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Does financial advice by AI-based robo-advisors will replace humans? Evidence from ChatGPT and Google Bard

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Abstract

The advent of artificial intelligence technologies has transformed various sectors, including taxation. The present study investigates the accuracy and knowledge of taxation advice provided by two leading AI tools, ChatGPT and Google Bard, for Indian taxpayers. Utilizing nine evaluative criteria - Clarity, Accuracy, Precision, Relevance, Depth, Breadth, Logic, Significance, and Fairness, we examine the capabilities of ChatGPT and Google Bard in delivering reliable taxation advice. We used 12 different prompts for each taxation advice from ChatGPT and Google Bard separately. Our respondents are limited to Chartered Accountants having exposure to robo-advisory services in varied capacities. The findings indicate that Google Bard exhibits superior accuracy, while ChatGPT excels in other evaluative categories. Both AI tools, however, demonstrated comparable overall performance. Notably, Chartered Accountants slightly favoured the responses generated by Google Bard concerning the correctness of Indian taxation advice. These findings are significant for three major stakeholders of the Indian Taxation system; the Government, Chartered Accountants, and Assessees, and indicate the need for policy changes in regulating the role of Artificial Intelligence in the Indian financial advice domain. One major limitation of this research is the number of respondents due to the complex and time-intensive nature of the questionnaire. This is the first study in our knowledge that evaluates the authenticity and reliability of financial advice provided by robo-advisors; with a particular focus on tax-saving approaches tailored to the Indian context.

Subject Classification: *68M11 Internet topics.*

Keywords: *Financial advice, Artificial intelligence, Wealth management, ChatGPT, Google Bard.*

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1. Introduction

"*Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks*." **Stephen Hawking**

In an era where technological advances are reshaping established businesses, the financial industry has seen a revolutionary shift in how advice and guidance are delivered to individuals seeking personalized financial solutions [1]. The term "artificial intelligence" was first used in the 1950s to describe robots' capacity to display intelligence [2].

Lately, the development and use of Artificial Intelligence (AI) have gained momentum and are the most debatable topic across the globe [3–6]. With enormous growth, AI has inspired a sense of awe and is successful in creating excitement in the minds of people from all walks of life. Not only the professionals in the IT industry but even scientists, academicians, policymakers, and regulators are chuffed up about them. This paved the way for a new reform in the industry (Industry 5.0) emphasizing the coexistence of artificial intelligence and humans [7–10]. We witness an exponential surge in the literature investigating the role of AI in various industries, such as agriculture [11–13], manufacturing [14–16], education [17–19], healthcare [20–23] and financial services [24–28]. As the use of AI and its impact on various industries proliferate, they are preferred as indispensable for businesses to sustain in the marketplace.

Though Generative AI (ChatGPT) has been creating a lot of buzz since its launch in November 2022, it is vital to outline that AI has been around us since the early 1950s. A decade later, financial institutions embraced the process of automation with the introduction of Automated Teller Machines (ATMs). Subsequently, the financial industry has witnessed several digital and automation reforms. While the role of AI was ambiguous initially, they were deployed by financial institutions recognizing their potential, allowing its evolvement and application in domains like banking, financial advisory, portfolio management, etc.

In contemporary finance, AI technology has been elevated in customer service platforms; comprising chatbots mechanized on Natural Language Processing (NLP) that utilizes a vast collection of texts and drafts appropriate and automated responses. For example, the introduction of ChatGPT (AI-based tool) in November 2022, followed by other generative AIs, such as Google Bard can create a human-like conversational dialogue or even better, at times. The deployment of AI in the financial services industry has paved the way for automated financial advisors (robo-

advisors); thereby promoting cost-effective financial advisory. In particular, the use of robo-advisors provides a transparent cost structure that curtails the friction cost (brokerage fees and commissions) leading to higher profitability [29–32]. The rise of robo-advisors, an internet-based service offering automated, algorithm-driven financial advice with minimal or no human intervention, has been crucial to this transformation. Robo-advisers are low-cost, automated investing mechanisms [29]. They work with little human intervention, creating personalized portfolios for investors depending on their risk appetite and financial objectives. Because of this automated method, robo-advisors may give investment advice at a lesser cost than conventional financial advisers, making them an appealing choice for normal investors [33]. According to projections, robo-advisors are expected to be in charge of managing more than $1 trillion of money in the USA [34]. The convenience and usefulness of robo-advisors may play a role in this rise by positively influencing views towards and utilization of the innovation [35]. However, it may prove precarious to avail tailored financial advice from the robo-advisors neglecting the role of financial institutions and may amplify the pre-existing financial market risks.

ChatGPT & Google Bard as Robo advisor:

ChatGPT, built on the GPT-3.5/4 framework created by OpenAI, has emerged as a notable artificial Intelligence tool capable of producing a broad variety of text with human-like intelligence. ChatGPT is a product of cutting-edge artificial intelligence [36]. In a similar way, Bard was introduced as an alternative to the growing popularity of OpenAI's ChatGPT; designed on Google's advanced language models, leveraging their LaMDA (Language Model for Dialogue Applications) technology. Both AI-powered chatbots can perform a variety of interactions, including answering requests, delivering information, etc. These Large Language Models (LLMs), models are very powerful and well-known for taking and employing worldly information. However, they encounter issues related to control, transparency, and adherence to human ethical values [33]. There has been an increase in reliance on these technologies for information as a result of the widespread usage of chat-based generative AI. One of these areas is advising on wealth management [33]. One of the critical applications of robo-advisors lies in the realm of financial advice, where it offers recommendations on tax-saving strategies tailored to the specific needs of individuals.

This study examines the role of robo-advisors and the challenges and opportunities they pose to the financial advice markets. Hence, we formulated a few of the primary queries related to robo-advisory services in the Indian tax-saving context:

RQ1: Do robo-advisors, such as ChatGPT and Google Bard provide reliable tax-saving advice to salaried persons in the Indian context based on intellectual Standards Essentials [37]?

RQ2: Do robo-advisors such as ChatGPT and Google Bard provide similar and significant taxation advice to salaried persons in India?

RQ3: Do robo-advisors such as ChatGPT and Google Bard have significant knowledge of the Indian tax system?

Considering an emerging economy like India with an intricate and frequently evolving taxation framework, the pursuit of efficient tax-saving strategies presents significant challenges. The present study aims to fill the empirical void and provide new insights into the role of robo-advisors. To attain our objective, we investigate the authenticity and reliability of financial advice provided by robo-advisors; with a particular focus on tax-saving approaches tailored to the Indian context. The reliability of ChatGPT and Google Bard advice is critical because of the possible influence on an individual's financial decisions and eventual tax liabilities. Further, this study also examines AI tools' knowledge of the Indian tax system providing valuable information for policymakers, financial professionals, and taxpayers.

2. Literature Review

There exist several empirical studies evaluating the role of financial literacy and its impact on financial market participation [38–41]. Despite the growing importance of financial literacy across the globe owing to a wide array of investment avenues, the previous studies outlined that financial illiteracy persists in developed and developing economies alike [42–45]. Financial illiteracy has serious repercussions, the prominent being an increased risk of accumulating unsustainable debt burdens [46–48], either through poor spending decisions or a lack of long-term investment planning [49, 50].

The advancement in technology and vast growing complex financial products pose a significant challenge to individuals who opt for financial

products to mitigate the risks and manage capital. The freely available information in abundance further perplexed the optimal financial planning [49, 51]. Against this backdrop, investors quest professionals for better investment outcomes and manage their finances [52, 53]. Indisputably, the role of financial advisors is ubiquitous and ever-evolving, particularly post-global financial crisis, as consumers are fervent to seek financial advice for sound financial positions [54–56]. However, the impact of financial advice may not always be affirmative [30, 57]. In addition, assessing financial advice comes with some cost, either in cash or in-kind [58, 59]. To overcome such issues, there is a proliferation of online investment advisory platforms (generative AI, chatbots) known as robo-advisors [31, 60, 61].

The robo-advisors use artificial intelligence to generate algorithm-driven financial advice, based on predefined rules, autonomously. They are cost-effective and free from human behaviour bias, capable of advising individuals contingent on their investment objectives [29, 62, 63]. These machine learning, AI-enabled robo-advisor performances are manifolds; including automated wealth management, tax advisory, and individually tailored investment avenues. The robo-advisory services have gained momentum and it is estimated that the robo-advisors will be managing $ 16.0 trillion in assets under management (AuM) by the end of 2025.[1] The adoption of classic Wealth Management by robo-advisors is an emerging trend and this can be attributed to unlimited access and availability, user-friendly technology, cost-effectiveness, etc. [64–66]. However, the robo-advisory is often been criticized for trust issues as AI may violate privacy using personal data. Further, AI may provide insignificant advice during economic shocks or market failures leading to false conclusions [67, 68]. Lastly, robo-advisors may be subject to conflicts of interest prioritizing robo-advisors investment approach powered by algorithms [69, 70].

Launched in 2008, the robo-advisory services are still evolving and is considered in its nascent stage. Unlike major economies like US, UK, and China, where robo-advisory is already triumphed, it has gained significant ground in an emerging economy like India. According to Statista Market Insights (2023), the Assets under Management (AUM) by robo-advisors in India are predicted to reach $ 33.49 billion by the end of 2023. More importantly, the report states that the total AUM is expected to grow at 14 percent annually by 2027 resulting in a projected total amount of $ 56.58

[1] https://www2.deloitte.com/content/dam/Deloitte/de/Documents/financial-services/Deloitte-Robo-safe.pdf

billion by 2027. These trends suggest the rise and adoption of robo-advising platforms by investors. Consequently, evaluating the role of robo-advisor in financial advising assumes significance.

3. Material and methods

3.1 *Data*

In the present paper, the recipient of the tax advice is eligible for direct taxes and is willing to get taxation advice. The target individuals were defined as the Indian salaried individuals having earnings in different tax categories. Due to insignificant financial literacy among working youth in India [71] and the complex tax structure [72], eligible taxpayers are often interested in seeking taxation advice from human tax advisors. As of July 2023, India witnessed a whopping 67.7 million income tax returns (ITRs) filed for AY 2023-24, comparatively 16.1% higher than the total ITRs filed during the previous year.[2] The prompts to robo-advisors, ChatGPT, and Google Bard, in particular, included various tax slabs of the old vs. new regime in the Indian tax system as exhibited in **Table 1**. Our prompt started with an individual earning 500,000 Indian Rupees (INR) as it is the minimum income group in the tax slab. Further, our maximum limit is 5,000,000 INR purposely, as the total income of an assessee above this limit will be levied with a surcharge.[3] An appropriate prompt was provided for taxpayers in each tax-slab rate and the prompts were further adjusted to each level of taxation advice based on the level of total income as per old vs. new tax rates. The full description of the prompts using fictitious scenarios is provided in Supplementary Table 1.

Table 1

Income tax slab for Individuals (resident or non-resident & >60 years of age) at any time during the previous year:

Old Tax Regime		New Tax Regime u/s 115BAC	
Income Tax Slab	**Income Tax Rate**	**Income Tax Slab**	**Income Tax Rate**
Up to ₹ 2,50,000	Nil	Up to ₹ 2,50,000	Nil

Contd..

2 https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1944821#:~:text=The%20total%20number%20of%20ITRs,till%2031st%20July%202022.

3 https://incometaxindia.gov.in/charts%20%20tables/tax%20rates.htm

₹ 2,50,001 – ₹ 5,00,000	5% on income above ₹ 2,50,000	₹ 2,50,001 – ₹ 5,00,000	5% on income above ₹ 2,50,000
₹ 5,00,001 – ₹ 10,00,000	₹ 12,500 + 20% on income above ₹ 5,00,000	₹ 5,00,001 – ₹ 7,50,000	₹ 12,500 + 10% on income above ₹ 5,00,000
Above ₹ 10,00,000	₹ 1,12,500 + 30% on income above ₹ 10,00,000	₹ 7,50,001 – ₹ 10,00,000	₹ 37,500 + 15% on income above ₹ 7,50,000
		₹ 10,00,001 – ₹ 12,50,000	₹ 75,000 + 20% on income above ₹ 10,00,000
		₹ 12,50,001 – ₹ 15,00,000	₹ 1,25,000 + 25% on income above ₹ 12,50,000
		Above ₹ 15,00,000	₹ 1,87,500 + 30% on income above ₹ 15,00,000

Source: Income Tax Department, Government of India.

We used a single prompt using English as a medium of instruction for each taxation advice from ChatGPT and Google Bard separately, making all observations independent. We used a total of 12 prompts (6 for each robo-advisor) on a 5-point Likert scale (1: Strongly Disagree, 2: Disagree, 3: Undecided, 4: Agree, 5: Completely Agree). All prompts were conducted on 4th September 2023, using ChatGPT 4.0 and Google Bard's most recent version available during the period. The responses to each prompt from both the robo-advisors are finally assessed by Chartered Accountants.

3.2 *Selection of participants and sampling technique*

The respondents for the research are experts (solely CA) in taxation advice who have exposure to robo-advisory services in varied capacities. Chartered accountants are individuals working in India who have a CA degree from the Institute of Chartered Accountants of India (ICAI). The role of a chartered accountant in tax planning is to advise and direct the tax advice-seekers all year long. Their assistance includes, but is not limited to financial decisions, such as investments and expenditures that will reduce their tax obligations and increase tax savings within the legal purview. We used the snowball sampling technique to target respondents from CA disciplines only, in order to gain reliable and accurate responses from the subject matter expertise. The snowball sampling technique is

suitable for our study as CAs are elite hidden groups and contacting them for data collection demands great exertion and effort [73]. This sampling technique assisted in getting referrals from the experts to approach more CAs. Our respondents further purged as a majority of qualified CAs are reluctant to participate as respondents, citing limited or no exposure to artificial intelligence (AI) and robo-advisory. Out of the 247 candidates contacted, we received a total of 12 responses after distributing the questionnaire through various social media platforms, cold emails, and direct in-person interactions. However, two respondents were excluded from our analysis as, despite holding an ICAI certification, they were not actively practising their profession. Owing to the nascent and exploratory nature of our research, we opted to proceed with the analysis based on the remaining 10 responses. It is noteworthy that all these responses were obtained from Chartered Accountants whom we contacted in person. The low response rate can likely be attributed to the complexity and time-intensive nature of the questionnaire, as highlighted by one of the experts consulted during the study. **Table 2** provides the demographic of our respondents to this study.

Table 2

Demographics of the respondents

Characteristics	Number
Age	
25-40	4
40-60	5
>60	1
Gender	
Male	8
Female	2
Experience	
0-5 years	5
5-10 years	3
10-15 years	1
>15 years	1
Designation/Position	
Entry level	5
Mid-level	3
Top-level	2

3.3 *Selection of Variables*

In exploratory research, critical evaluation of the observation is of paramount importance in decision-making. For the comprehensive analysis, critical thinking assists in overcoming cognitive biases, evaluating information effectively, and making informed choices.[4] In the present study, it is crucial to apply, analyze, and evaluate the responses obtained from robo-advisors. After a careful review of the past literature, we unanimously agreed to employ the Paul-Elder (**Table 3**) critical thinking framework [37] to evaluate each prompt response from both robo-advisors.

Table 3

Depicts the Paul-Elder critical thinking framework.

Clarity	Can you explain it further?
	Can you provide an example?
	Can you illustrate your point?
Accuracy	How can you check on it?
	How do you determine if it is accurate?
	How can you verify or validate it?
Precision	Can you be more specific?
	Can you add more details?
	Can you be more precise?
Relevance	How is this related to the issue?
	How does this connect with the question?
	How does that help us with the problem?
Depth	What makes this problem challenging?
	What complexities are involved in this question?
	What are the obstacles that need to be addressed?
Breadth	Do you need to examine it from a different perspective?
	Do you need to evaluate another point of view?
	Do you need to explore alternative ways to look at it?
Logic	Does everything align logically?
	Does the initial argument connect with the last?
	Does the conclusion follow from the evidence?

Contd...

4 https://www.criticalthinking.org/pages/defining-critical-thinking/766

Significance	Do you consider it the most important problem to be addressed?
	Do you think it is the primary idea to focus on?
	Which among the provided facts is more important?
Fairness	Do you have any biases in this issue?
	Are you fairly representing other's viewpoints?
	Have you considered all perspectives?

The Paul and Elder model depicts critical thinking by applying these nine (9) Universal Intellectual Standards to the evaluation of typical Elements of Thought, intending to develop certain Essential Intellectual Traits to assess thinking.

3.4 *Methodology*

Even after decades of research, there still exists disagreement among scholars concerning the use of the t-test versus its non-parametric equivalents. In particular, the use of a t-test is debatable when the normal distribution assumption of the t-test remains invalid. The non-parametric procedures should be utilized whenever the level is no more informative than ordinal. Moreover, the extensive use of Likert scales in the majority of the previous studies further aggravated the issue. With a large sample size and normal distribution, the t-or-Z-test is more suitable for justifying the central limit theorem. However, if the normality assumption of the sample is violated, a non-parametric test (for example, Wilcoxon Signed Rank test) is more powerful than t-tests.

3.4.1 Wilcoxon Signed-Rank test

In the nonparametric approach, the sign and Wilcoxon signed-rank tests in one sample scenario are well-known tests about the population median (M). We applied the Wilcoxon signed rank test in our study as it doesn't adhere to the assumption of normal distribution and can be applied to a smaller sample size. We test the null hypothesis H_0: $M = M_0$. In this context, let R_i represent the rank of d_i based on its absolute value $|d_i|$. The ranks are integers that signify the position of $|d_i|$ and subsequently arrange them in ascending order. Symbolically, the Wilcoxon signed-rank test statistics are as follows:

$$W_n^+ = \sum_{i=1}^{n} I_{\{d_i>0\}} R_i$$

where $I_{\{d_i>0\}}$ exhibits the indicator with the value 1 (0) if the logic $d_i > 0$ holds valid or otherwise. Thus, W_n^+ consider and sum the ranks of positive $d_i's$ only.

The statistic W_n^+ ranges from 0 to $\frac{n(n+1)}{2}$. Under H_0 partial $d_i's$ are positive. Therefore, any pair (d_i, d_j) depicts a probable chance that d_i, $d_j > 0$. Considering the ranks, it indicates that the sum of R_i for positive d_i is about half the range of $\frac{n(n+1)}{2}$. Thus, the null hypothesis can be measured as follows:

$$H_0 : \theta = \frac{1}{2}, \text{ or } H_0 : \theta \neq \frac{1}{2}$$

where, θ = Pr (d_i, $d_j > 0$).

We propose the following hypothesis using the Wilcoxon signed rank test for ChatGPT taxation advice based on essential intellectual standards:

H_0*1*: ChatGPT taxation advice for salaried individuals is not clear.

H_0*2*: ChatGPT taxation advice for salaried individuals is not precise.

H_0*3:* ChatGPT taxation advice for salaried individuals is not accurate.

H_0*4*: ChatGPT taxation advice for salaried individuals is not relevant.

H_0*5*: ChatGPT taxation advice for salaried individuals lacks depth.

H_0*6*: ChatGPT taxation advice for salaried individuals lacks breadth.

H_0*7*: ChatGPT taxation advice for salaried individuals is not logical.

H_0*8:* ChatGPT taxation advice for salaried individuals is not significant.

H_0*9*: ChatGPT taxation advice for salaried individuals is not fair.

Similarly, we repeated the same hypothesis using the Wilcoxon signed rank test for Google Bard taxation advice based on essential intellectual standards.

H_0*10:* Google Bard taxation advice for salaried individuals is not clear.

H_0*11:* Google Bard taxation advice for salaried individuals is not precise.

H_0*12:* Google Bard taxation advice for salaried individuals is not accurate.

H_0*13:* Google Bard taxation advice for salaried individuals is not relevant.

H_0*14:* Google Bard taxation advice for salaried individuals lacks depth.

H_0*15:* Google Bard taxation advice for salaried individuals lacks breadth.

H_0*16:* Google Bard taxation advice for salaried individuals is not logical.

H_0*17:* Google Bard taxation advice for salaried individuals is not significant.

H_0*18:* Google Bard taxation advice for salaried individuals is not fair.

3.4.2 Mann-Whitney U test

We applied the Mann-Whitney U test to analyze differences between the medians of the robo-advisors (ChatGPT and Google Bard). The rationale for using this non-parametric statistical technique is the violation of assumptions of normality and the small sample size of data used in the study [74]. We test the null hypothesis utilizing the Mann-Whitney U test as both of our samples have the same median value [75]. The independence of our observations further prompted us to use this method. We propose the following null hypothesis:

H_0*19:* There is no significant difference in the taxation advice based on clarity between ChatGPT-4 and Google Bard.

H_0*20:* There is no significant difference in the taxation advice based on precision between ChatGPT-4 and Google Bard.

H_0*21:* There is no significant difference in the taxation advice based on accuracy between ChatGPT-4 and Google Bard.

H_0*22:* There is no significant difference in the taxation advice based on relevance between ChatGPT-4 and Google Bard.

H_0*23:* There is no significant difference in the taxation advice based on depth between ChatGPT-4 and Google Bard.

H_0*24:* There is no significant difference in the taxation advice based on breadth between ChatGPT-4 and Google Bard.

H_0*25:* There is no significant difference in the taxation advice based on logicalness between ChatGPT-4 and Google Bard.

H_0*26:* There is no significant difference in the taxation advice based on significance between ChatGPT-4 and Google Bard.

H_0*27:* There is no significant difference in the taxation advice based on fairness between ChatGPT-4 and Google Bard.

3.4.3 Fleiss Kappa

Lastly, we used the kappa statistic in our study to test interrater reliability among chartered accountants and robo-advisors' responses. To be precise, we employed Fleiss Kappa as our study has 3 or more raters of

the contingency coefficient. The extent of the data collection accurately represents the variables measured which signifies raters' reliability. In unison with the majority of the correlation statistics, the Fleiss kappa ranges from -1 to +1. Fleiss Kappa is a widely used measure to gauge interrater reliability. A value of Fleiss Kappa ranging from 0-0.20 implies a non-existent level of agreement among interraters, while a value of 0.80-1.0 signifies a strong level of agreement [76]. However, Fleiss Kappa is criticized as due to the variation among human observers, the issue of consistency or agreement among those collecting data may arise. Therefore, the significance of reliability coefficients of Kappa varies significantly and should be interpreted with caution. The following hypothesis is being proposed:

$H_0$28: There is no agreement between the Chartered Accountants on the correctness of the responses given by ChatGPT.

$H_0$29: There is no agreement between the Chartered Accountants on the correctness of the responses given by Google Bard.

4. Results and discussions

The research analysis was conducted using the SPSS package program. The Wilcoxon signed-rank test was applied to evaluate the median differences in alpha-diversity measurements and Mann Whitney U test was used for paired comparisons. Moreover, we used Fleiss' Kappa to measure the agreement as our study consists of more than two raters.

To test $H_0$1- $H_0$18, the Wilcoxon signed rank test is used at a 5% level of significance. As our study is exploratory, we test the responses of the prompts provided by robo-advisors on the essential intellectual standards, namely, clarity, precision, accuracy, relevance, depth, breadth, logicalness, significance, and fairness. Using these parameters, we can overcome cognitive bias and evaluate our results effectively. Most of these essential intellectual standards are positive and significant for both the robo-advisors. However, the ChatGPT fails to provide precise (p= 0.07) and accurate (p= 0.08) information. This result is particularly noteworthy, as precision and accuracy are significant parts of the taxation advice and inaccurate advice may lead to serious financial repercussions. An in-depth analysis of this matter leads us to a new finding. The results obtained from the first 2 prompts are more inaccurate. This may be attributed to the absence of a more precise prompt at our end without suggesting deductions and exemptions in the prompt itself. As we provide a more comprehensive

prompt from 3-6, the accuracy and precision were significantly improved for ChatGPT. However, Google Bard has provided accurate and precise taxation advice. The other reason may be the fact that ChatGPT has data updates till Sep 2021. Since there are various changes and reforms in the Indian tax system post-2021. For Google Bard, the majority of the essential intellectual standards are positive and significant, except logicalness (p= 0.07). It is noteworthy to mention that the taxation advice of both the robo-advisors was formulated following the basic recommendations indicated in different tax-related prompts, such as "common tax saving options under different sections, deductions for HRA, life-insurance, medical allowances, PPF, etc. Additionally, notes such as "*this is a simplified example and the actual circumstances may be much more complex. Always consult a qualified tax advisor for personalized advice"* were displayed for each response by ChatGPT emphasizing the need for consulting a tax advisor for personalized advice. In contrast, in Google Bard, the note was "I hope this helps. Let me know if you have any other questions." Seems rigid and overconfident.

To test our null hypothesis from $H_0$19-$H_0$27, we employed the Mann-Whitney U test to investigate the difference among the responses generated by ChatGPT and Google Bard. The majority of the essential intellectual parameters to measure the difference among the responses are positive and insignificant, except the breadth ($p = 0.04$) of the responses by ChatGPT and Google Bard. This may be attributed to more breadth in responses provided by ChatGPT in each of the prompts. The results obtained from Mann-Whitney suggest that the robo-advisors' responses were generated using machine learning and Natural Language Processing (NLP). This implies that the results are free from cognitive or any other human behaviour bias. [29].

Lastly, we test the hypothesis $H_0$28 – $H_0$29 on the agreement between the Chartered Accountants on the correctness of the responses given by ChatGPT and Google Bard, using Fleiss Kappa. The coefficient obtained on the ChatGPT is $\kappa = 0.19$ suggesting a slight agreement between the responses generated by ChatGPT and the Likert scale responses of CAs. The Fleiss kappa coefficient for Google Bard is $\kappa = 0.28$ indicating a fair agreement among the raters. This may be attributed to the updated information and knowledge about the Indian taxation system on Google Bard, as even the latest version of ChatGPT-4 has data up to September 2021.

With a wider acceptance and manifold advantages, such as reduced costs, easy accessibility, operational efficiency, etc., the robo-advisors'

performance is outstanding and gradually the robo-advisor will be adopted for taxation and other financial advisory services by individuals and institutions alike to have a competitive edge. The findings of our study contribute to understanding the role and credibility of AI-driven advisory tools in navigating the complexities of the Indian taxation system.

5. Implications

The emergence of robo-advisors in the financial sector raises concerns about the future role of human financial advisors. Artificial Intelligence technologies like ChatGPT and Google Bard have shown capabilities in providing tax advice and investment suggestions. The findings of our study have significant implications for financial institutions, regulators and policymakers as they navigate the evolving landscape of AI-driven financial advisory services in India.

The present study offers valuable insights for financial institutions, regulators and policymakers in assessing the role of robo-advisors in an emerging economy like India with a complex tax structure. The robo-advisory service will have a greater impact on the three major stakeholders in taxation advice related to income tax in India namely the Government, Charter accountant, and Assessee (opting for taxation advice) that are to be impacted by this emerging revolution of Artificial Intelligence.

It is essential to put in place a standardized regulatory framework to ensure the reliability and accuracy of AI-generated financial advice, particularly in a country with an intricate tax structure. The Government of India (GoI) must consider how these technologies can be integrated into the existing financial infrastructure while ensuring compliance and accuracy. For example, in the United States, the regulatory framework provided by the Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA) must be followed by financial advisors and broker-dealers offering services through robo-advisors [33]. The Indian government can take the help of the European Union AI Act proposal [77]. This proposal has been recently updated to address challenges posed by generative AI. The government must also come out with a strict policy of compulsory credential verification to make sure these websites/platforms/applications adhere to strict certification requirements. Recently many incidents covered by mass media explaining how numerous unregulated apps on Google Android target individuals with easy loan options and later on indulge in malpractice to exploit the investors if they are unable to repay the loans [78].

Misbehavior in the financial sector is prevalent and costly [79]. In traditional financial advice, there is empirical support [80–84] that financial advisors push customers towards high fees for financial products to prevent discriminatory practices. The government must ensure that AI-based financial advice systems should be built to adhere to certain ethical standards. It is often argued that many chartered accountants make deliberate attempts to provide undue advantages to their clients by indulging in unethical taxation practices [85]. From the past experiences of the 2016 demonetization where Indians have frantically searched for innovative to launder their black money [86], it is evident that investors having black money may resort to AI-based financial advice systems to understand how they can park their unaccounted wealth.

Once the large-scale utilization of Artificial intelligence in taxation advice starts, it may lead to the concern of data protection of sensitive financial information of the assessee. In order to have relevant financial advice, the assessee might be required to share PAN numbers, income details, and other personal information [87] and investment details that might be leaked online and elevate already existing issues of confidential information breaches. The Reserve Bank of India (RBI) has proposed that banks implement two-stage authentication to enhance transaction security [88] and prevent banking funds from breaches of confidential data. Along similar lines, the government should ensure that the highest security protocols must be followed by AI-based financial advisor platforms.

India has seen tremendous growth in the number of Income tax returns filed in the last 10 years as well as the level of income, especially in the middle class [89, 90]. There is a proliferation among individuals seeking taxation advice, however, still, the awareness of artificial intelligence tools in Tier 2 and Tier 3 cities is relatively low. Fintech companies can explore these untapped customers by organizing consumer awareness drives. It is pertinent to highlight that a vast majority of users resorting to generative AI technologies for investment advice are probably inexperienced investors who might not have access to other sources of financial guidance. Therefore, underlining the limitations of existing AI tools as they are still in the developing stage and may not give accurate advice as human advisors assume significance.

a) Hiring a chartered accountant in India for taxation advice is a costly affair. The cost can start from 1000 rupees for a simple return filling. The fees can rise to 30000 based on the complexity of taxation advice [89, 90]. The fees charged by an accountant may be reduced

drastically, AI based platforms are very cost-effective due to their power to deal with several requests at one go [33].

b) Chartered accountants must understand that the risk of getting outdated in front of AI-based advisors may not pose in the short term, however, in the long term, it can either replace them or co-exist with them. It is therefore significantly necessary for them to be equipped with the latest technology. Rather than seeing technology as a competitor, they can embrace AI tools for better efficiency and productivity.

c) A significant challenge to the widespread adoption of AI-based advisors in India lies in the trust and confidence of the Indian consumer. Trust is a critical component in establishing consumer confidence in any technology-driven service [91]. Previous studies have demonstrated that low levels of trust in the information source can lead to negative perceptions of the associated brand [92]. This issue is not unique to AI-based advisors; similar challenges were encountered by Indian e-commerce companies during their initial growth phases. However, through sustained efforts to build and maintain customer trust, these companies successfully overcame scepticism, positioning India as one of the world's largest e-commerce markets.

6. Conclusion

This study investigates the knowledge and accuracy of the taxation advice provided by ChatGPT and Google Bard for Indian taxpayers within the current ecosystem of artificial intelligence. The empirical evidence made a significant contribution to understanding the current level of knowledge of two important AI tools available in the market. The findings of our study have implications for three primary stakeholders, i.e., the Government, Chartered Accountants, and Assesses (those seeking tax advice). Both ChatGPT and Google Bard were evaluated across Nine criteria suggesting that Google Bard is relatively better in accuracy while ChatGPT outperformed in other broad criteria. When comparing the two directly, they were mostly similar. The agreement among Chartered Accountants on the correctness of responses is slightly better for Google Bard than for ChatGPT. The policy implications are drawn that can significantly assist the government in regulating these emerging and interesting financial tools.

Overall, this study emphasizes the significance of Artificial Intelligence in professional financial advice domains, contributing insights into its capabilities to the financial literature. It is critical to investigate these ongoing technological developments in order to improve and perhaps redefine best practices, eventually contributing to the industry's progress.

The present paper suffers from various limitations that warrant consideration. Firstly, the small sample size, primarily due to the time constraints of Chartered Accountants, may limit the generalizability of the findings. Future research should aim to involve a larger cohort of financial professionals to enhance the robustness of the results. Secondly, the study utilized the paid version of ChatGPT4.0 to obtain more comprehensive answers, which may not reflect the experience of individuals using the free version, particularly in a price-sensitive market like India. Thirdly, ChatGPT is unable to access data sources published after 2021 [93] raises concerns about the relevance and accuracy of its responses, especially in the context of constantly evolving Indian tax laws. Fourthly, the study also did not explore queries in vernacular languages such as Hindi, which are supported by both ChatGPT and Google Bard. This omission is significant in the Indian context, where many users may seek taxation advice in their native languages. Future research should consider analyzing AI-generated financial advice across multiple languages to capture a broader perspective. Lastly, our study focused exclusively on taxation advice, however, further exploration into other financial domains, such as stock markets, mutual funds, and various financial instruments will be illuminating. Moreover, as AI tools continue to evolve, incorporating voice and image search capabilities may present new avenues for research in the financial advice sector.

Disclosure of AI-generated and AI-assisted technologies in the writing process:

"Statement: During the preparation of this work the author(s) used [ChatGPT & Google Bard] to generate Taxation Advice. After using ChatGPT & Google Bard, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication".

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