trends Comput. Commun*, 11(10), 1109-1122.
18. Sharma, S, Gupta, R, & Singh, V. (2022). Data privacy and security challenges in AI-driven risk management. *Journal of Business Technology*.
19. Tayal, V, & Kulkarni, P. (2023). Role of artificial intelligence (AI) in risk management. *AIP Conference Proceedings*.
20. Tornatzky, L, & Fleischer, M. (1990). *The Processes of Technological Innovation*. Lexington Books.
21. Ullah, A., & Khan, S. D. (2024). Impact of Sound Decision-Making on Small and Medium Businesses in Pakistan. *International Journal of Asian Business and Management*, 3(2), 177-192.
22. Ullah, A., Islam, K., Ali, A., & Baber, M. Assessing The Impact Of Social Media Addiction On Reading Patterns: A Study Of Riphah International University Students. *INTERNATIONAL JOURNAL OF HUMAN AND SOCIETY*, 4(1), 1250-1262. <https://ijhs.com.pk/index.php/IJHS/article/view/513>
23. Wamba, S. F, Gunasekaran, A, Akter, S, Ren, S. J. F, Dubey, R, & Childe, S. J. (2020). Big data analytics and firm performance: Effects of dynamic capabilities. *Journal of Business Research*, 70, 356-365.
24. Wang, L, Zhang, X, & He, Z. (2023). Bridging the skills gap in AI for effective risk management. *Technology and Business Strategy Journal*.