The Role of Ai in Transfor9ming Smes: Opportunities and Challenges

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Abstract: Artificial Intelligence (AI) systems assist in enhancing data analysis with meaningful insights and promote real-time decision construction that implements blockchain technology in data security. This factor guides SMEs in managing big data by usage of predictive analysis and algorithms in reducing operational complexity in the USA. There are 33.2 million SMEs in the US and contribute 50% of the overall GDP in this country as per the 2023 report [1]. The application of AI and automation technology leads to improved work distribution and enhanced overall performance in handling the SME's services. This factor encouraged operational facilities to use the real-time tracking system and promote the level of the smart manufacturing process. The primary research used 101 participants to conduct a survey on SME employees for the transformation of SMEs with AI in analyzing opportunities and challenges. This analysis reflects that most of the employees felt encouraged to adopt AI and blockchain in expanding the overall productivity of USA SMEs.

Keywords: AI, Technology, Blockchain, SMEs and USA.

1. INTRODUCTION

The province Intelligence enhances workforce engagement with the evaluation of different departments such as HR, finance, and operational processes in expanding digitalization among SMEs. This factor helps in developing managerial decisions and increases the usage of operational resources in delivering effective services for its customers with the assistance of chatbots.
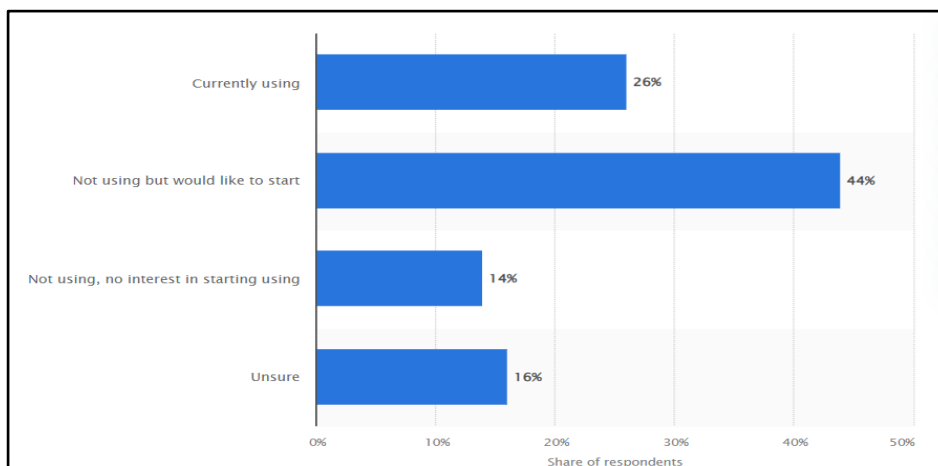

Figure. 1: USA SME's investment in AI and automation technology

(Source: Faria, 2023)

 The above figure shows that 26% of US SMEs are 26% use AI to enhance their overall performance through real-time tracking within a short period and in-depth surrounding analysis. On the contrary, 44% of SMEs are interested in the application of automation to increase operational flexibility in offering efficient services to US consumers [2]. This factor reflects the manager and employees felt encouraged by the usage of real-time

performance data and enhanced employee satisfaction positively. The research study has the aim of "identifying the role of AI in transforming SMEs through analysis of challenges and opportunities".

Challenges: The operational process of SMEs faced operational difficulties in utilizing effective knowledge and resources in adapting AI technology due to the absence of digital literacy. This factor focused on the absence of a clear understanding of utilizing predictive analysis in AI and affected overall production performance negatively. The digital literacy analysis of the USA reflected that around 24% of people faced difficulty in executing automation systems and increased operational complexity in technology adaptation [3]. This factor portrayed data security issues faced by SMEs as the impact of insufficient AI adaptation plans and generated difficulties in the decision-making process.

Opportunities: The annual growth rate of AI demand shows the prediction of a 14.27% increase and a market volume of $237 billion by 2023 [4]. This factor indicates that the usage of AI encouraged USA SMEs to expand the quality of digitalization with effective technological resources and promoted service reach toward customers. The real-time insights of customers assist in enhancing the recommendation with the help of predictive algorithms to promote overall sales performance positively.

2. LITERATURE REVIEW

According to [5], SMEs are considered the key force of economic growth and employment. SMEs became vulnerable after the outbreak of covid-19 pandemic in 2020 and they have been facing greater uncertainties and challenges compared to large organisations. Governments have initiated mitigation measures such as providing wage support, subsidies, and loans. However, the financial difficulties of the SMEs could not be improved. As per [6], the sudden increase in digital and AI technology has enhanced innovation in products, processes, and services. AI has a significant role in transformation and it is an advanced technology of almost accurate prediction. Machine learning, NLP ("Natural Language Processing"), and deep learning are included in the application of Artificial Intelligence. One of the major advantages of implementing AI is enhanced productivity and efficiency. By using the power of this technology such as ML and automation, SMEs in the US can streamline their business operations and their overall performances. The usage of natural processing language leads to simplifying the activities of SMEs with technological advancement effectively.

The US inflation is 3.4% which affects the financial decisions of businesses and causes difficulties in AI adoption [7]. This factor guides to promotion of uncertainty in digitalisation with effective resources and raises high operational costs in handling business services. However, the managerial process of AI leads to enabling changes in business models and practices that contribute to scaling up operational productivity. This factor promoted automated repetitive and multiple-tasking facilities by using technological resources with the help of real-time assistance.

3. METHODOLOGY

The combination of blockchain and artificial intelligence has been found along with its impact on the SME's revenue growth. For this study, the positivist research philosophy has been chosen. This philosophy is involved in containing knowledge that can be obtained through objective measurements and observations. In addition to this, the inductive research approach has been selected for this. It has been defined as a process that has been engaged through the development of generalisations or theories on the basis of data observation. For this study, the exploratory research design has been chosen. This has been considered as a method that is involved in finding out the AI issues within the SME industry of the US [9]. Within the part of data collection and analysis primary quantitative data analysis has been selected for the study. Referring to these types there 10 questionnaires were developed in selecting 101 participants who belonged from different SMEs in the US.

4. RESULTS AND DISCUSSION

Are you working in US SMEs or not?
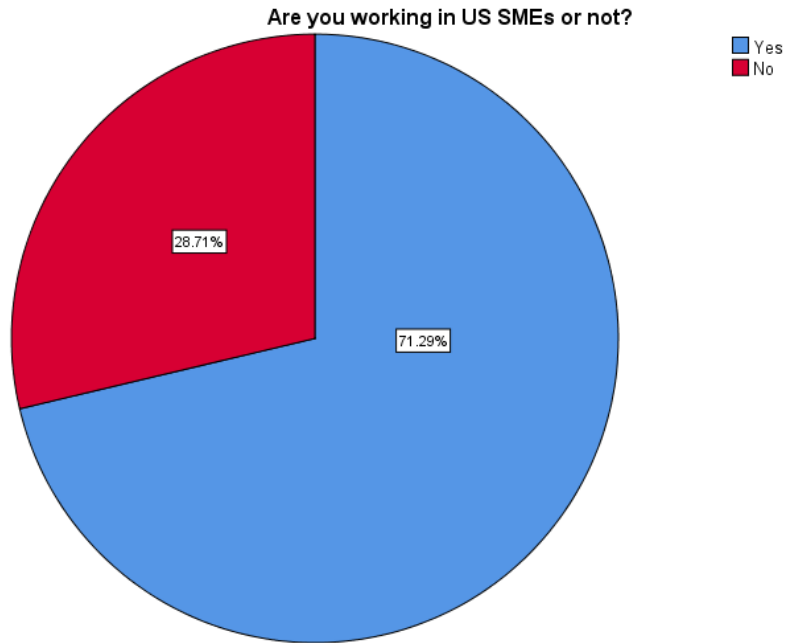

In reference to the first question, 71.2% of participants have been selected who are working in the SME sector of the US.

**How many years of SMEs working experience do you have?**
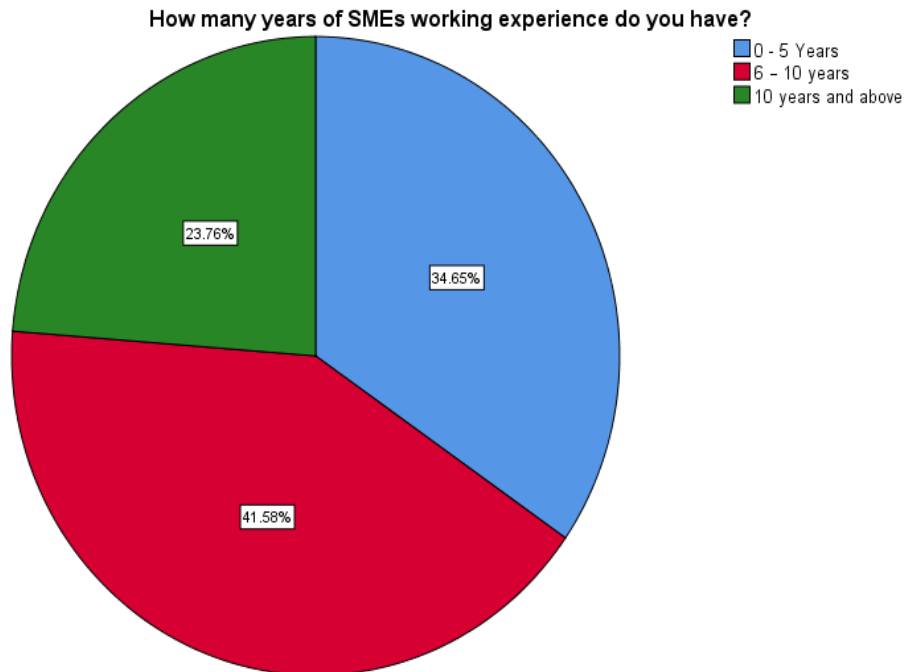
In the second question, there are 41.58% of participants who are working for 6-10 years in various sectors of US SMEs. Also, there are around 23.76% of participants who have 10 or more years of SME experience.

Do you agree that AI has transformed the small and medium sectors of USA?
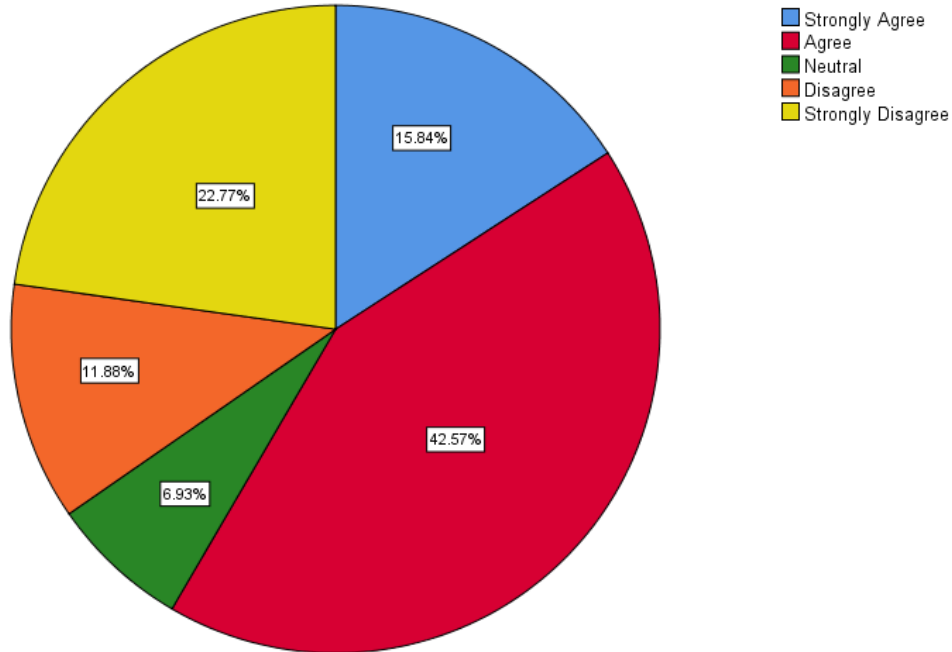
Within question 3, 42.57% of participants agreed that artificial intelligence can bring transformation among US SMEs. Contrasting to this there are also 22.77% of respondents who strongly disagreed upon this statement.

In adopting of AI, SMEs have faced challenges due to its limited resources. Agree or not
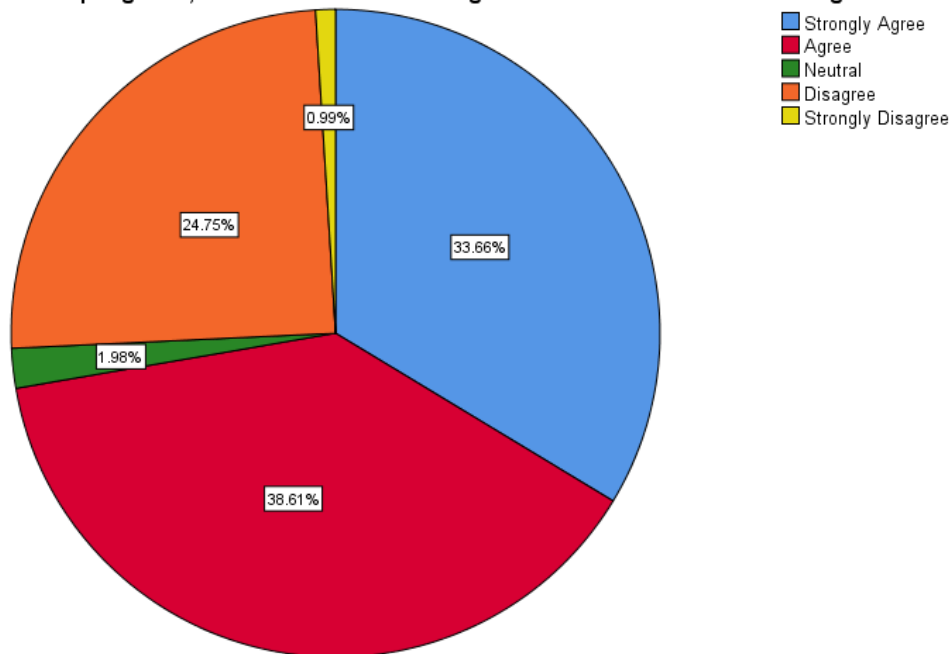
In question 4, 38.61% of respondents answered that there are lots of challenges faced by US SMEs for AI adaptation.

AI can develop the productivity of SMEs. Agree or not
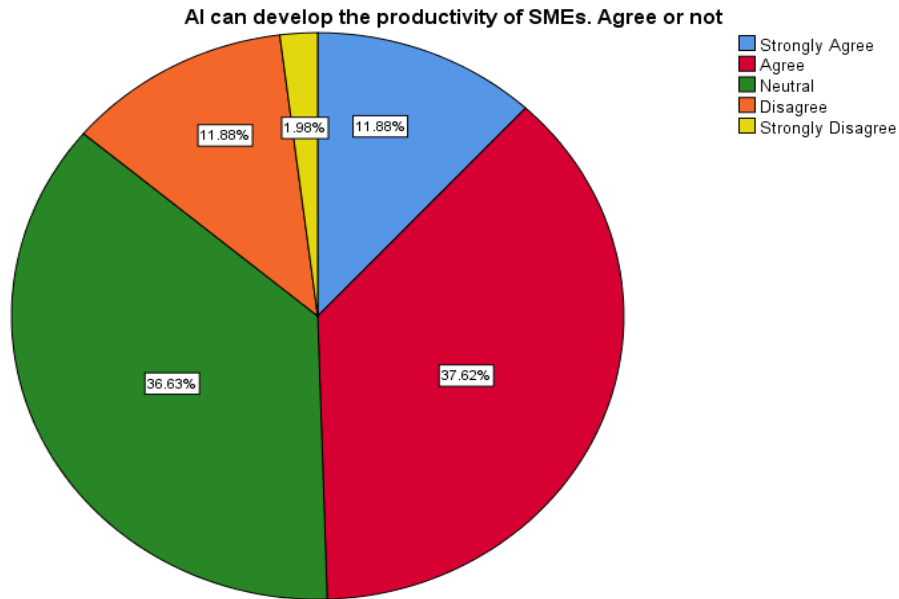
After agreeing that AI could help SMEs, approximately 37.62% of participants have agreed while 36.63% of participants also stay neutral.

Through training and upskilling of employees SMEs can maximized the AI's benefit. Agree or not

Cognitive biases might be unclouded through AI application. Agree or not
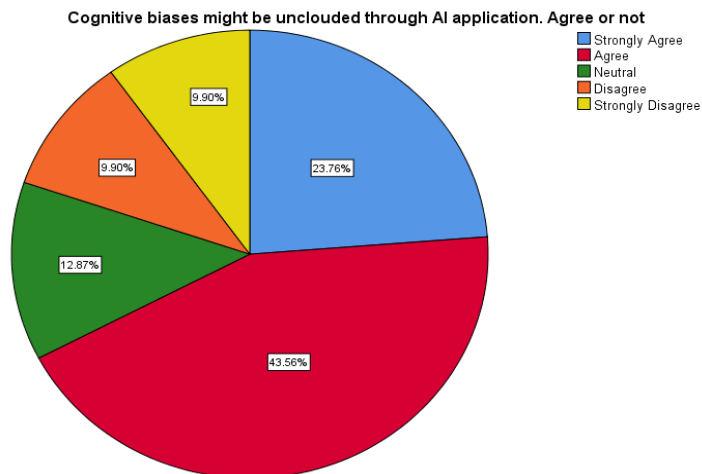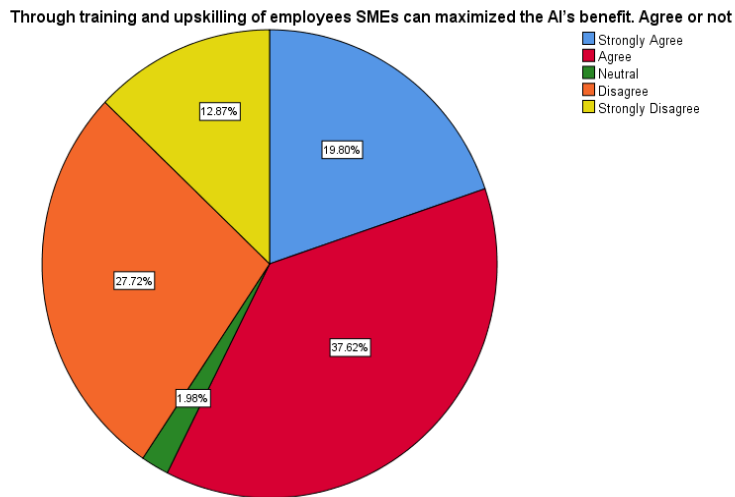
In considering the responses to questions 6 and 7, 37.62% of respondents have agreed that through training and employee upskilling US SMEs can adopt the use of artificial skills more actively. Additionally, 43.56% of participants have agreed that through use of AI can create cognitive biases. There are also 23.76% of participants who strongly agreed upon this.

According BLS, there are more than 50% small business has rejected AI IN US in 2023. Agree or not
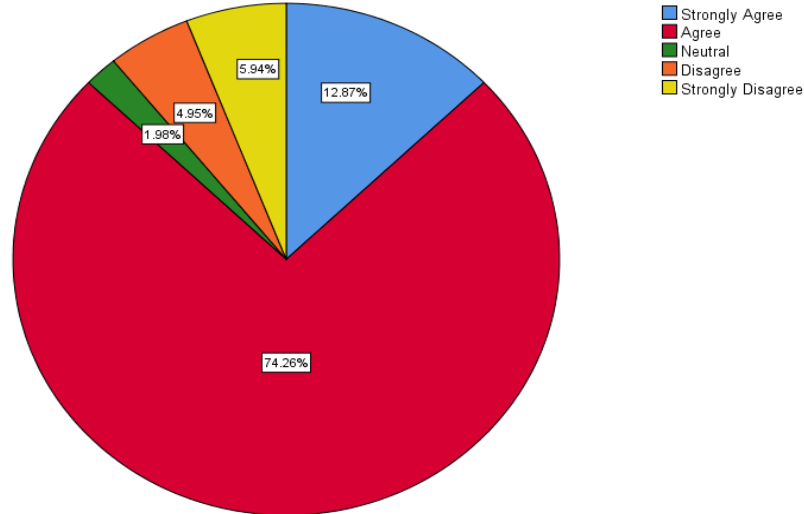
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

In considering BLS data 74.26% of participants have reported about this 50% reduction of AI adaptation from US SMEs which shows a fifth-year stable deduction.

AI adaptation in SMEs is more challenging than MNCs in US. Agree or not

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
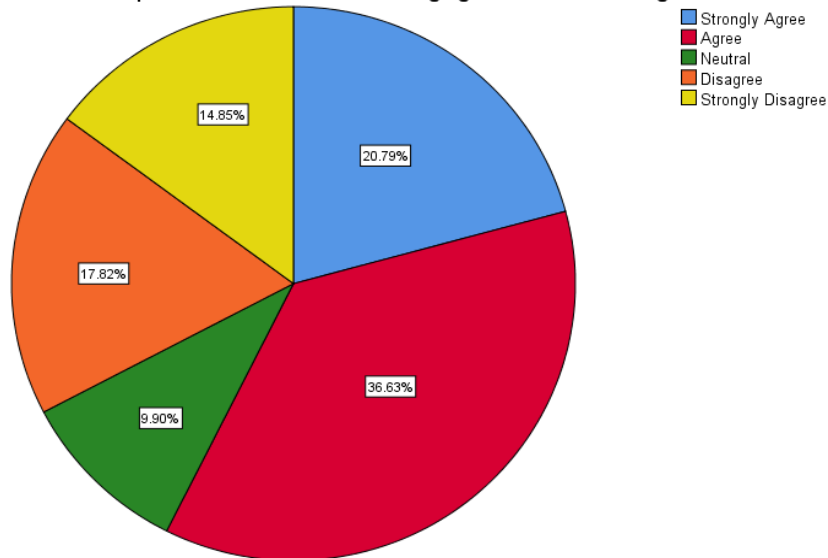
From the above graph, it has been shown about the challenges of AI adaptation where 36.63% of participants have agreed on this. In contrast to this 14.85% of participants also strongly disagreed about this statement.

Could AI be considered as game changer in SMEs business?

Legend:
- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Pie chart values: 20.79%, 34.65%, 5.94%, 23.76%, 14.85%
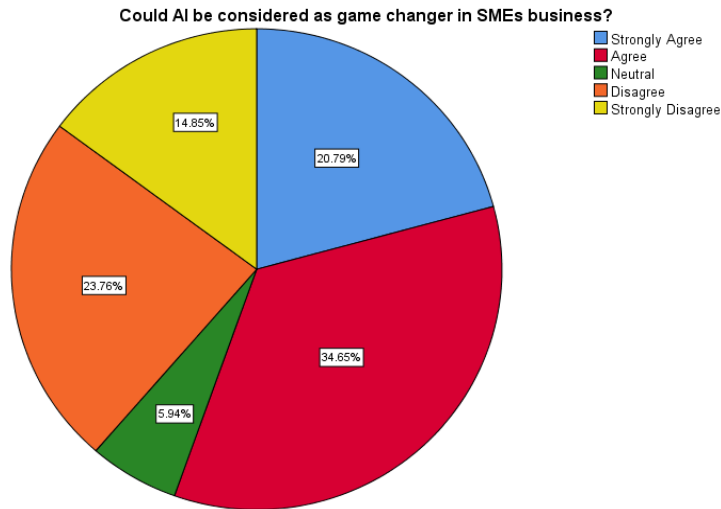
In the last question, 34.65% of respondents agreed that this AI could be a game-changer for transforming the small and medium sectors of the United States of America. Due to the present failure 14.65% also strongly disagreed with this fact.

Correlations

		Are you working in US SMEs or not?	How many years of SMEs working experience do you have?	Do you agree that AI has transformed the small and medium sectors of USA?	In adopting of AI, SMEs have faced challenges due to its limited resources. Agree or not	AI can develop the productivity of SMEs. Agree or not	Through training and upskilling of employees SMEs can maximized the AI's benefit. Agree or not	Cognitive biases might be unclouded through AI application. Agree or not	According BLS, there are more than 50% small business has rejected AI IN US in 2023. Agree or not	AI adaptation in SMEs is more challenging than MNCs in US. Agree or not	Could AI be considered as game changer in SMEs business?
Are you working in US SMEs or not?	Pearson Correlation	1	.786**	.867**	.908**	.697**	.775**	.853**	.595**	.845**	.791**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000
	Sum of Squares and Cross-products	20.673	27.158	56.881	48.970	29.208	48.891	47.802	25.119	52.901	50.604
	Covariance	.207	.272	.569	.490	.292	.489	.478	.251	.529	.506
	N	101	101	101	101	101	101	101	101	101	101
How many years of SMEs working experience do you have?	Pearson Correlation	.786**	1	.877**	.946**	.827**	.848**	.878**	.636**	.875**	.865**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000
	Sum of Squares and Cross-products	27.158	57.802	96.149	85.287	57.990	89.386	82.248	44.851	91.624	92.495
	Covariance	.272	.578	.961	.853	.580	.894	.822	.449	.916	.925
	N	101	101	101	101	101	101	101	101	101	101
Do you agree that AI has transformed the small and medium sectors of USA?	Pearson Correlation	.867**	.877**	1	.909**	.859**	.950**	.914**	.664**	.966**	.952**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000
	Sum of Squares and Cross-products	56.881	96.149	208.139	155.535	114.257	189.960	162.564	88.861	191.782	193.129
	Covariance	.569	.961	2.081	1.555	1.143	1.900	1.626	.889	1.918	1.931
	N	101	101	101	101	101	101	101	101	101	101
In adopting of AI, SMEs have faced challenges due to its limited resources. Agree or not	Pearson Correlation	.908**	.946**	.909**	1	.819**	.857**	.909**	.658**	.903**	.874**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000
	Sum of Squares and Cross-products	48.970	85.287	155.535	140.634	89.564	140.990	132.891	72.465	147.446	145.782
	Covariance	.490	.853	1.555	1.406	.896	1.410	1.329	.725	1.474	1.458
	N	101	101	101	101	101	101	101	101	101	101
AI can develop the productivity of SMEs. Agree or not	Pearson Correlation	.697**	.827**	.859**	.819**	1	.892**	.860**	.803**	.889**	.898**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000
	Sum of Squares and Cross-products	29.208	57.990	114.257	89.564	85.050	114.069	97.762	68.743	112.881	116.525
	Covariance	.292	.580	1.143	.896	.850	1.141	.978	.687	1.129	1.165
	N	101	101	101	101	101	101	101	101	101	101
Through training and upskilling of employees SMEs can maximized the AI's benefit. Agree or not	Pearson Correlation	.775**	.848**	.950**	.857**	.892**	1	.891**	.700**	.972**	.982**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000
	Sum of Squares and Cross-products	48.891	89.386	189.960	140.990	114.069	192.297	152.267	90.040	185.634	191.535
	Covariance	.489	.894	1.900	1.410	1.141	1.923	1.523	.900	1.856	1.915
	N	101	101	101	101	101	101	101	101	101	101
Cognitive biases might be unclouded through AI application. Agree or not	Pearson Correlation	.853**	.878**	.914**	.909**	.860**	.891**	1	.808**	.943**	.905**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000
	Sum of Squares and Cross-products	47.802	82.248	162.564	132.891	97.762	152.267	151.941	92.436	159.970	156.881
	Covariance	.478	.822	1.626	1.329	.978	1.523	1.519	.924	1.600	1.569
	N	101	101	101	101	101	101	101	101	101	101
According BLS, there are more than 50% small business has rejected AI IN US in 2023. Agree or not	Pearson Correlation	.595**	.636**	.664**	.658**	.803**	.700**	.808**	1	.714**	.689**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000
	Sum of Squares and Cross-products	25.119	44.851	88.861	72.465	68.743	90.040	92.436	86.139	91.218	89.871
	Covariance	.251	.449	.889	.725	.687	.900	.924	.861	.912	.899
	N	101	101	101	101	101	101	101	101	101	101
AI adaptation in SMEs is more challenging than MNCs in US. Agree or not	Pearson Correlation	.845**	.875**	.966**	.903**	.889**	.972**	.943**	.714**	1	.981**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000
	Sum of Squares and Cross-products	52.901	91.624	191.782	147.446	112.881	185.634	159.970	91.218	189.485	189.941
	Covariance	.529	.916	1.918	1.474	1.129	1.856	1.600	.912	1.895	1.899
	N	101	101	101	101	101	101	101	101	101	101
Could AI be considered as game changer in SMEs business?	Pearson Correlation	.791**	.865**	.952**	.874**	.898**	.982**	.905**	.689**	.981**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	Sum of Squares and Cross-products	50.604	92.495	193.129	145.782	116.525	191.535	156.881	89.871	189.941	197.762
	Covariance	.506	.925	1.931	1.458	1.165	1.915	1.569	.899	1.899	1.978
	N	101	101	101	101	101	101	101	101	101	101

**. Correlation is significant at the 0.01 level (2-tailed).

In the above the correlation data table has been shown where no missing data has been found. The correlation value is significant up to 0.00 level data value.

Descriptive Statistics

	Mean	Std. Deviation	N
Are you working in US SMEs or not?	1.29	.455	101
Do you agree that AI has transformed the small and medium sectors of USA?	2.83	1.443	101
In adopting of AI, SMEs have faced challenges due to its limited resources. Agree or not	2.21	1.186	101
AI can develop the productivity of SMEs. Agree or not	2.54	.922	101
Through training and upskilling of employees SMEs can maximized the AI's benefit. Agree or not	2.76	1.387	101
Cognitive biases might be unclouded through AI application. Agree or not	2.39	1.233	101
According BLS, there are more than 50% small business has rejected AI IN US in 2023. Agree or not	2.17	.928	101
AI adaptation in SMEs is more challenging than MNCs in US. Agree or not	2.69	1.377	101
Could AI be considered as game changer in SMEs business?	2.77	1.406	101

In the above the descriptive statistics have been shown where the maximum std, deviation value is measured as 1.443. Here the maximum mean value is 2.83.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.938[a]	.880	.869	.164	.880	84.232	8	92	.000

a. Predictors: (Constant), Could AI be considered as game changer in SMEs business?, According BLS, there are more than 50% small business has rejected AI IN US in 2023. Agree or not, In adopting of AI, SMEs have faced challenges due to its limited resources. Agree or not, AI can develop the productivity of SMEs. Agree or not, Cognitive biases might be unclouded through AI application. Agree or not, Do you agree that AI has transformed the small and medium sectors of USA?, Through training and upskilling of employees SMEs can maximized the AI's benefit. Agree or not, AI adaptation in SMEs is more challenging than MNCs in US. Agree or not

Within this, the model summary table has been evaluated through ANOVA analysis. Here sig. F change is shown as 0.000 which presents that the data analysis is correct.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.190	8	2.274	84.232	.000[b]
	Residual	2.483	92	.027		
	Total	20.673	100			

a. Dependent Variable: Are you working in US SMEs or not?

b. Predictors: (Constant), Could AI be considered as game changer in SMEs business?, According BLS, there are more than 50% small business has rejected AI IN US in 2023. Agree or not, In adopting of AI, SMEs have faced challenges due to its limited resources. Agree or not, AI can develop the productivity of SMEs. Agree or not, Cognitive biases might be unclouded through AI application. Agree or not, Do you agree that AI has transformed the small and medium sectors of USA?, Through training and upskilling of employees SMEs can maximized the AI's benefit. Agree or not, AI adaptation in SMEs is more challenging than MNCs in US. Agree or not

Relating to the ANOVA table, the F value is 84.232.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.975	.982	10

In the above figure, the results of the reliability analysis have been presented. Here the value of Cronbach's Alpha is measured as 0.975 where the number of items is listed as 10.

From the results, it can be concluded that AI is particularly important for small and medium-sector growth in the USA. In terms of financial variables both the exporting status and funding source are also found to have a broader impact on SMEs growth [11]. More especially it can be suggested that SME businesses should make a sector-specific analysis of how this technology can be implemented within this particular context.

5. CONCLUSION

Based on the above discussion it needs to be concluded that AI plays an indispensable role in the SMEs of the USA. Artificial Intelligence along with Blockchain has majorly influenced the SME firms of the country based on which the first have been able to generate increased productivity. At the same time, the incorporation of AI and blockchain has brought significant growth and flexibility in USA SMEs through which there has been observed significant improvement in the decision-making abilities of the firms. Challenges stated above regarding AI and blockchain would have to be dealt with strategically which would allow SME firms to be more prolific in conducting their operations. Employers who participated in the SPSS analysis conducted above have majorly agreed to the view that the role of blockchain and AI have been massive in SMEs of the country which has helped the business to be more agile to carry out business activities in a systematic manner.

6. REFERENCES

[1] K. Sehmbi and R. Murphy , "Small-Business Statistics: Numbers to Know for 2023," NerdWallet, May 11, 2023. https://www.nerdwallet.com/article/small-business/small-business-statistics#:~:text=33. 2%20million%20small%20businesses%20across%20the%20U.S.&text=U.S.%20Small%20Business%

20Administration. (accessed Dec. 23, 2023).

[2]   J. Faria, "U.S. SMBs investing in AI for marketing 2023," Statista, 2023. https://www.statista. com/statistics/1412453/likelihood-of-us-smbs-to-invest-in-ai/ (accessed Dec. 23, 2023).

[3]   A. Bergson-Shilcock, "A THE NEW LANDSCAPE OF DIGITAL LITERACY The New Landscape of Digital Literacy," 2020. Accessed: Dec. 23, 2023. [Online]. Available: https://nationalskillscoalition. org/wp-content/uploads/2020/12/05-20-2020-NSC-New-Landscape-of-Digital-Literacy.pdf

[4]   Statista, "Artificial Intelligence - US | Statista Market Forecast," Statista, 2023. https://www.statista. com/outlook/tmo/artificial-intelligence/united-states#:~:text=Artificial%20Intelligence%20%2D%20 United%20States&text=The%20market%20size%20is%20expected (accessed Dec. 23, 2023).

[5]   Palacios-Manzano, M., Leon-Gomez, A. and Santos-Jaén, J.M., 2021. Corporate social responsibility as a vehicle for ensuring the survival of construction SMEs. The mediating role of job satisfaction and innovation. IEEE transactions on engineering management.

[6]   Brem, A., Giones, F. and Werle, M., 2021. The AI digital revolution in innovation: A conceptual framework of artificial intelligence technologies for the management of innovation. IEEE Transactions on Engineering Management.

[7]   B. K. Kuguoglu, H. van der Voort, and M. Janssen, "The Giant Leap for Smart Cities: Scaling Up Smart City Artificial Intelligence of Things (AIoT) Initiatives," Sustainability, vol. 13, no. 21, p. 12295, Nov. 2021, doi: https://doi.org/10.3390/su132112295.

[8]   Peres, R.S., Jia, X., Lee, J., Sun, K., Colombo, A.W. and Barata, J., 2020. Industrial artificial intelligence in industry 4.0-systematic review, challenges and outlook. IEEE Access, 8, pp.220121-220139.

[9]   Omrani, N., Rejeb, N., Maalaoui, A., Dabić, M. and Kraus, S., 2022. Drivers of digital transformation in SMEs. IEEE Transactions on Engineering Management.

[10] Vijayakumar, H., 2021. Impact of AI-Blockchain Adoption on Annual Revenue Growth: An Empirical Analysis of Small and Medium-sized Enterprises in the United States. International Journal of Business Intelligence and Big Data Analytics, 4(1), pp.12-21.

[11] Chintala, S. (2021). Evaluating the Impact of AI and ML on Diagnostic Accuracy in Radiology. EDUZONE: International Peer Reviewed/Refereed Multidisciplinary Journal (EIPRMJ), Volume(10), Issue(1), Page range(68-75). ISSN: 2319-5045. Impact Factor: 7.687. Retrieved from www.eduzonejournal.com

[12] Chintala, S. (2022). AI in Personalized Medicine: Tailoring Treatment Based on Genetic Information. Community Practitioner, 21(1), 141-149. ISSN 1462-2815.www.commprac.com

[13] Rao, D. D. (2009, November 25). Multimedia-based intelligent content networking for future internet. In Proceedings of the 2009 Third UKSim European Symposium on Computer Modeling and Simulation (pp. 55-59). IEEE.

[14] Thapliyal, A., Bhagavathi, P. S., Arunan, T., & Rao, D. D. (2009, January 10). Realizing zones using UPnP. In 2009 6th IEEE Consumer Communications and Networking Conference (pp. 1-5). IEEE.

[15] Pandey, P. and Pandey, M.M., 2021. Research methodology tools and techniques. Bridge Center.