

Analysis of the Impact of Artificial Intelligence Applications on the Development of Accounting Industry

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Over the past two years, the COVID-19 pandemic served as a catalyst for an industry-wide shift toward online platforms. This trend, particularly evident in the financial and economic sectors, has fueled the adoption of Artificial Intelligence (AI) applications. Specifically, big data analysis and semantic analysis powered by AI are driving business growth by streamlining operations and maximizing efficiency. Virtual platforms facilitate efficient resource management for all levels of an organization, enabling robust development. Our research focuses on the past five years, including the COVID-19 period. We collected data from various organizations regarding financial management and accounting practices. By analyzing this data with AI and machine learning algorithms, we aim to develop solutions for accounting and management challenges, while also informing future managerial strategies. Our focus region is the Asia-Pacific area, where knowledge gaps pose a significant barrier to both the development of the accounting industry and the personal growth of management personnel. Our research endeavors to bridge these gaps and pave the way for a more robust and sustainable future.

Keywords: Financial management (FM), reinforcement learning, artificial intelligence, business tools.

Introduction

Accounting and accountants play pivotal roles in various industries (Citak, Owoc, and Weichbroth, 2021). Accountants serve as the backbone of financial management, embodying a role-modeling process integral to every financial transaction and industry operation. Accounting, being a dynamic field, facilitates the recording of transactions, particularly in terms of financial disbursements. Essentially, accounting serves as an intermediary for financial transactions. Across diverse industries, spanning from pharmaceuticals, fertilizers, pesticides, plastics, and food to technology, education, civil engineering, marketing, and all types of businesses, financial processes are essential for monetary transactions. This financial accounting process is meticulously executed by accountants and management,

representing a crucial control mechanism applicable in all spheres of payment (Citak, Owoc and Weichbroth, 2021). The COVID-19 pandemic has introduced numerous risks and challenges for supply chains (SCs) on a global scale, leading to a significant expansion that nearly brought the world market to a standstill. Regarded as one of the most devastating disruptions, this pandemic has resulted in loss of lives, pushed millions into extreme poverty, and created a period of income uncertainty. Beyond being a global health crisis (Citak, Owoc, and Weichbroth, 2021), it has also decelerated global economic activity and impacted financial markets in both emerging and developed economies. Despite numerous research studies addressing this phenomenon in the world market, the pandemic has left a lasting impact on supply chains.

Furthermore, the integration of Artificial Intelligence (AI) and Machine Learning (ML) has seen exponential growth in various fields, including accountancy, with an emphasis on analytical patterns (Kumpulainen and Terziyan, 2022). According to the latest survey from Source Essay Writing Service, the field of accountancy is undergoing transformation due to artificial intelligence. In 2019, the total turnover was estimated to be around 4500-5000 US million dollars (Kumpulainen and Terziyan, 2022).

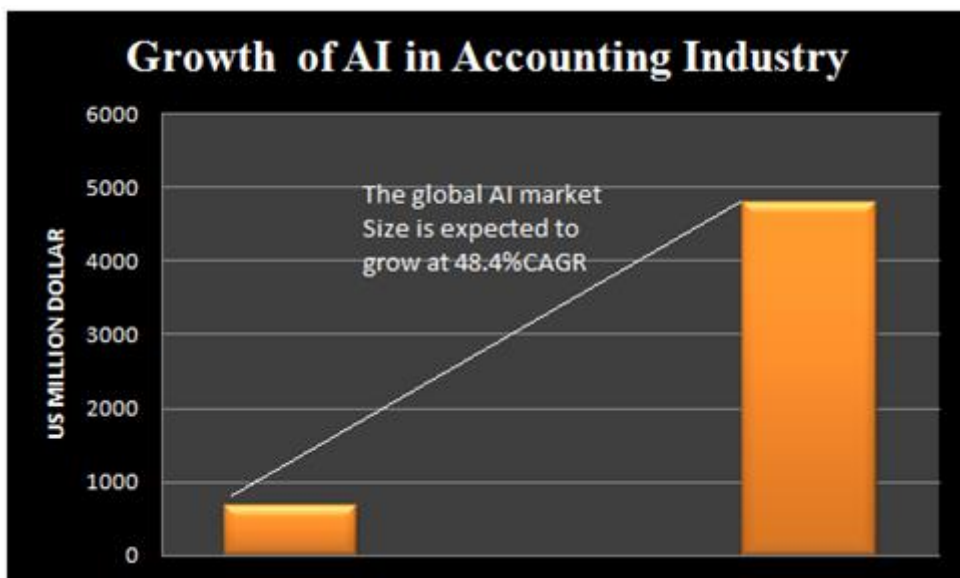


Fig-01- Global AI market Chart (Source- Market and Markets, 2020)

Figure 1 shows the projected growth of the global artificial intelligence (AI) market from 2016 to 2023, indicating that the global AI market was expected to grow from \$1,000 million in 2016 to \$5,800 million in 2023. This represents a compound annual growth rate (CAGR) of 48.4%. The data is from 2020, so it is possible that the actual market size and growth rate have changed since then. Nevertheless, the figure suggests that the global AI market is growing rapidly. This is due to a number of factors, including the increasing availability of data, the development of more powerful computing hardware and software, and the growing popularity of AI applications in a variety of industries.

According to several experts in accounting tasks, AI is the best complementary tool often used in the audit process. According to a global survey conducted by Sage, out of 3,000 executives (Peifer, Jeske and Hille, 2022), 50% of surveyed accountants reported that they are looking for AI automation in their operations to free up time. Most respondents felt that access to automated validated information may not require an audit (Centurion Reckord (2020). The demand for AI will automatically increase as natural language processing will be required for the NLP used for language: translation, information, reporting, identification of contract interpretation, etc. AI growth in 2020 is projected to increase from \$666 million in 2019 to \$4,791 million in 2024, at 48.4°GR over the forecast period, according to market and market analysis (Peifer, Jeske and Hille, 2022).

The challenges facing developing and emerging countries in finance management with the damage and disruption caused by the COVID-19 pandemic in industry are quite different and more severe than those of developed countries. Huge Employee of accountancy Shows Lack of Advanced AI Technologies for Enterprise and Broken HR & finance Systems (Bretas & Alon, 2020; Spieske & Birkel, 2021). Many developed countries are adapting to the new AI Algorithms as a normal working style and adopting resilient and advanced technologies to mitigate such uncertainties. But at the same time Undeveloped countries are confused and still working on making their own workflow straits (Peifer, Jeske and Hille, 2022).

In this era of the schematic stage, we are growing in 4.0 industry technologies to explore their interaction with machine-human relations in the form of AI. So we found that there is the same difference /gap in this terminology with respect to financial accountancy (Ahmed et al., 2023). To overcome this primary research gap, this study transceiver few queries or research questions:

Research problem A- primary equipment for accountancy is essential with or without AI?

Research problem B - Analysis and Impact of AI & ML in the recent industry with 4.0?

Exploring this problem mentioned above, this study serves the Asian continent data set to evaluate and analyze with the help of R programming. As of August 2021, R is one of the top five programming languages of the year(Nasir, Ahmed and Karmaker, 2023), so it's a favorite among data analysts and research programmers. It is also used as a fundamental tool for finance, relying mainly on statistical data.

Applications of R programming extend to the worlds of hypothetical and computational statistics as well as the hard sciences, e.g. astronomy, chemistry, and genomics for practical applications in business, pharmaceutical development products, Finance& Accountancy healthcare (Citak, Owoc and Weichbroth, 2021), marketing, medicine, etc. Since R has nearly 5,000 packages (libraries of functionality), many of which are dedicated to specific applications, you don't need to be an R programming genius to start developing your applications. Below fig 2 defines the various modules that will be based on the AI platform to solve our above-mentioned research problems (Kumpulainen and Terziyan, 2022).



Fig 2- R programming for Diff. financial tools.

Literature Review

This is a semi-systematic or narrative review approach that was used to analyze relevant published work in books and journals. Industry 4.0’s disruptive technologies, driven by AI and automation (Peifer et al., 2022), are pushing the accounting and audit field towards a crossroads: transform or fall behind. Collaboration across disciplines, particularly with computer science for AI and machine learning, is crucial to advance AI research in these fields. While wider AI adoption promises increased efficiency, productivity, and accuracy, it also raises concerns about income and wealth disparities, job displacement, and workforce unpreparedness (Peifer et al., 2022). To navigate this paradigm shift, a collaborative effort is needed: educators equipping students for a data-driven world, regulators adapting policies, and professionals embracing continuous learning. Together, they can prepare us for the challenges and opportunities of this new era, defined by big data, blockchain (Kusuma et al., 2022), AI, and the Fourth Industrial Revolution. Preparations are needed on the part of home organizations (Sircar et al., 2021).

Academia needs to redesign its accounting curriculum. Regulators need to make a difference by developing innovative policies. Additionally, professional associations need to redesign their professional development and training processes. Pro hybrids are expected to emerge and lead the pros in the near future. The development and implementation of AI in the accounting and audit professions can be viewed as a double-edged sword. What emerges may change over time, but this is certain, and the accounting and auditing professions as we know them are about to change dramatically in the coming days (Sircar et al., 2021; Cho, 2024; AlZubi and Al-Zu’bi AlZubi, 2023).

Data collection

An open-source COVID-19 economic data relevant to Asian country financial development, spanning the period 2019-2021, also known as the COVID era was used in the present study (Sircar et al., 2021).

Table 1: Asia-Pacific region, along with their corresponding country codes, and attributes related to economic factors.

Economy (country code)		Attributes Name	Range for consumption minimum	Range for consumption maximum
Bangladesh	BAN	1-Consumption shocks (% decline in consumption growth)	6.6 8%	9.9 8%
Bhutan	BTN			
Brunei Darussalam	BRN	2-Investment shocks (% decline in investment growth)	Shorter-containment 4%	Longer-containment 4%
Cambodia	CAM			
Fiji	FIJ	3-Decline in tourism receipts (% of GDP)		
Hong Kong, China	HKG			
India	IND	4-Average Stringency Index		
Indonesia	IDN			
Kazakhstan	KAZ	5-Average Mobility		
Kyrgyz Republic	KGZ			
Lao People's Democratic Republic	LAO			
Malaysia	MAL			
Maldives	MDV			
Mongolia	MON			
Nepal	NPL			
Pakistan	PAK			
People's Republic of China	CHN			
Philippines	PHI			
Republic of Korea	KOR			
Singapore	SIN			
Sri Lanka	SRI			
Taipei, China	TAP			
Thailand	THA			
Viet Nam	VIE			

The Table 1 provides information about various countries in the Asia-Pacific region, along with their corresponding country codes, and attributes related to economic factors. Bangladesh and Bhutan have experienced consumption shocks, with Bangladesh facing a 6.6% decline and Bhutan facing a 9.9% decline. The investment shocks during shorter and longer containment periods are both 8%. Tourism receipts and average mobility data are not provided in the table. The Stringency Index during shorter and longer containment periods is the same, with a value of 4%. The data seems to represent the economic impact of consumption and investment shocks during different containment periods, but additional

information on tourism receipts and average mobility is required to draw comprehensive inferences about the overall economic situation in these countries.

This decoration administers an estimate of the macroeconomic and corporation impact of the COVID-19 outbreak. Update quote published on March 28, 2020 (Dudnik et al., 2021). This release uses country-specific information on the severity of outbreaks, the severity of containment measures, and reductions in movement outside the home to help identify significant outbreaks (defined as: Adjust the size of the domestic demand contraction caused. >1,000 COVID-19). Estimated impacts are relative and not a “no COVID baseline” scenario. The Scenario Assumptions tab contains the underlying assumptions. Select an economy in cell C1 of the Main tab to see details about how that economy (and sectors with in the economy) is affected (Ahmad et al., 2022, Solikin and Darmawan, 2023, Hermansyah, 2023). It also analyzes the channels through which the economy is affected (tourism, other external demand, domestic demand). For direction that have not yet experienced a significant outbreak (less than 1,000 COVID-19 cases as of May 31, 2020), select the option in "main" cell C2 to Evaluate the global ramifications of the outbreak or whether the overall impact is indicative of IF a. In the future, there will be an epidemic in the country (Ahmad et al., 2022).

Research Methodology for data analysis with R studio (R programming algorithm)

This analysis develops an innovative integrated model to explore and assess AI-based imperatives for Accounting Industry (Abioye et al., 2021). This will help the organization make strategic decisions to establish a volatile relationship with future technology for Asian countries of the world. We used open-source data for analysis with R programming named in Excel file format. Firstly, this file is imported into R studio software after that we used AI-based algorithms (Rejeb et al., 2022).

1- Import file with analysis- We analyze one attribute “consumption shocks” with data programming (fig.3a shown below), it shows that consumption growth decreased by some percentage of 2-8 % in the last COVID period.



Fig 3a

2- Analysis of Investment shocks (% decline in investment growth): In this analysis of investment maximum, the decline is at 10-12 %. It shows that in the future there will again be a maximum decline up to 12-14 % (fig.3b shows below). This is our primary focus to decrease this Ratio accountancy and account Industry (Rejeb et al., 2022).

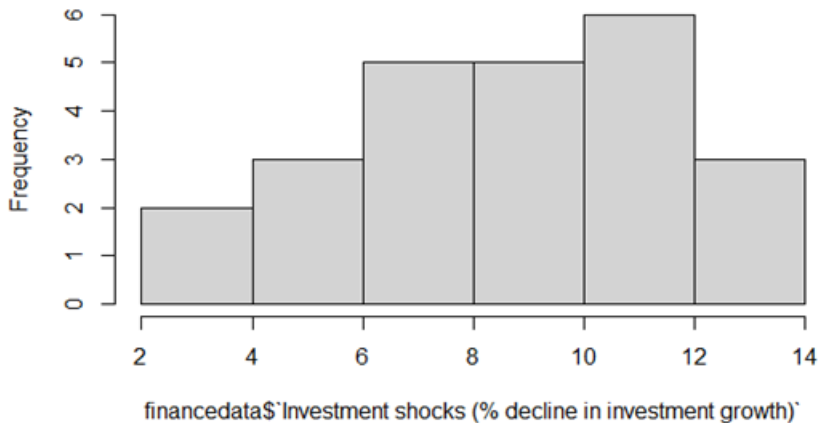


Fig 3b

3- Impact analysis of excel data (Finance Data) of Artificial Intelligence algorithm annealing algorithm in r studio for the Development of the Accounting Industry

In this phase of analysis and Development, we applied an AI-based algorithm named Annealing with levi function for impact analysis with a function written below in fig.4.

```
>
> library( GenSA )
>
> levi <- function(x) { return( sin(3*pi*x[1])^2 + (x[1]-1)^2 * (1+sin(3*pi*x[2])^2)
+ (x[2]-1)^2 * (1+sin(2*pi*x[2])^2) ); }
>
>
> levi( c(0,0) )
[1] 2
> levi( c(1,1) )
[1] 1.349784e-31
>
> levi( c(10,10) )
[1] 162
> levi( c(-10,-10) )
[1] 242
>
>
> solution <- GenSA(fn=levi, lower=c(-10,-10), upper=c(10,10))
```

Fig.4- Annealing algorithm in r studio with Levi Function.

GneSA packages use various algorithms to analyze the impact of any industry. Our main focus is the accounting and management industry. In this R programming, we used `levi` function for analysis of data for future prediction as well as the growth of positive industry (Peifer, Jeske and Hille, 2022). GenSA algorithm works for a complex optimization problem that will be beneficial to financial accounting management. After applying this, we found that after 2- 3 years the financial area or industry will move forward 12 % every year as Asian countries improve their quality of service using AI and basic output-based technology.

4- Histogram of Average Mobility Prediction

For basic phenomena, we design a histogram to show the future mobility of the accountancy and management industry.

Code

```
hist.default (finance data$`Average Mobility`)
```

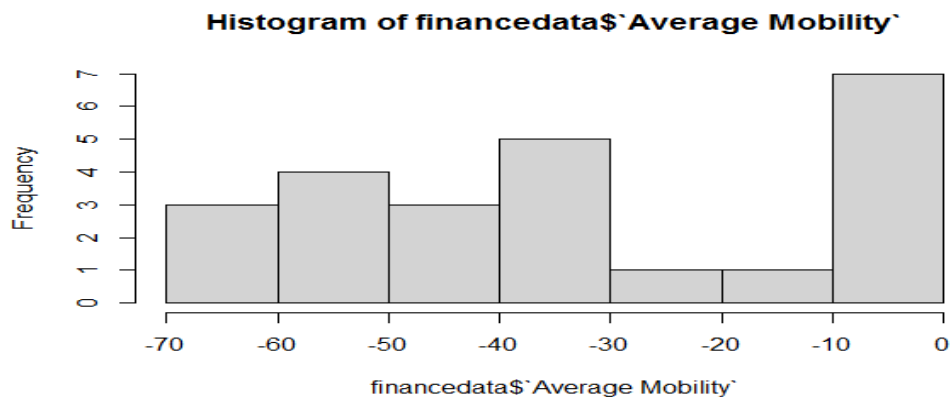


Fig . 5: Histogram of Average Mobility Prediction

Conclusion and Future Scope

In this research study, we mainly focused on accounting industry development with a primary focus on AI & ML based industry to forecast as well as broadcast the next four to five decades of technology-based industry. We employed an Asian dataset that describes various attributes that are dependent variables to technology, The COVID-19 pandemic has impacted many emerging global markets for accountancy interfering with production activities and analysis of AI-based Technology. Many manufacturing industries have already stopped manual operations and others face many challenges to continue their operations with previous technology. According to the analysis, this issue is expected to be resolved or shortened with AI-based technology. In the future, the accounting industry is projected to play very powerful interface role in each field of the accounting industry. The practical implications of this study are related only to patterns from Asian countries. Other standard policies can be developed to enable implementation in other countries' accounting practices.

However, the intrinsic characteristics of AI-based technology allow companies to develop management product services and implement AI, taking into account the country's economic development level. It seems necessary to consider the qualitative parameters of AI talent in human capital and accounting development.

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Authors' Contributions

All authors contributed toward data analysis, drafting, and revising the paper and agreed to be responsible for all aspects of this work.

Declaration of Conflicts of Interests

The authors declare that they have no conflict of interest.

Data Availability Statement

The databases generated and /or analyzed during the current study are not publicly available due to privacy but are available from the corresponding author upon reasonable request.

Declarations

Author(s) declare that all works are original and this manuscript has not been published in any other journal.

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