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Fairness Under Algorithmic Opacity: A Configurational Model of Price Evaluation in Digital Platform Markets

1. Ehsan. Saghaei Dehkordi: PhD Candidate, Department of Business Management, Kish International Campus, University of Tehran, Tehran, Iran
2. Mohsen. Nazari*: Professor, Department of Marketing and Market Development, Faculty of Business Management, College of Management, University of Tehran, Tehran, Iran

*corresponding author's email: mohsen.nazari@ut.ac.ir

ABSTRACT

The present study aimed to develop a qualitative configurational model explaining how consumers evaluate price fairness under conditions of algorithmic opacity in digital platform markets. This study was conducted using a qualitative exploratory design with a configurational approach. The research population consisted of digital platform users in Tehran who had prior experience with algorithmically mediated pricing systems in online marketplaces, ride-hailing services, food delivery applications, and e-commerce platforms. Twenty-eight participants were selected through purposive sampling with maximum variation in age, gender, occupation, and platform usage patterns. Data were collected through semi-structured in-depth interviews and scenario-based discussions focused on experiences of dynamic pricing, personalized pricing, transparency, trust, and fairness perceptions in digital markets. Interviews lasted between 45 and 75 minutes and were audio-recorded and transcribed verbatim. Data analysis was performed using thematic and configurational analysis through open, axial, and selective coding procedures with the assistance of MAXQDA software. Credibility and trustworthiness were enhanced through participant validation, peer review, memo writing, and audit trail documentation. The findings revealed that fairness evaluation in digital platform markets is a multidimensional and configurational process rather than a simple reaction to price magnitude. Perceived transparency emerged as the strongest factor associated with positive fairness judgments, while algorithmic opacity intensified distrust, emotional dissatisfaction, and perceptions of manipulation. Participants generally accepted dynamic pricing when contextual justifications such as demand pressure, urgency, or service convenience were perceived as legitimate. Comparative assessment across platforms and users played a major role in fairness interpretation, especially under conditions of informational uncertainty. Personalized pricing practices generated strong perceptions of discrimination when users believed that behavioral or personal data influenced prices without procedural explanation. Prior trust in the platform partially moderated negative reactions toward algorithmic pricing, although repeated unexplained inconsistencies weakened platform credibility. The final configurational model demonstrated that fairness judgments emerge through the interaction of transparency cues, trust mechanisms, contextual necessity, emotional responses, comparison processes, and perceived consumer vulnerability. The study concluded that fairness in digital platform markets is socially and cognitively constructed through users' interpretations of opaque algorithmic systems rather than solely through objective price outcomes. Algorithmic opacity transforms price evaluation into an interpretive process shaped by procedural transparency, platform accountability, trust, and contextual reasoning. Digital platforms that fail to provide understandable explanations for pricing mechanisms risk increasing perceptions of manipulation, discrimination, and procedural injustice. The findings suggest that sustainable digital marketplace governance requires explainable and transparent pricing systems capable of maintaining both technological efficiency and consumer trust.

Keywords: Algorithmic opacity, price fairness, digital platform markets, dynamic pricing, consumer trust, configurational model, platform economy, online marketplaces, perceived fairness, algorithmic pricing

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Introduction

Digital platform markets have transformed the contemporary economic landscape by reshaping the mechanisms through which consumers search for products, compare alternatives, evaluate prices, and make purchasing decisions. The rapid expansion of e-commerce ecosystems, platform-based service infrastructures, algorithmic recommendation systems, and AI-enhanced marketplaces has fundamentally altered traditional market relationships and introduced new forms of interaction between consumers, data systems, and digital intermediaries (1). In recent years, the increasing integration of artificial intelligence, predictive analytics, dynamic pricing systems, and behavioral data extraction into digital marketplaces has intensified the complexity of market transactions and significantly changed the nature of price evaluation in online environments (2). Unlike conventional physical markets where price determination mechanisms are relatively visible and socially observable, digital platform markets frequently rely on opaque computational processes that remain inaccessible to users. Consumers often encounter prices generated through hidden algorithms, personalized recommendation systems, automated demand forecasting models, or dynamic pricing infrastructures without fully understanding the criteria or variables influencing those prices. This transformation has shifted price evaluation from a straightforward economic judgment into a broader cognitive, emotional, and interpretive process involving trust, transparency, technological literacy, and perceptions of procedural fairness (3). As digital markets continue to expand globally and increasingly mediate everyday economic activities, understanding how consumers perceive fairness under algorithmic opacity has become an essential issue for researchers, policymakers, and platform designers.

The rise of algorithmically mediated commerce has created unprecedented opportunities for efficiency, scalability, personalization, and market expansion across multiple industries. Contemporary digital platforms facilitate rapid interactions among producers, consumers, intermediaries, and service providers while simultaneously reducing transaction costs and increasing market accessibility (4). AI-enhanced marketplaces have further accelerated economic integration and cross-border trade by enabling adaptive pricing strategies, predictive customer segmentation, and automated market optimization (5). E-commerce ecosystems now extend far beyond traditional retail transactions and encompass tourism platforms, creative economy infrastructures, NFT marketplaces, geospatial data exchanges, agricultural digital systems, and multi-sided sharing platforms (6-9). These developments have enabled businesses to create increasingly personalized user experiences and maximize market responsiveness through real-time algorithmic adjustment mechanisms. Studies examining the evolution of digital ownership, platform capitalism, and decentralized commercial alternatives suggest that algorithmic coordination is rapidly becoming a defining feature of digital economic systems (10, 11). At the same time, the widespread implementation of dynamic pricing systems and behavioral personalization has generated growing concerns regarding fairness, discrimination, transparency, and consumer autonomy in digital environments.

Price has traditionally represented one of the most influential determinants of consumer behavior and purchasing decisions in both physical and online markets (12). However, digital platform economies have altered the meaning and social interpretation of pricing by embedding prices within invisible algorithmic infrastructures. Consumers no longer evaluate prices solely according to objective cost-value relationships; instead, they increasingly interpret prices through perceptions of transparency, consistency, accountability, and procedural legitimacy. Research on online consumer behavior indicates that trust and perceived fairness significantly influence digital purchase intentions and platform loyalty (13). In highly digitized markets, users frequently encounter situations in which

identical or similar products appear with varying prices depending on timing, location, user behavior, browsing history, or platform-specific recommendation algorithms. Such conditions often produce uncertainty regarding whether pricing outcomes reflect legitimate market conditions or hidden forms of algorithmic manipulation. The absence of transparent pricing explanations can intensify perceptions of exploitation, especially when users believe that platforms selectively target vulnerable consumers or personalize prices according to behavioral data profiles. Consequently, the concept of fairness in digital markets has evolved into a multidimensional phenomenon shaped by informational asymmetry, technological opacity, social comparison, and emotional interpretation.

The expansion of AI-driven personalization systems has further complicated the relationship between consumers and digital pricing structures. Contemporary e-commerce platforms rely heavily on user data extraction, predictive analytics, and automated recommendation systems to optimize engagement and maximize revenue generation (14). While such systems improve convenience and customization, they also create environments in which users possess limited visibility regarding how decisions are made and how prices are generated. Scholars examining data-economy relationships emphasize that digital platforms derive substantial economic power from their ability to collect, process, and operationalize user data within opaque commercial infrastructures (3). This opacity may undermine consumer trust when users perceive that algorithmic systems are unfairly exploiting informational advantages. Research on online marketplaces has shown that consumers frequently interpret unexplained price fluctuations as evidence of manipulation, particularly when platforms provide insufficient procedural transparency (15). Similar concerns have emerged in studies of platform capitalism and meta-platform business models, which suggest that digital ecosystems increasingly centralize market power while reducing the visibility of pricing mechanisms and governance structures (10, 16). As algorithmic systems become more sophisticated, consumers may struggle to distinguish between legitimate dynamic pricing and potentially discriminatory personalization practices.

The issue of fairness in digital platform markets also intersects with broader debates regarding competition, regulation, and market governance. Scholars examining online marketplace structures argue that platform dominance and algorithmic coordination can reshape competitive dynamics by influencing visibility, accessibility, and pricing behavior (17). Debates surrounding antitrust reform and digital platform power further demonstrate that algorithmic infrastructures increasingly shape economic opportunities and consumer experiences in ways that are not always transparent or democratically accountable (18). The growing concentration of market power within large digital platforms has raised concerns regarding asymmetrical control over data, pricing information, and transaction processes. In many cases, consumers possess limited capacity to verify whether prices are fair because the logic underlying algorithmic decisions remains inaccessible. This informational imbalance may weaken perceptions of procedural justice and reduce trust in digital commerce ecosystems. Moreover, as online marketplaces expand into essential sectors such as transportation, tourism, healthcare products, and food systems, perceptions of pricing fairness become socially significant beyond purely commercial considerations (19, 20). Consumers increasingly depend on platform-mediated services in their everyday lives, making algorithmic fairness a critical dimension of digital economic governance.

Recent developments in e-commerce design and user experience have attempted to address some of these concerns by emphasizing transparency, interoperability, and consumer-centered platform architectures. Studies on unified cart systems and integrated marketplace infrastructures indicate that digital platforms are increasingly investing in streamlined user experiences and enhanced transaction coordination (21). Similarly, research

examining platform and e-commerce design in family businesses demonstrates that platform trust and interface clarity significantly influence user satisfaction and purchasing behavior (22). Nevertheless, technological improvements alone do not necessarily resolve concerns regarding hidden algorithmic processes. Consumers may still perceive unfairness even within highly efficient systems if they believe that critical pricing decisions occur without adequate explanation or accountability. The rapid monetization of digital assets, NFTs, and platform-mediated ownership structures has further intensified these challenges by introducing new forms of speculative valuation and algorithmically mediated market exchange (23, 24). In such contexts, price evaluation increasingly depends on symbolic trust, platform legitimacy, and perceptions of procedural integrity rather than solely material product characteristics.

The COVID-19 pandemic accelerated the global dependence on digital marketplaces and further reinforced the importance of online pricing systems in shaping economic behavior. Research on tourism marketplaces, creative economy platforms, and digital entrepreneurship demonstrates that digital commerce became an essential mechanism for economic resilience during periods of physical restriction and market disruption (6, 25). SMEs, entrepreneurs, and local producers increasingly relied on online platforms to sustain market participation and consumer access during the pandemic period. This transition significantly expanded the influence of digital pricing systems on consumer experiences and purchasing decisions. At the same time, heightened economic uncertainty increased consumer sensitivity toward fairness, affordability, and price transparency. Studies exploring consumer perceptions in online shopping environments reveal that fairness perceptions strongly influence trust formation, repeat purchase intentions, and long-term platform engagement (15). When consumers perceive that prices are manipulated or inconsistently applied, their willingness to continue platform participation may decline substantially. Consequently, algorithmic fairness has become closely connected to the sustainability and legitimacy of digital commerce ecosystems.

Another important dimension of fairness evaluation concerns the social and emotional aspects of digital consumption. Consumer reactions to prices are not exclusively rational calculations but are deeply influenced by psychological interpretation, social comparison, and emotional response. Research on social media marketing and digital consumer dynamics suggests that trust, symbolic value, and perceived authenticity increasingly shape online purchasing behavior (13). In algorithmically mediated markets, users often compare their experiences with those of other consumers and interpret inconsistencies as indicators of discrimination or procedural injustice. Emotional responses such as suspicion, frustration, helplessness, or anger may emerge when users believe that platforms exploit personal data or selectively impose higher prices on vulnerable consumers. Studies examining global consumer dynamics emphasize that digital commerce environments are increasingly shaped by behavioral personalization strategies that blur the boundaries between market optimization and consumer manipulation (14). Such developments highlight the need to conceptualize fairness not only as an economic outcome but also as an experiential and relational phenomenon embedded within broader digital interactions.

The configurational complexity of fairness judgments suggests that consumers rarely evaluate prices according to isolated variables. Instead, fairness perceptions emerge through interactions among transparency cues, contextual justifications, prior trust, platform dependence, technological literacy, and social comparison processes. Existing studies on marketplace growth, entrepreneurship promotion, and digital business models provide valuable insights into platform expansion and consumer behavior but often fail to examine how these multiple dimensions combine to shape fairness judgments under conditions of algorithmic opacity (26, 27). Similarly, research on e-

commerce growth trajectories and future digital market structures primarily emphasizes technological efficiency, economic scalability, and innovation potential without sufficiently addressing the interpretive experiences of users confronting opaque pricing systems (28). The literature therefore reveals an important conceptual gap regarding the configurational mechanisms through which consumers construct fairness evaluations in algorithmically mediated markets. Although prior studies have explored digital trust, online pricing, consumer dynamics, and platform governance separately, limited attention has been devoted to understanding how these dimensions interact simultaneously within real consumer experiences.

The increasing diversification of digital marketplaces also underscores the need for context-sensitive approaches to fairness evaluation. Hyper-local AI marketplaces, decentralized blockchain commerce systems, NFT economies, and multi-sided data platforms each introduce distinct forms of algorithmic coordination and pricing logic (2, 7, 11). Consumers navigating these environments encounter varying degrees of transparency, accountability, and procedural explanation. Moreover, digital literacy levels, technological familiarity, and prior platform experiences may significantly influence how users interpret algorithmic pricing decisions. Research on online skill development and digital capability enhancement demonstrates that consumers and entrepreneurs differ substantially in their ability to understand and navigate digital systems (29). Such differences may intensify inequalities in digital markets by affecting users' capacity to evaluate whether prices are fair or manipulative. The complexity of these interactions reinforces the importance of qualitative approaches capable of capturing the lived experiences, interpretations, and emotional responses of digital platform users.

Despite the rapid expansion of digital platform economies and the growing influence of algorithmic pricing systems, the existing literature lacks a comprehensive configurational understanding of how consumers evaluate fairness under conditions of algorithmic opacity. Most prior studies focus either on technological infrastructure, market performance, consumer trust, or regulatory concerns independently, while relatively few studies investigate how these dimensions interact within the subjective experiences of users confronting opaque pricing environments. Furthermore, many quantitative investigations reduce fairness perceptions to isolated measurable variables and overlook the dynamic, relational, and interpretive nature of fairness construction in digital markets. The present study seeks to address this gap by examining how consumers in digital platform markets construct fairness judgments through the interaction of transparency perceptions, trust dynamics, comparative evaluations, contextual justifications, emotional reactions, and experiences of vulnerability under algorithmically mediated pricing systems.

The aim of this study is to develop a qualitative configurational model of price fairness evaluation under algorithmic opacity in digital platform markets.

Methods and Materials

This study was conducted using a qualitative exploratory design with an inductive–configurational approach. The purpose of the qualitative design was to understand how users evaluate the fairness of prices in digital platform markets when pricing mechanisms are algorithmic, dynamic, personalized, or insufficiently transparent. The study focused on users' interpretations of price fairness under conditions of algorithmic opacity, meaning situations in which the consumer observes the final price but does not have full access to the rules, variables, or computational logic through which that price has been generated. The research setting was Tehran, Iran, because the city has a high concentration of digital platform users and includes diverse forms of platform-mediated consumption, including ride-hailing, online food delivery, e-commerce marketplaces, digital service platforms, and online accommodation

or ticketing platforms. The study population consisted of adult digital platform users residing in Tehran who had used at least two types of digital platforms during the previous six months and had experienced price changes, personalized offers, surge pricing, commission-based pricing, discounts, or other algorithmically mediated pricing practices. Participants were selected through purposive sampling, and maximum variation was considered in terms of gender, age, education level, income level, frequency of platform use, and type of platform experience. The final sample included 28 participants from Tehran, consisting of 15 women and 13 men aged between 21 and 49 years. Sampling continued until theoretical saturation was achieved; after the twenty-fifth interview, no substantially new conceptual categories emerged, and three additional interviews were conducted to confirm the stability and conceptual adequacy of the extracted categories. Inclusion criteria were residence in Tehran, being at least 18 years old, regular use of digital platforms, willingness to participate in an in-depth interview, and the ability to describe personal experiences of evaluating prices in digital markets. Participants who had no direct experience with digital platform transactions or who were unable to provide reflective accounts of price evaluation were excluded from the study. Before the interviews, all participants were informed about the purpose of the study, confidentiality of information, voluntary participation, and their right to withdraw at any stage. Verbal informed consent was obtained from all participants, and all identifying information was removed during transcription and analysis.

Data were collected using a semi-structured interview protocol developed by the researchers based on the conceptual focus of the study, namely price fairness, algorithmic opacity, platform trust, perceived discrimination, price transparency, and user responses to dynamic pricing. The interview protocol included open-ended questions designed to encourage participants to describe their real experiences with digital platform prices rather than provide abstract opinions. The main questions addressed how participants notice and interpret price changes, what factors make a platform price seem fair or unfair, how they understand algorithmic or automated pricing, whether they believe different users receive different prices, how discounts and promotions affect fairness judgments, and how they respond when they feel that a price is unjustified. Follow-up questions were used to deepen the interviews, such as asking participants to explain a specific situation in which they abandoned a purchase, compared prices across platforms, distrusted a platform, accepted a higher price, or attributed a price change to demand, location, timing, user profile, or platform manipulation. The interview guide was reviewed by three academic experts in marketing, consumer behavior, and digital business studies to evaluate its content relevance, clarity, and adequacy. After expert review, two pilot interviews were conducted with digital platform users in Tehran, and minor revisions were made to improve the wording, sequencing, and probing depth of the questions. The pilot interviews were not included in the final analysis.

In addition to the interview protocol, a short demographic and platform-use information form was used to collect background information from participants. This form included age, gender, education level, employment status, approximate monthly income category, frequency of platform use, types of platforms used, and the participant's most common digital purchasing or service-ordering activities. This information was not used for statistical analysis, but it helped contextualize the interview data and supported maximum variation in participant selection. Scenario-based prompts were also used during the interviews to elicit more precise reflections on price evaluation. These prompts presented participants with brief hypothetical examples of dynamic pricing, such as a ride-hailing fare increasing during rain, a food delivery fee changing at peak hours, an e-commerce product being shown at different prices across users, or a platform applying a discount that later appeared to be artificial. Participants were asked

how they would interpret each situation, whether they would consider the price fair, and what information would change their judgment. These scenarios helped reveal the configurational nature of fairness evaluation by showing how different conditions, such as transparency, necessity, trust, urgency, comparison opportunities, and perceived exploitation, combine to shape user judgments. All interviews were conducted individually, either face-to-face in a quiet location in Tehran or online through secure communication platforms according to participant preference. Each interview lasted between 45 and 75 minutes. With participant permission, interviews were audio-recorded and then transcribed verbatim. Field notes were also written after each interview to record contextual observations, preliminary interpretations, emotional emphasis, and emerging analytical ideas.

Data analysis was performed using qualitative thematic and configurational analysis. The analysis began immediately after the first interviews and continued concurrently with data collection. Interview transcripts were read several times to achieve immersion in the data and to identify meaningful units related to price perception, fairness judgment, opacity, trust, and behavioral response. In the first stage, open coding was conducted line by line, and statements that reflected participants' interpretations of platform prices were coded as close as possible to the language of the participants. Initial codes included concepts such as "unexplained price increase," "comparison with previous price," "trust in platform reputation," "feeling targeted by the algorithm," "acceptance of surge pricing during peak demand," "suspicion toward discounts," "price justified by urgency," "fairness through transparency," and "switching to another platform." In the second stage, similar codes were compared, merged, and organized into broader conceptual categories. This process led to the development of categories such as perceived price transparency, perceived algorithmic discrimination, market comparison, situational necessity, platform dependence, prior trust, perceived value, justification of price change, emotional reaction, and resistance behavior.

In the next stage, axial coding was used to examine relationships among categories and to identify the conditions under which users judged platform prices as fair, conditionally acceptable, suspicious, or unfair. The analysis did not treat fairness evaluation as the result of a single factor; instead, it examined how multiple conditions combined to produce different fairness judgments. For example, a price increase was more likely to be perceived as acceptable when users believed that demand had genuinely increased, when the platform provided an explanation, when alternative platforms showed similar prices, and when the user had prior trust in the platform. In contrast, the same price increase was more likely to be perceived as unfair when users could not identify a clear reason for the change, suspected personalization based on their location or purchase history, observed inconsistent prices across users, or felt unable to avoid the transaction because of urgency or dependency. Through constant comparison, the study developed a configurational model showing that price evaluation in digital platform markets emerges from the interaction of informational, relational, situational, and behavioral conditions. The final model conceptualized fairness under algorithmic opacity as a judgment formed through the configuration of transparency cues, trust resources, comparison possibilities, perceived user vulnerability, and platform accountability.

To enhance analytical rigor, all transcripts were coded and organized using MAXQDA software. Memo writing was used throughout the analysis to document coding decisions, emerging assumptions, category boundaries, and relationships among concepts. Peer review was applied by asking two qualitative research specialists to examine selected transcripts, codes, and category definitions. Disagreements were discussed until conceptual clarity was reached. Credibility was strengthened through participant validation, in which a brief summary of the extracted categories was shared with six participants to assess whether the interpretations were consistent with their experiences. Transferability was supported by providing detailed descriptions of the research context, participants,

platform-use experiences, and analytical procedures. Dependability was maintained through an audit trail that included interview guides, coding notes, memos, category development records, and model-building decisions. Confirmability was addressed by reflexive note-taking, through which the researchers documented their own assumptions about platform pricing and algorithmic fairness in order to reduce interpretive bias. The final analytical output was a qualitative configurational model of price evaluation in digital platform markets, explaining how users construct fairness judgments when algorithmic pricing is only partially visible, weakly explained, or entirely opaque.

Findings and Results

The demographic characteristics of the participants indicated substantial diversity in terms of age, educational background, occupation, and digital platform usage patterns, which contributed to the richness and variability of the qualitative findings. Among the 28 participants, 15 were women and 13 were men. The age distribution ranged from 21 to 49 years, with the largest proportion belonging to the 26–35 age group, reflecting the dominant demographic profile of active digital platform users in Tehran. Participants included undergraduate students, postgraduate students, private-sector employees, self-employed individuals, public-sector employees, freelancers, and online business users. Educational levels ranged from diploma holders to doctoral graduates, although the majority possessed at least a bachelor's degree, indicating relatively high digital literacy and familiarity with online environments. In terms of platform use, all participants reported regular engagement with ride-hailing applications, while most participants also used food delivery platforms, online retail marketplaces, online payment services, ticketing systems, and digital service applications. Frequency of use varied from occasional weekly use to multiple daily transactions. Participants also differed in their attitudes toward technology and algorithmic systems; some demonstrated strong trust in platform automation and viewed algorithmic pricing as efficient and rational, whereas others expressed persistent skepticism toward hidden pricing mechanisms and believed that digital platforms intentionally manipulated prices based on user behavior, urgency, or purchasing history. This demographic and experiential diversity enabled the study to capture a broad spectrum of perceptions regarding fairness under algorithmic opacity and strengthened the conceptual depth of the emerging configurational model.

Table 1. Descriptive Overview of Core Categories Extracted from Participant Interviews

Core Category	Frequency of Mentions	Representative Meaning	Dominant Participant Response
Perceived Price Transparency	24	Clarity regarding reasons for price changes	Increased acceptance and reduced suspicion
Algorithmic Distrust	22	Suspicion toward hidden computational pricing systems	Feelings of manipulation and unfairness
Dynamic Pricing Acceptance	18	Acceptance of changing prices during high demand conditions	Conditional fairness perception
Comparative Price Evaluation	21	Comparing prices across platforms or users	Validation or rejection of fairness
Personalized Pricing Concern	19	Belief that prices differ according to user profile or behavior	Perceived discrimination
Platform Trust and Reputation	20	Reliance on platform credibility and prior positive experience	Greater tolerance toward price variation
Perceived Consumer Vulnerability	16	Feeling compelled to accept prices due to urgency or dependency	Emotional dissatisfaction
Discount Authenticity Doubt	17	Suspicion regarding artificial or misleading discounts	Reduced trust in promotional pricing
Value-Based Justification	15	Acceptance of higher prices when accompanied by quality or convenience	Rationalized fairness judgment
Switching and Resistance Behavior	14	Migration to alternative platforms after unfair experiences	Behavioral rejection of platform pricing

The findings presented in Table 1 demonstrate that fairness evaluation in digital platform markets is not based on a single isolated variable, but rather emerges through a combination of informational, emotional, comparative, and relational conditions. The most frequently mentioned category was perceived price transparency, which appeared in 24 interviews and represented the strongest factor associated with positive fairness judgments. Participants repeatedly emphasized that they were more willing to accept high or fluctuating prices when the platform clearly explained the reason for the change, such as increased demand, traffic congestion, weather conditions, or limited supply. Algorithmic distrust was also highly prevalent, appearing in 22 interviews, indicating that many participants viewed opaque pricing systems as potentially exploitative. Several participants believed that platforms monitored user behavior patterns and adjusted prices according to urgency, purchasing history, device type, or frequency of use. Comparative price evaluation emerged as another dominant theme, revealing that users often relied on cross-platform comparisons or interpersonal discussions to determine whether a price was fair. Participants rarely evaluated fairness in isolation; instead, they assessed prices relative to prior experiences, competitor platforms, and expectations shaped by digital market norms. Personalized pricing concern reflected the perception that algorithmic systems may produce unequal outcomes for different consumers, which intensified feelings of injustice even when the absolute price difference was relatively small. Trust in the platform's reputation partially moderated these concerns, as users who viewed a platform as reliable and accountable were more likely to justify temporary price increases. At the same time, categories such as perceived consumer vulnerability and discount authenticity doubt revealed that users became particularly critical when they felt dependent on the platform or suspected manipulative promotional tactics. Overall, the findings indicate that algorithmic opacity transforms price evaluation from a purely economic calculation into a broader interpretive and emotional process shaped by transparency, trust, comparison, and perceived autonomy.

Table 2. Axial Coding Structure of Fairness Evaluation Under Algorithmic Opacity

Axial Theme	Causal Conditions	Contextual Conditions	Intervening Conditions	User Consequence
Acceptance of Dynamic Pricing	Perceived demand increase	Time-sensitive transactions	Prior platform trust	Conditional acceptance
Perception of Algorithmic Unfairness	Unexplained price variation	Lack of transparency	Comparative inconsistency	Distrust and dissatisfaction
Justification Through Convenience	Faster delivery or service quality	Urban digital dependency	Habitual platform use	Rationalization of high prices
Perceived Personalized Discrimination	Different prices across users	Data-driven personalization	Weak accountability mechanisms	Emotional resistance
Suspicion Toward Promotional Pricing	Artificial discounts	High frequency of sales campaigns	Prior negative experience	Reduced promotional credibility
Migration to Alternative Platforms	Repeated unfair experiences	Availability of substitutes	Social recommendations	Platform switching behavior
Temporary Tolerance of High Prices	Urgency and necessity	Lack of immediate alternatives	Service dependency	Forced compliance
Demand for Transparency	Confusion about pricing logic	Opaque algorithmic systems	Desire for procedural fairness	Request for explanation and accountability

The axial coding structure presented in Table 2 illustrates the configurational relationships among causal, contextual, and intervening conditions shaping user judgments about pricing fairness in digital platform markets. The findings reveal that the same pricing outcome may produce different fairness evaluations depending on the broader interpretive context within which users understand the transaction. For instance, dynamic pricing was not automatically perceived as unfair; participants frequently accepted increased prices when they believed that demand conditions objectively justified the change. Situations involving heavy traffic, bad weather, peak-hour transportation demand, or urgent delivery requests often led participants to perceive higher prices as procedurally

reasonable, especially when platforms provided visible explanations for the increase. In contrast, unexplained price changes generated strong perceptions of unfairness because users interpreted opacity as a signal of possible manipulation or hidden discrimination. The findings also demonstrate that convenience and efficiency played an important moderating role. Many participants acknowledged that digital platforms provided speed, accessibility, and reduced transaction costs, which sometimes justified prices that would otherwise be considered excessive. However, when users suspected personalized discrimination or inconsistent pricing among consumers, emotional reactions became significantly stronger. Participants described feelings of exploitation, helplessness, and loss of control when they believed that algorithmic systems selectively targeted them according to behavioral data or situational vulnerability. Promotional pricing generated particularly complex reactions. While discounts initially created positive perceptions, repeated exposure to artificial or inflated “before discount” prices reduced trust and increased skepticism toward platform intentions. Repeated unfair experiences often resulted in switching behavior, with participants moving toward alternative platforms that appeared more transparent or predictable. Overall, the findings confirm that fairness under algorithmic opacity is configurational rather than linear, emerging through the interaction of transparency, trust, necessity, convenience, accountability, and perceived consumer agency.

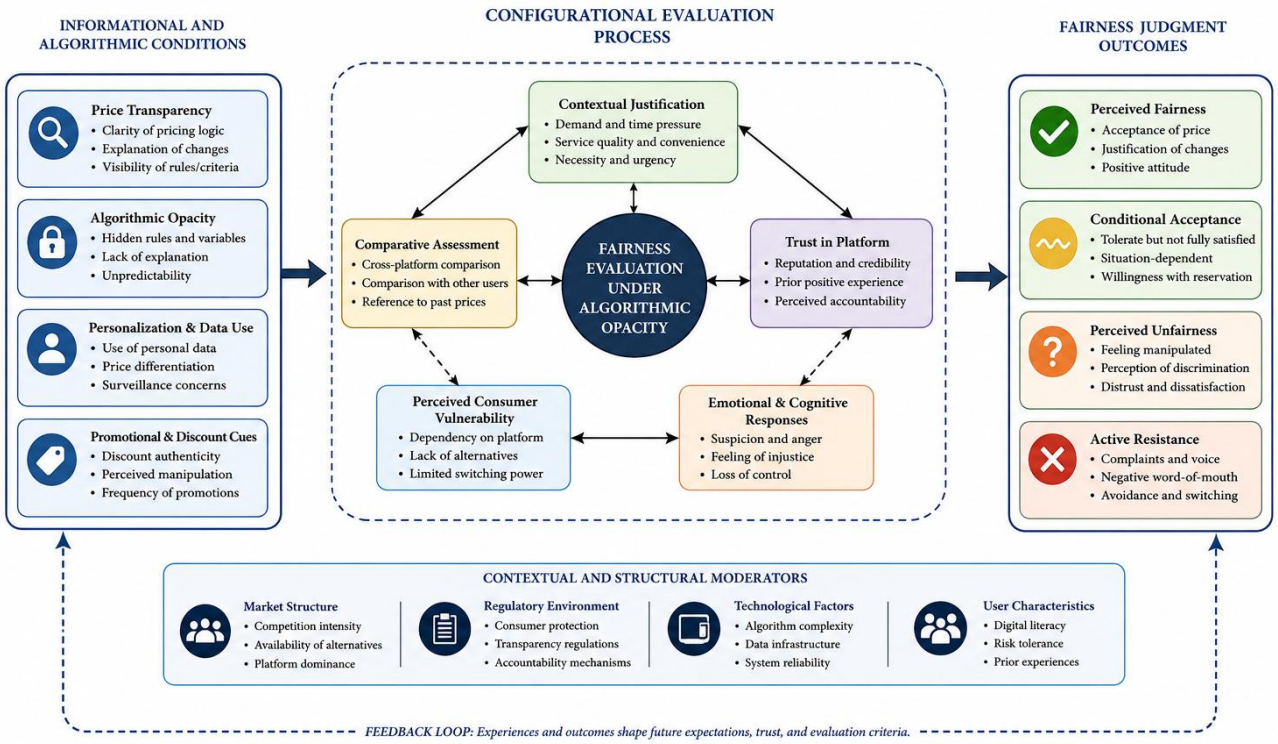
Table 3. Selective Coding and Final Configurational Model of Price Fairness Evaluation

Selective Category	Integrated Dimensions	Conceptual Interpretation
Transparent Algorithmic Fairness	Explanation, accountability, consistency	Fairness emerges when users understand pricing logic
Conditional Procedural Acceptance	Necessity, urgency, contextual justification	Users tolerate higher prices under justified conditions
Relational Trust-Based Fairness	Reputation, prior experience, reliability	Trust moderates negative reactions to price changes
Comparative Equity Assessment	Cross-platform comparison, social comparison	Fairness is evaluated relationally rather than absolutely
Data-Driven Injustice Perception	Personalization, opacity, surveillance concerns	Hidden algorithmic targeting produces perceived discrimination
Vulnerability-Induced Compliance	Dependency, lack of alternatives, urgency	Consumers may accept prices despite perceived unfairness
Resistance and Corrective Behavior	Complaints, switching, avoidance	Perceived unfairness generates behavioral responses
Configurational Fairness Formation	Interaction of informational and emotional conditions	Fairness is constructed through multiple simultaneous conditions

The selective coding findings presented in Table 3 led to the development of the final configurational model of price fairness evaluation under algorithmic opacity. The model demonstrates that fairness judgments are not formed exclusively through objective price levels, but rather through the interaction of procedural interpretation, emotional response, platform trust, social comparison, and situational dependency. Transparent algorithmic fairness emerged as the strongest positive pathway, indicating that users are generally willing to accept algorithmic pricing when the underlying logic is understandable and appears consistent across users and situations. Participants repeatedly emphasized that even unfavorable prices could be perceived as fair if accompanied by adequate explanations and visible procedural accountability. Another major pathway involved conditional procedural acceptance, in which users tolerated high or fluctuating prices during urgent or exceptional circumstances. This finding suggests that contextual rationality plays a major role in digital market fairness evaluation. Relational trust-based fairness further revealed that platform reputation and prior positive experience reduced the intensity of negative reactions to pricing changes. Participants who trusted a platform often interpreted ambiguous pricing situations more favorably and gave the system the benefit of the doubt. In contrast, data-driven injustice perception represented the strongest negative pathway. Users became highly critical when they believed that platforms used behavioral or personal data

to selectively manipulate prices without transparency or consent. Comparative equity assessment showed that fairness was fundamentally relational; participants constantly compared their experiences with those of other users and competing platforms. Vulnerability-induced compliance demonstrated that acceptance of a price does not necessarily indicate perceived fairness, since many users complied with prices because of urgency, dependency, or lack of alternatives. Finally, resistance and corrective behavior illustrated that unfairness perceptions translated into concrete behavioral outcomes, including platform abandonment, reduced trust, negative word-of-mouth, and active price comparison practices. These findings collectively support the conclusion that fairness in digital platform markets is configurational, dynamic, and deeply shaped by the opacity of algorithmic pricing systems.

Figure 1. Final Configurational Model of Fairness Evaluation Under Algorithmic Opacity in Digital Platform Markets



The conceptual model illustrated in Figure 1 integrates the major themes and configurational pathways extracted from participant interviews and demonstrates the dynamic interaction among transparency cues, algorithmic trust, contextual justification, personalization concerns, social comparison, consumer vulnerability, and behavioral response. The figure conceptually represents fairness evaluation as a multidimensional process rather than a fixed economic judgment. According to the model, informational transparency acts as the primary stabilizing mechanism within digital platform markets because it reduces uncertainty and weakens perceptions of algorithmic manipulation. At the same time, emotional and contextual conditions significantly shape user interpretation of pricing outcomes. The model also highlights that consumer reactions are not passive; rather, users actively interpret, compare, negotiate, justify, resist, and respond to platform pricing practices. Consequently, the findings suggest that fairness under algorithmic opacity should be understood as a socially constructed and configurational phenomenon

emerging from the interaction of technological systems, market structures, user expectations, and situational experiences within digitally mediated economic environments.

Discussion and Conclusion

The findings of the present study demonstrated that fairness evaluation in digital platform markets is a multidimensional and configurational process shaped by the interaction of transparency perceptions, trust mechanisms, algorithmic opacity, comparative assessment, emotional interpretation, and contextual necessity. The results revealed that consumers do not evaluate prices solely according to objective economic value or absolute price levels; rather, they interpret pricing outcomes through broader perceptions of procedural legitimacy, informational visibility, and relational accountability. One of the most significant findings of the study was the central role of perceived transparency in shaping fairness judgments. Participants consistently reported that they were more willing to accept dynamic or fluctuating prices when platforms provided understandable explanations regarding the reasons for those changes. This finding aligns with studies emphasizing that consumer trust and purchasing decisions in digital environments depend heavily on perceived credibility, transparency, and informational reliability (13). The findings also support arguments suggesting that modern e-commerce ecosystems increasingly require user-centered transparency mechanisms in order to sustain long-term platform legitimacy (21). The participants' emphasis on explanation and procedural clarity further indicates that fairness judgments in algorithmic markets are strongly connected to the visibility of decision-making processes rather than merely transactional outcomes.

The study further revealed that algorithmic opacity significantly intensifies perceptions of distrust and perceived unfairness. Participants frequently interpreted unexplained price changes as indicators of hidden manipulation, discriminatory personalization, or exploitative market behavior. These findings are consistent with discussions regarding the growing concentration of informational power within digital platforms and the asymmetrical relationship between consumers and algorithmic infrastructures (3). Previous studies examining platform capitalism similarly argue that digital platforms increasingly operate through opaque computational systems that limit consumer understanding of pricing logic and behavioral targeting practices (10). The present findings extend this literature by demonstrating that algorithmic opacity not only affects informational access but also shapes emotional and psychological responses toward the platform itself. Participants often described feelings of uncertainty, suspicion, and loss of control when they believed that prices were generated through inaccessible computational mechanisms. This suggests that algorithmic opacity functions as a social and emotional trigger that influences fairness perceptions independently of the actual price magnitude.

Another important finding concerned the conditional acceptance of dynamic pricing under specific contextual circumstances. Participants generally viewed price increases as acceptable when situational factors such as high demand, urgency, traffic congestion, limited supply, or service convenience appeared to justify the change. This finding indicates that consumers possess contextual flexibility in evaluating fairness and are capable of rationalizing price variation when they perceive a legitimate external cause. Such findings correspond with broader research on consumer dynamics in digital markets, which suggests that users increasingly interpret prices in relation to convenience, accessibility, and service responsiveness rather than fixed market standards (14). Similarly, studies examining tourism resilience and digital commerce adaptation during periods of crisis have shown that consumers may tolerate higher prices when platforms provide perceived value, continuity, or necessary services under

constrained conditions (6). The present study therefore demonstrates that fairness judgments in digital platform markets are situationally negotiated and influenced by contextual interpretations of necessity and proportionality.

The findings additionally highlighted the importance of comparative evaluation in the construction of fairness judgments. Participants rarely assessed prices in isolation and instead relied heavily on comparisons with competing platforms, prior experiences, and other users' transactions. This finding reflects the inherently relational nature of fairness perception within digital marketplaces. Previous studies on online consumer behavior and e-commerce interaction similarly emphasize that digital consumers continuously compare alternatives and evaluate market legitimacy through relative positioning rather than purely objective standards (12). The configurational model developed in the present study extends this perspective by demonstrating that comparative assessment becomes especially important under conditions of algorithmic opacity, where users lack direct access to pricing logic and therefore rely on external comparison cues to determine whether prices are fair. In this sense, comparison functions as a compensatory mechanism through which consumers attempt to reconstruct transparency within opaque digital environments.

The issue of personalized pricing emerged as another major source of perceived unfairness among participants. Many users believed that platforms adjusted prices according to behavioral data, purchasing history, urgency patterns, or location-based information. These concerns were closely associated with perceptions of algorithmic discrimination and procedural injustice. The findings support previous literature emphasizing the growing role of data extraction and behavioral personalization within digital economies (16). Research on AI-enhanced marketplaces and digital monetization systems similarly indicates that platforms increasingly rely on user profiling and predictive analytics to optimize commercial outcomes (5, 23). However, the present study demonstrates that such personalization mechanisms may weaken consumer trust when users perceive insufficient transparency or accountability regarding how data influences pricing decisions. Participants frequently described personalized pricing as unfair not because price variation itself was inherently unacceptable, but because the decision-making process appeared hidden, selective, and uncontestable. This finding suggests that procedural visibility is more important for fairness perception than price uniformity alone.

The findings also showed that trust in the platform partially moderated negative reactions toward algorithmic pricing. Participants who had prior positive experiences with a platform or who viewed a platform as reputable and reliable were more likely to tolerate temporary price increases or ambiguous pricing situations. This finding aligns with studies emphasizing the mediating role of brand trust and digital reputation in shaping consumer behavior and purchasing intentions (13). Research on e-commerce design and marketplace development likewise demonstrates that long-term platform relationships can reduce uncertainty and strengthen user confidence in digital transactions (22). Nevertheless, the present findings indicate that trust has limits under conditions of persistent opacity. Even highly trusted platforms generated negative reactions when users repeatedly encountered unexplained price inconsistencies or perceived manipulative promotional tactics. Therefore, trust alone cannot fully compensate for the absence of procedural transparency within algorithmic pricing systems.

An additional contribution of the study concerns the role of emotional and cognitive responses in fairness construction. Participants frequently described emotional reactions such as anger, frustration, helplessness, or resentment when they perceived prices as procedurally unjust. These findings indicate that price evaluation in digital markets extends beyond economic rationality and involves emotional interpretations linked to dignity, autonomy, and perceived respect. Previous research on consumer perceptions and digital engagement has similarly

highlighted the growing importance of experiential and psychological dimensions in online purchasing behavior (15). The current study expands this understanding by showing that algorithmic opacity intensifies emotional responses because consumers feel excluded from decision-making processes affecting their transactions. This emotional dimension is particularly important because it directly influences resistance behaviors such as platform switching, avoidance, complaints, and negative word-of-mouth communication.

The findings further demonstrated that many consumers continue to accept prices despite perceiving them as unfair due to dependency, urgency, or limited alternatives. This phenomenon, conceptualized in the study as vulnerability-induced compliance, reflects the increasing structural dependence of consumers on digital platform ecosystems. Studies examining digital marketplaces and platform expansion indicate that online systems increasingly mediate essential aspects of economic and social life (4). As platforms become integrated into transportation, food delivery, tourism, healthcare access, and entrepreneurial ecosystems, consumers may feel compelled to tolerate pricing practices they consider questionable because practical alternatives are limited. This finding contributes to broader discussions regarding digital market power and consumer autonomy by illustrating that acceptance of algorithmic pricing does not necessarily indicate genuine perceptions of fairness.

The present study also contributes theoretically by proposing a configurational model of fairness evaluation under algorithmic opacity. Existing studies often examine isolated determinants of online purchasing behavior, such as trust, convenience, usability, or pricing strategy independently (27, 28). In contrast, the findings of this study demonstrate that fairness emerges through the simultaneous interaction of multiple informational, contextual, emotional, and relational conditions. This configurational perspective is particularly important because digital platform markets are inherently complex and dynamic environments where users interpret pricing outcomes through interconnected cognitive and social processes. The findings therefore provide a more comprehensive framework for understanding fairness in contemporary algorithmic economies.

From a broader perspective, the results also carry implications for debates surrounding platform governance, regulation, and digital market ethics. As digital marketplaces increasingly rely on AI-driven pricing systems, concerns regarding accountability, transparency, and procedural justice are likely to intensify (2). Studies examining antitrust issues, decentralized commerce systems, and digital ownership structures have already emphasized the need for more balanced governance mechanisms within platform economies (7, 11, 18). The present findings reinforce these concerns by showing that consumers interpret opacity itself as a source of unfairness even when the final economic outcome may appear commercially rational. Consequently, the legitimacy of future digital marketplaces may depend not only on efficiency and personalization but also on the extent to which algorithmic systems remain explainable, accountable, and socially understandable to users.

One limitation of the present study concerns the qualitative nature of the research design and the relatively limited sample size, which restricts the statistical generalizability of the findings. Although the study achieved theoretical saturation and captured diverse consumer experiences, all participants were recruited from Tehran, meaning that cultural, technological, and economic conditions specific to this urban context may have influenced the findings. Another limitation involves the reliance on self-reported experiences and perceptions, which may be affected by memory bias, subjective interpretation, or emotional framing. Additionally, because algorithmic pricing systems are themselves opaque, participants could only describe their perceptions of pricing logic rather than objectively verify the actual computational mechanisms used by platforms.

Future research could expand the present study by employing mixed-method or quantitative approaches to test the configurational relationships identified in this research across larger and more diverse populations. Comparative cross-cultural studies may provide important insights into how cultural norms, digital literacy levels, and regulatory environments influence fairness evaluation in algorithmic markets. Future investigations could also examine differences across specific platform sectors such as ride-hailing, healthcare applications, NFT marketplaces, tourism platforms, or AI-based retail systems. Another important direction for future research involves experimental studies that manipulate transparency explanations, personalization cues, or dynamic pricing conditions in order to observe how consumers respond under controlled conditions. Longitudinal studies may additionally help clarify how repeated interactions with opaque pricing systems shape trust, adaptation, and resistance behaviors over time.

The findings of the present study suggest several practical implications for digital platform managers, policymakers, and designers of algorithmic pricing systems. Platforms should prioritize transparency-enhancing mechanisms that clearly communicate the reasons for price changes and provide understandable procedural explanations for dynamic pricing decisions. User trust may be strengthened when platforms reduce informational ambiguity and offer visible accountability structures regarding the use of personal data in pricing processes. Digital platforms should also avoid excessive reliance on hidden personalization practices that may generate perceptions of discrimination or exploitation. Policymakers and regulatory institutions may benefit from developing clearer standards regarding algorithmic accountability and consumer rights in digital marketplaces. Finally, platform designers should recognize that fairness perceptions are deeply connected to emotional experience and procedural interpretation; therefore, maintaining long-term consumer trust requires not only efficient pricing systems but also transparent, explainable, and socially legitimate market interactions.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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