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Algorithmic Bias in Digital Advertising: Its Effects on Ethical Marketing Practices

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ABSTRACT

Objective: *This study examines the effect of algorithmic bias in digital advertising on ethical marketing practices in Iraqi organizations. The study focuses on three dimensions of algorithmic bias: demographic targeting bias, data-driven personalization bias, and algorithmic transparency and accountability deficiency. Ethical marketing practices were measured through fairness, transparency, privacy protection, accountability, non-discrimination, and respect for consumer rights.* ***Method:*** *The study adopted a quantitative approach based on a structured questionnaire distributed to a sample of 270 respondents working in advertising agencies, e-commerce companies, telecommunications firms, banking institutions, retail companies, technology companies, and related organizations in Iraq. The data were analyzed using reliability testing, KMO and Bartlett's test, descriptive statistics, and generalized linear regression.* ***Results:*** *The results showed that the questionnaire had strong reliability, with Cronbach's Alpha values ranging from 0.814 to 0.922, and strong construct validity, with an overall KMO value of 0.924. The descriptive results indicated high levels of awareness regarding algorithmic bias and ethical marketing practices. The regression results confirmed that the three dimensions of algorithmic bias had statistically significant effects on ethical marketing practices. Algorithmic transparency and accountability deficiency had the strongest effect, followed by data-driven personalization bias and demographic targeting bias.* ***Novelty:*** *The study concludes that ethical digital marketing requires systematic auditing of algorithms, stronger transparency, clear accountability mechanisms, responsible use of consumer data, and fair treatment of all consumer groups.*
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INTRODUCTION

The activity of digital advertising has evolved from a communication practice based on consumer segmentation to an algorithmic decision-making practice driven by artificial intelligence, predictive analytics, profiling and platform-based algorithmic targeted advertising [1], [2], [3]. This has enabled companies to reach their audience with relevant advertisements, eliminate advertising clutter, and increase the effectiveness of their marketing strategies. But the same algorithms that lead to better targeting may also lead to invisible forms of bias when relying on incomplete, biased, or historically discriminatory data. In this case, algorithmic bias is not a technical issue only. It is a marketing ethics issue because advertising algorithms may decide who is served with particular offers, who is excluded from opportunities and how personalisation is used to influence consumer preferences [4].

The ethical dimension is more relevant when online advertising platforms use demographic characteristics, behavioural signals, browsing patterns, geolocation, and predictive profiling to segment consumers into valuable segments. This can result in

differential exposure to job, financial, educational, retail or other services advertising. Prior research has shown that algorithmic advertising can lead to discrimination even when advertisers do not explicitly ask for it, because the way advertising platforms allocate ads are likely to follow patterns that are profitable for the advertising platform, rather than fair for the consumer [5]. This means that ethical marketing can no longer be assessed based solely on the advertiser's intentions. It needs to be evaluated through their outcomes [6], [7].

The Iraqi digital advertising landscape is a case in point of this issue as companies increasingly rely on social media, search advertising, e-commerce, and big data marketing strategies. However, the governance of algorithmic advertising is limited in emerging markets. The lack of transparency norms and consumer education, and limited audit practices in firms may enable biased digital targeting to go undetected. The study of algorithmic bias in Iraq, therefore, is relevant for adtech, e-commerce, telecommunication, financial, retail and technology organisations. So the current study explores the impact of demographic targeting bias, data-driven personalization bias, and algorithmic transparency and accountability deficiency on ethical marketing in Iraqi organisations. The manuscript uploaded has a sample of 270 responses and examines these via a questionnaire [8], [9], [10], [11].

Research problem

The problem investigated in this research is the increasing discrepancy between the technological effectiveness of digital advertising algorithms and ethical guidelines for equitable, transparent and responsible advertising. Companies often use algorithmic advertising systems to enhance targeting accuracy, decrease the cost of advertising and boost consumer engagement. But they may also produce subtle forms of discrimination, inequality, privacy violations and manipulation. It's not about whether firms explicitly discriminate. It also concerns whether automated advertising systems produce discriminatory results that firms do not track, explain or rectify [12]. Online advertising is growing in Iraq among private firms, banks, telecommunication companies, e-commerce businesses, and advertising agencies. But not all companies have robust processes for monitoring and auditing the outcomes of algorithms, explaining the logic of their targeting, or preventing deceptive personalisation [13], [14], [15]. This raises a research problem relating to the impact of algorithmic bias on ethical marketing in the Iraqi business landscape. This problem can be formulated as a main question: What is the extent of the influence of algorithmic bias in online advertising on ethical marketing practices in Iraqi companies? The main question can be broken down into the following sub-questions:

1. What is the extent of bias in demographic targeting on ethical marketing?
2. To what extent does big data-driven personalization bias affect ethical marketing practices?
3. To what extent does lack of algorithmic transparency and accountability affect ethical marketing practices?

4. How much do the elements of algorithmic bias explain the variation in ethical marketing practices?

Hypothesis

Following the research problem and the proposed link between algorithmic bias and ethical marketing practices, the study proposes to test the following two hypotheses: H1: Demographic targeting bias is significantly related to ethical marketing practices in Iraqi firms. H2: Big data personalisation bias has a statistically significant effect on ethical marketing practices in Iraqi organisations. H3: Algorithmic transparency and accountability deficiency has a statistically significant effect on ethical marketing practices in Iraqi organizations. H4: there is a statistically significant relationship between the dimensions of algorithmic bias and ethical marketing practices in Iraqi organizations.

Literature review

Recent research demonstrates that algorithmic bias in online advertising is now mainstream. It is a key issue in marketing practice, digital platform management, privacy, and consumer protection. Imana, Korolova and Heidemann studied discrimination in recruitment ads and discovered that ad delivery platforms may lead to discrimination even when advertisers do not explicitly exclude or include protected classes. They found that algorithmic allocation can be a source of discrimination as the platform systems allocate ads based on expected user engagement and cost-effectiveness [4].

Sapiezynski, Ghosh, Kaplan, Rieke, and Mislove examined biases in lookalike and special ad audiences and found that algorithmic audience targeting may perpetuate social inequality through "stealth" ad targeting. This research is significant because it shows that taking direct demographic variables out of the system doesn't necessarily stop bias. Algorithms can still draw inferences about sensitive attributes based on behavioural, locational or social data, which result in differential access to advertising [5].

Barbosa, Wang and Wang examined transparency in digital advertising and consumers' perceptions of online and offline profiling in digital advertisements. They highlighted that users do not have immediate explanations for why they are presented with certain ads. This results in diminished consumer autonomy and difficulties in contesting unfair and invasive advertising [16]. Burgess, Carah, Angus, Obeid and Andrejevic came to similar conclusions, as they demonstrated that platform explanations ("Why am I seeing this ad?") are not sufficient to explain the full complexity of algorithmic advertising [17].

In a related vein, from an ethical marketing standpoint, Rodgers and Nguyen suggested that artificial intelligence can facilitate better advertising decisions only if ethical considerations are built into the algorithmic purchase decision processes. Their research shows that ethical advertising involves fairness, accountability, transparency and responsibility, not just efficiency and personalization benefits [12]. Saura, Škare, and Ozretić Došen also mentioned the privacy paradox in AI-driven digital marketing, demonstrating that consumers may trade-off personalization advantages against privacy risks and data practices [18].

Other recent studies connect AI-based marketing with organisational and governance issues. De-Arteaga, Feuerriegel and Saar-Tsechansky argued that achieving algorithmic fairness in business analytics requires holistic consideration of data, model, incentives and outcomes [19]. Wang discussed discrimination and regulation of algorithms, suggesting that unfair algorithmic decision-making needs regulatory and legal mechanisms to identify and redress discrimination [20]. These research findings suggest that algorithmic bias in marketing is a multi-faceted issue including data, technology, governance, accountability and consumer rights.

The contribution of the current study is the extension of the debate to the digital advertising landscape of Iraq. Existing research has primarily addressed advanced platform economies, Western regulatory settings or massive social media platforms. The present study builds on the literature by examining the impact of three operationalized dimensions of algorithmic bias on ethical marketing practices in Iraqi firms. It also adds to the empirical literature by adopting a field questionnaire survey of experts with direct or indirect involvement in digital marketing, advertising, data analytics and platform-based consumer communication.

Spatial and temporal limits

The spatial limit of the study is the Iraqi organisations in sectors where digital advertising plays a role in consumer communication and data collection. These include advertising agencies, e-commerce firms, telecommunications companies, financial and banking companies, retail companies, technology companies and some government agencies. The study includes samples from various Iraqi governorates, such as Baghdad, Erbil, Basra, Mosul, Najaf and other governorates. This enables the study to capture the varying degrees of exposure to digital advertising practices in the Iraqi market. The time constraint of the study is the timeframe for preparing, distributing, collecting, and statistically analysing the questionnaire. The empirical analysis is focused on current practices of digital advertising that are based on artificial intelligence, algorithmic targeting, profiling, and personalization. The study is therefore associated with the post-2020 digital marketing ecosystem where advertising tools and algorithms based on artificial intelligence, privacy issues, and consumer profiling became more prominent in the digital marketing literature and practice [21], [22], [23], [24].

Population and sample

The population of the study is the employees and experts working in Iraqi firms that are involved with digital advertising tools. This includes digital marketers, marketers, social media advertisers, data analysts, IT experts, sales and customer service personnel, academics and researchers who have relevant experience with digital advertising algorithms. This is a suitable population given the subject of the research requires respondents who are able to assess algorithmic targeting, personalization, transparency, accountability, and ethical marketing practices from a professional or knowledgeable standpoint. The study sample is comprised of 270 valid responses from companies engaged in advertising, e-commerce, telecommunications, banking, retail, technology and public services in Iraq. The use of a purposive sample is appropriate

because the study topic requires respondents familiar (directly or indirectly) with digital advertising systems. The sample is statistically adequate because the survey questionnaire contains 25 measurement items, and the number of valid responses is more than the usual recommendation of 5 to 10 respondents per item. The sample size of 270 responses is also appropriate for reliability analysis, KMO and Bartlett's test, descriptive statistics, and generalized linear regression.

RESEARCH METHOD

The theoretical concept of the research

The conceptual framework of this study takes into account that digital advertising algorithms are not objective technological systems. They are socio-technical systems that integrate data, platform design and structure, business interests, prediction models and decision rules. When these systems categorise users, rank customers, or serve ads, they may result in biased outcomes if the data, optimisation and targeting criteria are imbalanced. Thus, algorithmic bias is systematic distortion in decision-making algorithms that results in inequitable, unfair, or unethical advertising [19].

The first independent variable is demographic targeting bias. It relates to the potential for digital advertising algorithms to target groups differently on the grounds of age, gender, income, education, geographical location, or other demographic factors. Bias can occur directly when advertiser-specified targeting parameters are used, or indirectly, when algorithms infer targeting factors. The ethical concern is that some groups may miss out on opportunities, offers, and more potentially exploitative messages based on automated targeting rules [4].

The second independent variable is data-driven personalization bias. This is the unfair or manipulative consequences of personalising advertising using of behavioural data, past purchase or search history, social media activity, and profiling. While personalization is beneficial in enhancing consumer relevance, it can also limit consumer choice, prime consumer attention to preferred choices, and influence consumer decisions without adequate awareness. Therefore, personalization bias is related to privacy, autonomy, manipulation, and consumer vulnerability [18].

The third independent variable is the lack of algorithmic transparency and accountability. This is the absence of explanation, auditability, and accountability in algorithmic advertising. Consumers do not understand why they are targeted for a particular advertisement, what data were used to make the decision, or which company is responsible for biased recommendations. Lack of transparency undermines ethical marketing because consumers cannot assess and challenge algorithmic advertising strategies [16].

The dependent variable is ethical marketing. It's marketing practices that consider fairness, honesty, transparency, privacy, non-discrimination and social responsibility. In digital advertising, ethical marketing means businesses must ensure their algorithms do not harm, discriminate against, manipulate, or use data irresponsibly [12]. So, the theoretical framework assumes that increased algorithmic bias undermines ethical digital

marketing practices, whereas transparency, accountability and fairness measures enhance ethical marketing practices [12].

RESULTS AND DISCUSSION

Table 1. Questionnaire Distribution for the Study Sample

Item	Frequency	Percentage
Questionnaires distributed	270	100.0%
Questionnaires returned	270	100.0%
Invalid questionnaires	0	0.0%
Valid questionnaires for statistical analysis	270	100.0%
Final response rate	270	100.0%

Source: Prepared by the researcher based on SPSS 29

As shown in the table, 270 questionnaires were sent to the sample. The return rate was 100% and all questionnaires were valid for statistical analysis. This means that the final sample size was adequate for reliability and construct validity testing, descriptive analysis, and generalized linear regression. The 100% response rate also supports the reliability of the statistical analysis.

Table 2. Demographic Characteristics of the Respondents

Demographic Variable	Category	Frequency	Percentage
Gender	Male	161	59.6%
	Female	104	38.5%
	Prefer not to say	5	1.9%
Age	Less than 25 years	34	12.6%
	25–34 years	96	35.6%
	35–44 years	82	30.4%
	45–54 years	43	15.9%
	55 years and above	15	5.5%
Educational Qualification	Diploma	31	11.5%
	Bachelor's Degree	147	54.4%
	Master's Degree	66	24.4%
	PhD	18	6.7%
	Other	8	3.0%
Professional Experience	Less than 3 years	39	14.4%
	3–5 years	63	23.3%
	6–10 years	84	31.1%
	11–15 years	52	19.3%
	More than 15 years	32	11.9%
Job Position	Digital Marketing Specialist	61	22.6%
	Marketing Manager	47	17.4%
	Social Media Advertising Officer	54	20.0%
	Data Analyst	31	11.5%
	IT Specialist	28	10.4%

Demographic Variable	Category	Frequency	Percentage
Type of Organization	Sales and Customer Relations Employee	34	12.6%
	Academic or Researcher	15	5.5%
	Advertising Agency	52	19.3%
	E-commerce Company	41	15.2%
	Telecommunications Company	37	13.7%
	Banking or Financial Institution	49	18.1%
	Retail Company	34	12.6%
	Technology Company	36	13.3%
	Public Institution	21	7.8%
Location of Work	Baghdad	86	31.9%
	Erbil	44	16.3%
	Basra	47	17.4%
	Mosul	36	13.3%
	Najaf	31	11.5%
	Other Iraqi Governorate	26	9.6%
Familiarity with Digital Advertising Algorithms	Very Low	18	6.7%
	Low	36	13.3%
	Moderate	89	33.0%
	High	91	33.7%
	Very High	36	13.3%

Source: Prepared by the researcher based on SPSS 29

The demographic results demonstrate that the sample represents participants from various professional, educational and organisational backgrounds. The majority of respondents were aged 25-44 years, which is a good fit for the study of digital advertising as this age group is more likely to engage with digital marketing. The sample also included experts from the fields of advertising, e-commerce, banking, telecommunications, retail and technology. This adds to the suitability of the sample to investigate the issue of algorithmic bias in digital advertising in Iraq.

Table 3. Reliability Results Using Cronbach's Alpha

Variable	Number of Items	Cronbach's Alpha	Reliability Level
Demographic Targeting Bias	5	0.814	Good
Data-Driven Personalization Bias	5	0.852	Good
Algorithmic Transparency and Accountability Deficiency	5	0.887	Very Good
Ethical Marketing Practices	10	0.922	Excellent
Overall Questionnaire	25	0.909	Excellent

Source: Prepared by the researcher based on SPSS 29

The reliability analysis reveals that the values of Cronbach's Alpha were between 0.814 and 0.922. This indicates that items in the questionnaire were reliable. The highest reliability value was for the dependent variable, Ethical Marketing Practices, which shows that the ten items measuring the variable were consistent. The questionnaire's overall reliability value, 0.909, confirms the questionnaire was reliable for statistical analysis.

Table 4. Construct Validity Results Using KMO and Bartlett's Test

Variable	Number of Items	Sample Size	KMO Value	Bartlett's Chi-Square	df	Sig.
Demographic Targeting Bias	5	270	0.823	459.672	10	0.000
Data-Driven Personalization Bias	5	270	0.849	498.315	10	0.000
Algorithmic Transparency and Accountability Deficiency	5	270	0.882	571.946	10	0.000
Ethical Marketing Practices	10	270	0.914	1268.733	45	0.000
Overall Questionnaire	25	270	0.924	3654.218	300	0.000

Source: Prepared by the researcher based on SPSS 29

All the variables had KMO values greater than 0.800, suggesting that the data were appropriate for factor-based validity assessment. Furthermore, the overall KMO value was 0.924, which is a good value Bartlett's Test was significant for all items (0.000), which suggests that the correlation matrix was not an identity matrix. These findings indicate that the questionnaire has good construct validity and items are appropriate for use in further analysis.

Table 5. Descriptive Statistics for Demographic Targeting Bias

Statement	Mean	Std. Deviation	Relative Importance	Likert Result
Digital advertising algorithms may expose certain demographic groups to more promotional opportunities than others.	3.694	0.817	73.88%	High
Algorithmic targeting in digital advertising can lead to unequal treatment of consumers based on age, gender, income, or geographic location.	3.921	0.769	78.42%	High
Some digital advertisements may unintentionally exclude specific groups from receiving relevant marketing offers.	3.481	0.842	69.62%	High

Statement	Mean	Std. Deviation	Relative Importance	Likert Result
Demographic-based targeting may reinforce social or economic inequalities in the digital marketplace.	3.746	0.798	74.92%	High
Companies using digital advertising should regularly assess whether their targeting systems produce demographic discrimination.	4.116	0.688	82.32%	High
Total score of Demographic Targeting Bias	3.792	0.783	75.84%	High

Source: Prepared by the researcher based on SPSS 29

The findings suggest Demographic Targeting Bias was rated highly. The overall mean was 3.792 and the relative importance 75.84%. The statement that received the highest mean rating stated the importance for companies to evaluate if their targeting programs discriminate. This finding indicates that respondents understand the potential ethical implications of "algorithmic fairness" in consumer targeting.

Table 6. Descriptive Statistics for Data-Driven Personalization Bias

Statement	Mean	Std. Deviation	Relative Importance	Likert Result
Excessive reliance on consumer data may lead to unfair personalization in digital advertising.	3.651	0.811	73.02%	High
Personalized advertisements may influence consumer choices in ways that limit independent decision-making.	3.904	0.754	78.08%	High
Algorithms may use browsing history and online behavior to create biased assumptions about consumer preferences.	4.027	0.708	80.54%	High
Data-driven personalization may expose consumers repeatedly to limited types of products or services.	3.604	0.829	72.08%	High
The use of predictive consumer profiling in advertising may create ethical concerns related to manipulation and privacy.	4.212	0.639	84.24%	Very High
Total score of Data-Driven Personalization Bias	3.880	0.748	77.60%	High

Source: Prepared by the researcher based on SPSS 29

The findings reveal that Data-Driven Personalization Bias has a high level. A total mean of 3.880 suggests that participants were concerned about the threats associated with

consumer profiling and tracking. The highest mean was found for the statement on manipulation and privacy. This indicates that personalization bias is considered a significant concern in digital advertising.

Table 7. Descriptive Statistics for Algorithmic Transparency and Accountability Deficiency

Statement	Mean	Std. Deviation	Relative Importance	Likert Result
Consumers often do not know why they receive specific digital advertisements.	4.091	0.698	81.82%	High
Companies usually provide limited explanations about how advertising algorithms target consumers.	3.972	0.731	79.44%	High
The lack of transparency in digital advertising algorithms makes it difficult to detect unfair practices.	4.142	0.681	82.84%	High
Organizations may avoid responsibility when biased advertising outcomes occur through automated systems.	3.754	0.807	75.08%	High
Clear accountability mechanisms are necessary to ensure ethical use of algorithms in digital advertising.	4.196	0.648	83.92%	High
Total score of Algorithmic Transparency and Accountability Deficiency	4.031	0.713	80.62%	High

Source: Prepared by the researcher based on SPSS 29

The findings show that Algorithmic Transparency and Accountability Deficiency is high. The overall mean of 4.031 was one of the highest levels in this research. The highest statement was related to the requirement of definite accountability in algorithms of digital advertising. It confirms that the respondents see transparency and accountability as the key elements of ethical algorithmic advertising.

Table 8. Descriptive Statistics for Ethical Marketing Practices

Statement	Mean	Std. Deviation	Relative Importance	Likert Result
Digital advertising practices should ensure fairness in targeting all consumer groups.	4.113	0.668	82.26%	High
Ethical marketing requires companies to avoid discriminatory outcomes in algorithm-based advertising.	4.181	0.637	83.62%	High
Companies should clearly inform consumers when algorithms are used to personalize advertisements.	3.936	0.742	78.72%	High

Statement	Mean	Std. Deviation	Relative Importance	Likert Result
Respecting consumer privacy is a core requirement of ethical digital marketing.	4.212	0.624	84.24%	Very High
Ethical digital advertising should avoid manipulating consumer behavior through excessive personalization.	3.991	0.709	79.82%	High
Companies should regularly audit their advertising algorithms to detect bias and unfair targeting.	4.074	0.692	81.48%	High
Ethical marketing practices require transparency in the collection and use of consumer data.	4.132	0.657	82.64%	High
Organizations should be held accountable for harmful outcomes caused by biased digital advertising algorithms.	3.884	0.768	77.68%	High
Digital advertisements should provide consumers with fair access to relevant offers and information.	3.751	0.803	75.02%	High
Ethical marketing in the digital environment depends on balancing business objectives with consumer rights.	4.101	0.684	82.02%	High
Total score of Ethical Marketing Practices	4.038	0.698	80.76%	High

Source: Prepared by the researcher based on SPSS 29

Overall, the findings show that Ethical Marketing Practices were scored highly. The overall mean was 4.038, which demonstrates high agreement on the need for fairness, privacy, transparency and accountability. The highest mean score is for privacy, which is important in ethical digital marketing. The study shows that ethical marketing in the digital advertising landscape in Iraq is about striking a balance between business goals and consumer interests.

Table 9. Generalized Linear Regression Results for Testing Research Hypotheses

Model	Predictor	B	Std. Error	Wald χ^2	Sig.	Hypothesis Result
Model 1	Constant	1.271	0.207	37.697	0.000	—
Model 1	Demographic Targeting Bias	0.731	0.054	183.171	0.000	H1 Supported
Model 2	Constant	1.083	0.191	32.149	0.000	—

Model	Predictor	B	Std. Error	Wald χ^2	Sig.	Hypothesis Result
Model 2	Data-Driven Personalization Bias	0.762	0.049	241.876	0.000	H2 Supported
Model 3	Constant	0.881	0.177	24.771	0.000	—
Model 3	Algorithmic Transparency and Accountability Deficiency	0.783	0.044	316.686	0.000	H3 Supported
Model 4	Constant	0.398	0.159	6.268	0.012	—
Model 4	Demographic Targeting Bias	0.218	0.047	21.516	0.000	H1 Supported
Model 4	Data-Driven Personalization Bias	0.289	0.044	43.137	0.000	H2 Supported
Model 4	Algorithmic Transparency and Accountability Deficiency	0.401	0.041	95.671	0.000	H3 Supported
Model 4	Overall Algorithmic Bias Dimensions	—	—	236.482	0.000	H4 Supported

Source: Prepared by the researcher based on SPSS 29

The results of the generalized linear regression (GLR) suggest that all dimensions of algorithmic bias significantly affected Ethical Marketing Practices. Algorithmic Transparency and Accountability Deficiency had the highest coefficient (B = 0.783) in the single models. In the overall model, the three predictors were significant at 0.000. This confirms all of the hypotheses and confirms that algorithmic bias is a predictor of unethical marketing.

Table 10. Model Fit and Diagnostic Tests for Generalized Linear Regression Models

Diagnostic Test	Model 1	Model 2	Model 3	Model 4	Accepted Criterion
Omnibus Wald χ^2 Sig.	0.000	0.000	0.000	0.000	Sig. < 0.05
Deviance / df	1.176	1.119	1.084	1.031	Close to 1
Pearson Chi-Square / df	1.204	1.139	1.101	1.047	Close to 1
Pseudo R^2	0.431	0.489	0.542	0.687	Higher is better
AIC	656.372	631.485	602.918	534.226	Lower is better
BIC	667.169	642.282	613.715	552.220	Lower is better
VIF Range	1.000	1.000	1.000	1.356–1.714	VIF < 5
Durbin-Watson	1.948	1.971	1.991	2.021	Near 2
Breusch-Pagan Sig.	0.193	0.226	0.274	0.329	Sig. > 0.05
Shapiro-Wilk Sig. for Standardized Residuals	0.096	0.121	0.142	0.163	Sig. > 0.05

Source: Prepared by the researcher based on SPSS 29

The diagnostics indicate that the four regression models were statistically sound. In each model, the Omnibus Wald test was significant, which means that the predictors added to the model. The Deviance/df and Pearson Chi-Square/df values were close to one, indicating that they were well fit The fourth model had the highest explanatory power, the smallest AIC and BIC values, and no significant issues of multicollinearity, autocorrelation, heteroscedasticity and residual non-normality.

CONCLUSION

Fundamental Finding: The study found that algorithmic bias in digital advertising is a threat to ethical marketing in Iraq. The findings revealed that there were significant effects of demographic targeting bias, data-driven personalisation bias, and algorithmic transparency and accountability on ethical marketing practices. The regression results showed that algorithmic transparency and accountability deficiency had the greatest impact on ethical marketing practices, followed by data-driven personalization bias and demographic targeting bias. This finding reveals that transparency and accountability are key factors for ethical digital advertising. **Implication:** The research suggests that Iraqi organizations should develop policies for digital advertising algorithm audits. Companies should also implement internal governance structures that specify responsibility for algorithmic advertising. It also suggests companies should enhance consumer transparency by informing customers about why certain ads are displayed, what data are used, and how personalisation can be managed. Ethical digital marketing practices need to protect privacy, obtain consent and provide equitable access to marketing information. Lastly, regulators, industry groups, and universities in Iraq should promote guidelines and training on responsible AI, fair advertising and customer data privacy. **Limitation:** The descriptive findings show that the respondents were very aware of the risks of algorithmic bias. Lack of algorithmic transparency and accountability had one of the highest means, which highlights the ethical issues related to advertising algorithms without clear explanations. Additionally, the findings indicated that data-driven personalization bias is highly related to consumer privacy and manipulation. Demographic targeting bias also emerged as a significant problem because algorithms may provide different opportunities for advertisers to target different consumer segments. **Future Research:** Therefore, digital ethical marketing cannot be disassociated from how algorithms track data, categorise consumers, personalise ads and allocate digital media. When a company can't explain how its advertising algorithms operate, how its customer data are used, or who is accountable for its bias, its marketing practices become less ethical.

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