**LEGAL DILEMMA OF CONSUMER PROTECTION UNDER ALGORITHMIC PRICING REGIME.**

by

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*The emergence of smart technologies has introduced machine learning algorithms with progressive capacities to predict the category of goods a particular class of persons may purchase and within a determined price range. The development has engendered personalised pricing regimes which threaten the cardinal principles of privacy and pricing uniformity or equity, thereby posing ethical and legal challenges. The prospect that algorithms could promote social welfare by increasing efficiency and promoting market optimisation dwindles with the grievous harm suffered by consumers from lack of information and behavioral biases disproportionately affecting identifiable consumer groups, particularly women and colored races. Unfortunately, most of these algorithms defy the General Data Protection Regulation (GDPR) of various jurisdictions, including Europe and United States of America (USA). This paper examines the efficiency of the current regulations on data governance and privacy protection, highlighting the need to balance regulation with the progressive social values of artificial intelligence (AI) technologies through the evolution of algorithm-centered approaches. A case is made for cutting edge policies designed to unmask the black box algorithmic phenomenon for proper interpretation of AI decision-making process. This would streamline the battlefield with clarity and precision regarding the limits of AI's intervention with market forces and consumers liberties.*

**Keywords**: Algorithmic Pricing, Data Governance, Artificial Intelligence, Consumer Protection, Law

1. **INTRODUCTION**

The emergence of machine learning and big data technologies have defied the hitherto private domains of personalised data through unhindered access to enormous information, thereby exposing the status of individual consumers to the advantage of sellers or marketers who offer personalised prices to their product consumers.[[1]](#footnote-1) The trend has become one of the notable marks of consumer economy around the globe which has raised manifest economic and legal puzzles questioning the safety and security of consumers within a market structure. The phenomenon maybe referred to as surveillance pricing because its pricing regime is anchored on discrete analysis of class status and behavioral preferences of the target consumer.[[2]](#footnote-2) In 2012 it was shown that prices at the online-sales-giant platform, amazon.com, was highly variable.[[3]](#footnote-3) It was earlier reported in 2001 that Amazon engaged AI to analyse behavioral tendencies of customers in order to offer personalised prices to them. Gunderson reports of a consumer who accessed some mahjong tiles put up for sales at $54.99.[[4]](#footnote-4) She dropped the tiles in her online basket only to discover that the price has escalated to $79.99. She immediately emptied the cat and picked up the item again. This time at $59.99. Other online trading platforms may stipulate prices based on estimated location of the potential consumer. Where a consumer lives within 20 miles of competing shops, staples.com persistently offered lower prices.[[5]](#footnote-5) In Nigeria, algorithmic pricing is most prominent with *Uber* which services are mostly enlisted by persons who may be stranded or in dire need of movement from one location to another. It has been shown that *Uber* offers higher prices to consumers with low battery phones or in secluded or crisis areas where such customers exhibit the proclivity to desperation.[[6]](#footnote-6)

The increasing challenges posed by the algorithmic pricing mechanism in terms of personalised data privacy breaches, unequal standards and unfair treatment of consumers of the same product informs the vigilance over the violation of consumers’ statutory rights.[[7]](#footnote-7) Incidents of price discrimination whether real or imagined have resulted in formidable backlash from informed consumers. This was the case with Disneyland Paris in 2015 when it attracted public outrage for offering disparate prices to consumers based on country of domicile. [[8]](#footnote-8) The public response shows that a granular price differentiation is considered exploitative and grave enough to attract bureaucratic intervention. The evolving landscape presents interesting times for litigation attorneys. In *Gibson v. MGM Resort Int'l*,[[9]](#footnote-9) the plaintiffs contend that prominent Las Vegas Strip Hotel casino contravened the law when it engaged algorithmic price fixing mechanism in accessing computer pricing data with which it provided unlawful room-rate schedules for hotel operators’ exorbitant profiteering. In a more recent development, the Attorney General of the District of Columbia in the United States of America (USA) initiated a lawsuit against 14 corporate landlords in the country who engage the RealPage software to coordinate centralised rent prices which overreached Americans.[[10]](#footnote-10)

Statutory interventions such as the General Data Protection Regulation (GDPR) applicable to online algorithmic pricing has exposed inherent price discrepancy and personalised pricing with underlying, potential biases, though without generalisation.[[11]](#footnote-11) Li suggests that the foregoing inherent features which justify the application of GDPR over-looks online algorithmic pricing by way of affinity database mechanism which challenges the very foundation of GDPR.[[12]](#footnote-12) Consequently, Meituan, China’s foremost online travel platform offers charges to its subscribers in consideration of their organisational band and phone brand so much so that *i*-phone users receive higher prices on the presumption that they are wealthier and more financially capable. [[13]](#footnote-13) Neither battery information nor specified phone brands identifies as personal data which could be used to mark out particular individuals as to come within the operations of the GDPR. This is because the evolving affinity database mechanism does not profile particular user as in the case of *Uber* but bypasses the GDPR to overreach the consumer.[[14]](#footnote-14) The law therefore should be dynamic to identify the changing faces of algorithmic pricing to avoid development of counter-technologies that may plunge the global market-space into crisis.

This paper has been developed in stages. The foregoing section sets up the template for the discourse and this is followed by a discourse on the concept of online algorithmic pricing, identifying reasons why statutes should interfere to regulate it. The economic importance of pricing algorithms on sales and purchases of goods and services is analysed. This paves the way for discussion on the regulatory interventions and challenges of legal implementation of such interventions. Attempts at protecting consumers in various jurisdictions are examined in the face of soaring popularity of online algorithmic pricing leading into the concluding remarks.

1. **2. MATERIALS AND METHODS**

The research uses the doctrinal technique of legal analysis, evaluating primary and secondary sources of law on the subject matter. Specifically, the paper is designed to engage linguistic, logical, and systematic approaches in its analysis. The linguistic approach is adopted for a broad analysis of legal nomenclature and the terminologies common to AI phenomenon. The logical approach provides a framework for aligning evidence with, enhancing an overall interrogation of the relationship between legal protection of consumers, the sustenance of the e-market economy and AI tools which appear to be driving the process. The systematic approach is helps in the evaluation of the basic principles of equality, data protection and contractual autonomy within the realities of technological innovations introduced into the landscape of modern commercial transactions. The approaches as designed will construct evolving patterns within the perspective of consumer protection law in contemporary society. In contributing to the discourse on the intervention of smart technology in commercial transactions, the paper draws on recent works on AI and data protection by such authors as Porat, [[15]](#footnote-15) Aloamaka[[16]](#footnote-16) and Panek, [[17]](#footnote-17) as well as corporate entities like the European Union.

2**.0 RESULT AND DISCUSSION**

**2. 1. CONCEPTUALISING ONLINE ALGORITHMIC PRICING**

Generally, algorithmic pricing may be defined as the deployment of software to automate the fixing of prices. This general definition excludes algorithms that could remotely influence pricing, including those engaged by donation-based live streaming platforms.[[18]](#footnote-18) According to the Organization for Economic Cooperation and Development (OECD), online personalised pricing consists in price discrimination on final consumers based on their personal characteristics and conducts, resulting in prices being set as an increasing function of consumers’ willingness to pay.[[19]](#footnote-19) It affords online sellers or platforms the capacity to offer different prices to multiple consumers of the same product relying on the data it generated about such consumers. Algorithmic pricing connotes a collection of predetermined pricing rules and strategies engaged to establish prices. Spann *et al* identify the basic differences between regular pricing mechanisms and algorithmic pricing to be the automation features peculiar to online pricing.[[20]](#footnote-20) By automation, it is meant that an algorithm could be programmed to harvest an individual's shopping data, browsing history and post code for the purpose of generating a consumer’s profile. The profile data enables the platform to forecast such a consumer's ability to pay or switch and tag prices appropriately.However, as Zang and Li posit, there is an ongoing debate among scholars for a uniform definition of algorithmic pricing. [[21]](#footnote-21)

Simply put, price discrimination describes the bottom line of algorithmic pricing. It needs to be noted that discrimination in pricing is not novel in the offline market economy. It is manifest in three varying classifications. Steppe suggests that the "Perfect" price discrimination which constitutes the first in the classification of price discriminations defines circumstances whereby a consumer is allowed to pay the maximum of what one could pay so long as the seller maximises profit from the sales. [[22]](#footnote-22)Another taxonomy of price discrimination is presented under the arrangement of ‘the more you buy the less you pay’. This process implicates greater discount for massive purchases. The last price discrimination mechanism as conceived by Gerlick and Liozu crystallises where prices are tagged in accordance with social variables, particularly occupation, gender, residence, and age.[[23]](#footnote-23) Algorithmic pricing devices may be classified based on the quality of task assigned to them, the extent of managerial input, and the mechanism of distillation of outcomes such as whether or not they engage randomisation or specification in the decision-making process. The differentiation may also be determined by the ownership or controlling mind of the algorithm such as seller as demonstrated by Amazon and affiliate sellers on Amazon or a platform like *Uber* which balances demand and supply through its ride-sharing platforms.

Notwithstanding the practice of individualised price discounts marketing strategies in retail shops, real-time algorithmic pricing became notable in the 2010s. The phenomenon has assumed a household status as online market economy continues to expand. To this end, it is most inappropriate to conceive algorithmic pricing only in terms of pricing discrimination for the purpose of legal analysis. The term "discrimination" in legal context implicates prejudicial or unjust treatment of diverse sets of persons. It is a nominative word that portends bias, resulting in ambiguation. Algorithmic pricing may be beneficial across board. Study has shown that when an algorithm sets delivery prices at regular intervals for a restaurant or food delivery outfit, the delivery cost is lower than the uniform delivery charges thereby demonstrating the potential of the pricing system to enhance consumer benefits as well as restaurants’ efficiency.[[24]](#footnote-24) The adoption of rent-optimisation algorithm by real estate companies in 2019 resulted in prices that are more in tandem with microeconomic realities.[[25]](#footnote-25) The price-fixing design of pricing algorithms may not be engaged for exploitation of individual persons as the term ‘discrimination’ legally connotes. The system may be a marketing strategy among competitors rather than against unsuspecting consumers. Brown and Mackay demonstrate that the use of algorithms for pricing of OTC allergy drugs among the most notable online retailers showed lower prices for consumers by the firms whose algorithms updated prices more frequently.[[26]](#footnote-26) They posit that frequent updates of prices undercut competitors rather than consumers. The attempt to argue the benefit of algorithmic pricing in favor of low-income consumers is inconclusive given the diverse marketing variables that interplay to establish welfare outcome of prices. The fact that the pricing mechanism is not absolutely negative on the consumers show that the term ‘discrimination’ as the underlying word within the concept of algorithmic pricing is misleading.[[27]](#footnote-27) It may therefore be safer to posit that online algorithmic pricing should be defined without reference to price ‘discrimination’ or ‘differentiation’. Price fixation suffices for legal analysis. The concept of algorithmic pricing generally raises the potential for collusion, price-fixing among competitors who may be oblivious of the collusion to artificially inflate prices and hamper competition. Where such outcomes demonstrate an illegal agreement as opposed to mere "conscious parallelism," a crime may attach.[[28]](#footnote-28)

1. **2. ECONOMIC IMPLICATIONS OF ENGAGING ALGORITHMIC PRICING**

The evolution of algorithmic pricing mechanism and its patronage across the length and breadth of e-commerce economy has thrown up legal and socio-economic realities. Part of the utility of civil-liberty statutes is the proscription of disparate treatments of individuals in a manner construed as discrimination. Bar-Gill *et al* suggest three fundamental taxonomy of algorithmic discrimination which implicates its negative impact in legal analysis.[[29]](#footnote-29) These are algorithmic price discrimination, algorithmic quality discrimination, and algorithmic discrimination based on sex and race. It follows that where algorithms take cognisance of human judgement that are inherently discriminatory, their decision outcomes will demonstrate discrimination. This outcome is exemplified in the Amazon recruitment algorithm which showed bias against women based on its male-overbearing training data. The social backlash was spontaneous, prompting immediate disengagement of the software.[[30]](#footnote-30)

The benefits of algorithmic pricing to low-income consumers exist to negate a blanket tag of adversity on the AI phenomenon.[[31]](#footnote-31) In the process of price fixing, algorithms show propensity to engage in both statistical and test-based discrimination highlighting the unlikelihood of unconscious bias inherent in most human decisions. It follows that a significant degree of sexism and racism interact to produce outcomes relating to ability to pay, willingness to repay (WTP), among other characteristics. Gallis refers to the features of sex and race in the circumstances as crude proxies devoid of excellence whereas algorithms are known to engage excellent predictors.[[32]](#footnote-32) The isolated cases of discrimination do not dwindle the benefits of the emerging trend given the ease with which algorithmic discrimination could be detected as against human propelled discriminations.[[33]](#footnote-33) Besides, consumers could de-escalate the implications of algorithmic price discrimination, unlike human discrimination, by concealing their salient features and fare better, especially those that have expertise in navigating digital environments. [[34]](#footnote-34) Notwithstanding the benefits of engaging algorithms in the pricing enterprise, much industry on the subject matter dwell on the aspects relating to algorithmic collusion, implicating the involuntary moderation of prices among algorithms owned and controlled by diverse merchants - producing an outcome of prices beyond competitive value.[[35]](#footnote-35) The collusion among algorithms for the purpose of price fixation justifies the revelations and fears of consumers who are more circumspect in engaging the online market economy. Where the market structure is oligopolistic, such seeming collusion could intensify competition among sellers resulting in better welfare for consumers. [[36]](#footnote-36)

Another implication of algorithmic pricing is consumer-apathy resulting from negative attitude or misrepresentation. [[37]](#footnote-37) The disposition of consumers in the circumstances are traceable to the basic aversion for differential treatment and the apprehension of being profiled by somewhat ubiquitarian "black box" whose outcomes depend on consumers’ personal data. The skepticism of consumers draws from the fundamental view of autonomy and fairness. Consumers’ conception of fairness may have regulatory effects in the long run. To this end, consumer backlash has regulated the opportunistic use of pricing algorithms and in the process engendered a moderate price disparity that has demonstrated ethical superiority to multilateral pricing.[[38]](#footnote-38)

Algorithmic fairness is underscored by a notion of autonomy beyond the concept of "right to choose," particularly the liberty to contract voluntarily. The act of buying and selling is no doubt contractual. Price discrimination is built on the premise of willingness to pay and willingness to supply by actors from the two sides to the bargain. Autonomy, therefore encompasses parties’ rights to the control of individual data with all diligence of privacy. Where such private data is supplied voluntarily it becomes a tool for algorithms to generate 'just prices'. Algorithmic pricing may after all produce fair and just price regimes in which every customer is offered prices which are in tandem with their social-economic status. This regime eventually creates inequality reflected in the customers aversion for being personalised and exploited because of their status.[[39]](#footnote-39) Autonomy which encompasses the liberty to transact a business is a fundamental right enacted in Article 16 of the European Union (EU) Charter. The Court of Justice of the European Union (CJEU)'s decision in *Sky Osterreich* on the liberty to conduct business covers all economic activities as well as the contract between parties.[[40]](#footnote-40) The CJEU had in an earlier case in *Commission v Belgium*[[41]](#footnote-41) interpreted the liberty to contract to consist in the liberty of choice of business partners as well as the capacity to determine prices for services rendered. Consequently, online market actors are at liberty to fix specific prices for specific customers whether by human decision process or by the use of mechanisms. The EU law appears to justify online algorithmic pricing in a manner that step-sides data subjects’ rights, particularly when such pricing outcome is affinity based. However, by the EU's hierarchy of laws, the right to the protection of personal data synced with privacy and family life are as fundamental as the liberty to transact business. It is therefore unsettled which law will prevail in a conflict situation. Following the strict interpretation of the EU laws, the regime for the protection of individual's data may take the back seat, a situation which is at variance with many of the municipal statutes of member states.

The right to set prices enjoyed by suppliers is directly proportional to the consumer's rights to withdraw from the contract. Article 9 (1) of the Directive 2011/83/EU on Rights of Consumers (CDR) [[42]](#footnote-42) gives two weeks to consumers to rescind a contract made online or by proxy. This implicates that a consumer is at liberty, within the stipulated time frame, to engage in a fresh contract and repudiate an earlier one upon discovery that the latter contracted an exorbitant price for the same products. [[43]](#footnote-43) In the case of *PE Digital*, [[44]](#footnote-44) the consumers sought redress upon discovery of lower price offer made to other consumer of the same products.The Court in the case declared the factors to be considered in determining excessive price to include the price offered by the particular seller to consumers of similar products under the same conditions.The decision resonates with the critical stipulations in the guidelines to Article 29 Working Party adopted by the European Data Protection Board in prohibitively highly prices resulting from automated pricing mechanism. [[45]](#footnote-45) In analysing the rights to personal data protection in Nigeria, Aloamaka posits that personal data protection is a statutory liberty enforceable by the mechanism of the Fundamental Rights Enforcement Procedure Rules.[[46]](#footnote-46) This implicates that such statutory protection which is constitutional overrides any legislations granting autonomy in commercial transactions in all circumstances.

1. 3. **PRICING ALGORITHMS: WHY DATA PROTECTION LAW SHOULD APPLY**

Metaverse implicates the practical reduction of the globe into a whole unit by obliterating geographical borders. [[47]](#footnote-47) The result is that online market economy is available to any participant at the touch of the button, irrespective of distance between demand and supply. The need for internet governance has empowered independent legal domains to respond to the emerging public concerns from the use of algorithmic pricing devices. The similitude of internet operations encourages uniform approaches which may only defer to state enforcement authority. Consequently, consumer protection laws and competition laws offer credible regulatory options given the propensity towards algorithmic collusion which tends towards market dominance that infringes consumers protection. China has developed e-commerce law[[48]](#footnote-48) which resonates with Europe’s anti-discrimination law.[[49]](#footnote-49) To this end, the need to engage data protection laws in the functioning of pricing algorithms may be justified for the protection of consumers’ identity and privacy, reputation, equity and autonomy.

Price fixing algorithms depend on attitudinal data and personal information so much so that they perceive a customer's personality from affinity data exposing such customer’s behaviours, private life, confidential preferences, and health status. The abuse of the price setting technology, therefore, endangers consumers’ privacy and infringes their rights to data autonomy. Also, the potentials of big data platforms to unleash ubiquitous algorithms which engage in random data harvesting for purposes of customer-assessment results in breach a person's reputational interest beyond a singular business transaction when such information is deployed to manipulate such customers unconsciously. This becomes the case when such data is perpetuated without the consent or knowledge of the profiled customer. The USA Airline Tariff Publishing Company (ATPCO), a company jointly owned by notable airline operators, declared its willingness in October 2019 to develop a pricing device that is capable of adjusting prices using the data of consumers’ previous transactions. Yang confirms that big data corporations such as Apple, Acxiom, Datalogix and Amazon harness data on consumers’ transactional behavior as well as personal issues like medical records and such other information and furnish such data to retailers. [[50]](#footnote-50) The data protection law in the circumstances becomes recipe for balancing lawfulness, transparency, and fairness. Any inquiry that uses or exposes an individual’s status falls into the scope of data protection law in its broadest application. The CJEU has given a wide interpretation to personal data in accordance with Article 29 WP, demonstrating the elasticity of the law to accommodate everything.[[51]](#footnote-51)

Another justification for invoking the data protection law regime over algorithmic pricing is because of its salient advantages over other species of consumer protection statutes. Data protection law is fortified with inherent remedies for aggrieved consumers. It is expansive enough to cater for ex-post judicial reliefs as well as ex-ante remedies through its risk-based mechanism to ensure the protection of personal data of users. The twin mechanisms of data protection by design and default (DPBD) and data protection impact assessment (DPIAs)[[52]](#footnote-52) function to identify palpable algorithmic risks prior to resultant infringement. Porat suggests the rights inherent in data protection laws to include data disclosure mandates, right to protection from data collection ex-ante also known as ‘cookies laws’ widely used in Europe and the USA and the right against data retention ex-post also known as the right to be forgotten or erasure laws. [[53]](#footnote-53) These protections are enacted in Article 17 of the GDPR and the Consumer Protection Act of California 2018. [[54]](#footnote-54) The data protection law interrogates the chilling effect of online pricing mechanism unlike the consumer protection law which requires a potential claimant to become a customer as prerequisite.[[55]](#footnote-55) The data protection law applies anywhere and whenever personal data is harvested or utilised, whether or not the data subject is a customer.

1. **REGULATORY CHALLENGES TO DATA PROTECTION LAW BY ALGORITHMIC PRICING**

Europe is a vantage standpoint to analyse the success of legal regulations for pricing algorithms because of its strong commitment toward consumer protection despite market liberality.[[56]](#footnote-56) The jurisprudence of consumer protection focuses on competition law with vigilance on the exploitative proclivities of big corporations to guarantee price fairness.[[57]](#footnote-57) In this regard, the EU consumer law is more concerned with transparency in price offers than it is with the activities of price fixing-algorithms, simpliciter. This reasoning is based on the belief that the result of algorithmic pricing is not entirely negative. Recital 45 of the Consumer Rights Directive (CRD) gives capacity to traders to offer differentiated prices to certain persons or community of persons by the use of automation.[[58]](#footnote-58) However, the transparency requirement is fortified by directives 2000/31/EC on e-commerce (ECD) which obligates European states to take steps to guarantee that such automated prices are clearly stated without ambiguation.[[59]](#footnote-59) Consequently, both seller and buyer are availed of the unit prices, weighed in kilograms or liters as the case may be under the price indication directive (PID).[[60]](#footnote-60) It is doubtful whether the unfair commercial practice directive (UCPD) mandates any other disclosure from sellers other than price and personalisation.[[61]](#footnote-61) Under the European liberal market, the consumer may elect not to be profiled by switching parameters where there is abundance of information.[[62]](#footnote-62) A community reading of the CRD and UCPD instruments demonstrates that both are dependent on the full harmonisation doctrine implicating uniformity across Europe where all member states are barred from enforcing stronger or weaker protection policies in their domestic markets.[[63]](#footnote-63)

Notwithstanding the various guarantees provided by consumer protection law, directives which generally apply to online individual-interests without particularisation to price differentiation may be extended to online algorithmic pricing devices. The GDPR apply to protect natural individuals’ private data.[[64]](#footnote-64) The GDPR is widely couched to complement the various consumer protection directives in e-commerce to the extent that other legal parameters such as consent or contractual exigencies may be required to justify algorithmic price differentiation. Whatever justification advanced by the data processor, Article 13(1) and 13(2) of the GDPR stipulates that a data subject, that is, the consumer shall be specifically informed of reason for profiling and the deployment of algorithmic tool to achieve that purpose.[[65]](#footnote-65)

Regrettably, the provisions of the GDPR have not produced a consumer manipulation-free market environment because the market situation that would invite the GDPR legal regime is subject to divergent opinions. Zhao suggests that the entitlement to explanation engineered by data protection legislation is potent enough to contain the harms enabled by pricing algorithms in the online market space.[[66]](#footnote-66) Belgium led the way when the Belgian Data Protection Authority categorised advertisement for price reduction as having sufficient legal effect to evoke enforcement of the provisions of GDPR.[[67]](#footnote-67) It follows that where a price offer is construed as invitation to contract, Article 22 of GDPR becomes applicable to personalised price. The EU GDPR provisions on automated decision-making (ADM) appears elastic enough to accommodate diverse toolkits including: freedom to be exempted from ADM and freedom to object for effective governance of automated pricing strategies.[[68]](#footnote-68) In *Patrick Breyer v Bundesrepublik Deutschland*, [[69]](#footnote-69) the CJEU held that Cookies, Internet Protocol (IP) Addresses device MAC addresses and Similar data accessors are carriers of personal data assessors are careers of personal data with peculiar identities capable of tracking individuals’ data subjects for specific purposes. The decision further commends the unified application of GDPR to similar and emerging technologies with access to personal data.[[70]](#footnote-70) However, for effective engagement of the consumer protection status within the online market space a definitive construction of prohibitively high prices is necessary. The guidelines to Article 25 Working Party (WP) adopted by European Data Protection Board suggests more definite cases of automated differential prices. EU member states are encouraged to take bold steps like Belgium to ensure pragmatic fairness of prices without introducing prohibitions to opaque market strategies as supplements to the UCPD and CRD. The clarity of the nature and scope of transparency required for proper consumer protection should not be left to academic dialectics. Harmonisation of all legal principles taken into cognizance the peculiarity of states is suggested. In the case of *Caja de Ahorros v Monte de Piedad de Madrid,*[[71]](#footnote-71) The court affirms that UCTD, being a harmonisation directive does not bar any nation’s judiciary from ensuring fairness in contractual matters whether or not such contractual terms are expressed in plain language. The proposed liberty of member states to act independently has restricted resonance, at least it has produced discordant responses. By the provisions of Article 29 WP, where it is not possible to trace a piece of data to an identifiable person but such data impacts individual’s interests or liberties, such data is classified as personal data. [[72]](#footnote-72) Consequently, personal data is construed to encompass subjective data, evaluations and opinions which are not needed to be established as true. A significant disconnect exists between the stipulations of the WP and the CEJU jurisprudence on what constitutes personal data. [[73]](#footnote-73) This is exemplified in Poland’s objection to the use of the term ‘gender equality’ in Charter of fundamental rights in the context of AI and digital change.[[74]](#footnote-74)

The inability to effectively regulate market prices propels the evolution of another racial genre creating a distinction between the utility of algorithms for consumer protection, and as mere devices in the evolving digital market. The divergent views of scholars on the potency of the GDPR to regulate algorithmic pricing generally notwithstanding, the instrument makes salutary provisions that may engage accountability and transparency of online algorithmic functions. The GDPR provides for the conduct of data protection impact assessments (DPIAs) prior to any operations that may occasion high risk on individuals liberties, including online algorithmic pricing designs. This ex-ante prescription compels corporate users to identify personal data, evaluate the consequence of processing such information and introduce measures to ameliorate veritable privacy infringements.[[75]](#footnote-75) By this mechanism, variables like tracking data, IP address and previous data on purchasing productivities used to determine pricing are examined for the purpose of ascertaining the propensity of bias, for unfair profiling of individuals or community of persons. Another excellent safeguard in the regulation of algorithmic pricing is the privacy by design (PBD) requirements. This mechanism mandates the inclusion of information protection features from the incubation of the algorithmic technology onto its engagement in business practices.[[76]](#footnote-76)

Existing legal framework in Nigeria such as the Nigeria Data Protection Regulation 2019 does not adequately address abuse or extortionist deployment of algorithms against citizens, particularly consumers in outline market space. [[77]](#footnote-77) Consequently, it is required under the PBD stipulations that protection mechanisms be inbuilt into the algorithmic infrastructure and sundry applications which play roles in price determination outcome. [[78]](#footnote-78) Saputra *et al* suggest the integration of ethical issues from design through implementation and utilization of algorithms would reduce bias and other harms associated with AI. [[79]](#footnote-79) These regulatory option manifests in pseudonymization and data minimization ensuring that individual users’ data are assessed for specific purposes. It is suggested that a functional PBT arrangement must ensure that algorithms are configured in such a manner as to make them adapt, learn and develop functionalities beyond their initial design in order to cope with evolving data technologies. The GDPR also provides for audits of the functionality of the algorithmic pricing device to enhance revenues to consumers whose rights are infringed by pricing algorithms. This excellence regulatory approach is fundamental in all cases relating to data rights, particularly the right to object, right to access, right to erasure, right to rectification and right against ADM.[[80]](#footnote-80)

The right to access implicates the right to explanation which underscores transparency and provides users with evidence and materials to redress infringements by pricing algorithms.[[81]](#footnote-81) This right is however a comma limited by the right to security of trade secrets and intellectual property of the sellers. Article 21 GDPR provides for the right to object to profiling and access to personal information, remarkably for purposes of direct marketing except in any situations of overriding legitimate grounds.[[82]](#footnote-82) It is argued that the provision’s application to online algorithmic pricing echoes some ambiguation, especially with respect to the definition of direct marketing. Article 4(3) (F) of the mooted e-privacy regulation in its definition of direct marketing communications narrowed down to advertising. Algorithmic pricing goes beyond advertising to include valid contract of sales and purchase. Given that the construction of GDPR provision tends towards consumer protection against the backdrop of expansive algorithmic pricing influence, policy directives must be geared towards developing specialised consumer protective technologies. This could be done by engaging the bottom-up approach in the incubation and manufacture of online market tools. Lippi *et al*[[83]](#footnote-83) conceive technologies that empower consumers to have capacity to contain harmful algorithmic pricing outcomes such as opaque, unlawfully practices, bias, information overload, multimedia manipulation of consumers, and so on. The intentionally opaque nature of some commercial practices denies the consumer of the knowledge of infringing acts and the consequences in order to prevent legal responses. Individualised pricing shrouded in opacity can be exposed by the use of comparison devices which function to detect unfair clauses through unique data processing engine.[[84]](#footnote-84) Texts could be analysed by ordinary language processing applications to filter out unfair and illegal content. Instruments should be evolved to grant immunity to rights activists, bureaucrats, researchers and general public who hide or fake their identities for the purpose of uncovering vendors which offer differentiated prices for the same products. It has been suggested that the watchdog technique could be engaged to combat biases in price offers.[[85]](#footnote-85) AI enabled ads blockers and anti-tracking technologies have proved effective in warding off and featuring manipulative multimedia messages target to consumers. The development has moderated incidences of consumers data harvest by dark patterns.[[86]](#footnote-86)

1. **FUNDAMENTAL CONCERNS FOR THE REGULATION OF PRICING ALGORITHMS**

Algorithmic pricing has enhanced efficiency and ease of doing business within the outline market space. However there has been corresponding concerns about the flip side of the mechanism requiring bureaucratic intervention of regulatory agencies in order to safeguard the rights and interests of consumers. Three of these concerns would suffice. The outcomes of pricing algorithms portend unfair pricing regime to profiled consumers. This is the situation which *Uber* and Lyft’s prices hike during emergencies such as bone explosions, earthquakes, terrorist or herdsmen attack in Nigeria and floods in America.[[87]](#footnote-87) Dynamic pricing could be a veritable instrument of discrimination. Understanding the pricing mechanism of airlines which benefits leisure consumers who arrived early as against the business travelers who arrived later. The algorithms are programmed to be driven by demand elasticity of market forces which might adversely affect financially disadvantaged consumer of goods such as energy products. In another development, Dube and Misra posit that algorithmic price discrimination also arises from personalised pricing.[[88]](#footnote-88) The scholars formed that the rise of *zip recruiter* pricing algorithm shut up the profit margin of controllers by 19% relatively optimised price and by 86% relative to non-optimised flat price. Pricing algorithms may offer collusive prices in a market setting where cartel machinery to sanction deviance is weak or nonexistent. It has been demonstrated that a Large Language Model (LLM) based pricing device smartly collude in oligopoly arrangements without the slightest suggestion of collusion.[[89]](#footnote-89) This is so because sophisticated algorithms progressively learned to issue software competitive prices without reference to one another resulting in sustained high prices against the rights and interests of consumers.[[90]](#footnote-90) The engagement of pricing algorithms has hiked prices and sustained such excessive prices in Germany's retail gasoline market[[91]](#footnote-91)as well as real estate markets in the USA.[[92]](#footnote-92) Regulators should be concerned about the capacity of pricing algorithms to create price bubbles in like manners as content creators deploy algorithms to construct echo chamber on social media platforms. This is the outcome of a situation where reliance is placed on pricing algorithms which harness their inherent capacity to propagate false data or errors in the market whether in an oligopoly or free market setting. USA sellers and buyers depended on pricing outcomes from estimation algorithm engaged in buying and selling decisions of properties during COVID-19 pandemic. It was demonstrated that the algorithms interface with human behavior (feedback loop) generated obvious errors persistently.[[93]](#footnote-93)

1. **STATUTORY PARADIGM FOR CONSUMER PROTECTION AND SUNDRY CONCERNS**

The two leading jurisdictions in terms of regulation regimes of data laws are Europe and US. Both jurisdictions have statutory frameworks that produce remarkable differences in addressing online algorithmic pricing, especially in the areas of access to personal data, privacy and general consumer protection. The difference is notably attributed to cultural differences, governmental policies and mutual competition for control of the online space which mauls the entire universe into one without geographical boundaries. China's approach has been described as a balance between the extremes of the US and Europe.[[94]](#footnote-94)

The US leverages on its data privacy statutes, trade laws as well as the Financial Services Modernization Acts of 1999[[95]](#footnote-95) to track infringements by big data companies on consumer rights. The US legal regime demonstrates fragmented sector-based arrangements directed at particular data species or industries from federal and state regulators. The data privacy laws of the US are decentralised to allow federal and states to make complementary laws without prejudice to the doctrine of covering the fields. The regulators in the circumstances may intervene to curb dynamic pricing and price differentiation which has become unfair, deceptive and anti-competitive. The free market economy in the US which aligns with the EU approach conceives individual users of online marketplace as traders of their private goods and services requiring the regulators to keep a distance to allow transactional autonomy.[[96]](#footnote-96) Notwithstanding diverse state laws, there still exists price gorging situations which has raised doubts of potency of the laws to deal with algorithmic price outcomes owing to the fact that the laws pre-date the evolution of smart technology. Predatory pricing can be dealt with under the Sherman's Act and other statutes.[[97]](#footnote-97) Other statutes bearing on online algorithmic pricing, particularly in respect of data usage include the Equal Credit Opportunity Act (ECOA) in supervised by the Federal Trade Commission. The ECOA prohibits discrimination for credit sales based on color, origin, race, religion, age, sex or marital status. The FTC may proceed against firms engaged in deceptive or unfair dealings under the guise of online algorithmic pricing.[[98]](#footnote-98) The Finance Services Modernization Act of 1999 (FSMP) impacts algorithmic pricing by restricting the scope of data accessible by algorithmic pricing devices from financial institutions on users.[[99]](#footnote-99) Section 502 of the FSMA guarantees financial data protection to consumers by empowering them to quit any demand for divulging their personal information to third parties.

The US has made significant inroads into law enforcement for the purpose of curbing algorithmic collusion resulting in sustained exploitation of consumers. Section 1 of the Sherman Antitrust Act criminalises explicit collusion, particularly in internet commerce. In *United States v Topkins*,[[100]](#footnote-100) the commercial retailer colluded with two executives, using algorithmic pricing device to arrange prices on Amazon marketplace. The collusion eliminated price competition among the sellers, resulting in excessive price listing for wall paper. Upon conviction under Section 1 of the Sherman's Act, Topkins paid penalty of $20,000, Daniel Aston a controlling shareholder in Trod Limited was sentenced to a jail term while, Trod Limited which is a corporate entity received a sentence of $50,000 with a commitment to retain a compliance monitor.[[101]](#footnote-101) Private users have filed a number of suits challenging algorithmic pricing contending that the software is deployed by competitors in a “hub and spoke” conspiracy to establish a extortionist prices. In *Gibson v MGN Results International*,[[102]](#footnote-102) it was successfully contended for the plaintiff that prominent Las Vegas Strip hotel casino engaged in price-fixing and facilitated ‘algorithm-driven-price-fixing by accessing competitors’ pricing data for the purpose of providing unlawful room-rate schedules for hotel operators’ profit maximisation. As recent as November 2023, the Attorney-General for the District of Columbia initiated proceedings against 14 most notable landlords transacting under the RealPage centralised pricing algorithm to cause artificial inflation of house rent prices.[[103]](#footnote-103)

Europe[[104]](#footnote-104) and Britain[[105]](#footnote-105) align with the US’s approach in dealing with the negatives of algorithmic pricing within the framework of extant competition laws. In 2018, Asus, Philips, Pioneer and Denon & Marante which are electronics manufacturing giants established websites for price comparison with inbuilt tools to monitor retailers and compel them to sell at regulated prices, particularly in France and Germany.[[106]](#footnote-106) The European Commission found that Asus Computer/GmbH and Asus France SARL, by the singular act, violated Article 101, Treaty on the Functioning of the European Union (TFEU). Prohibitive fines were consequently imposed on Asus in accordance with Article 23(2)(a) of the Regulation.[[107]](#footnote-107) Generally, the European union brought the Digital Market Act (DMA) and the Digital Services Act (DSA) into force in May 2023 and February 2024 respectively.[[108]](#footnote-108) The DFA mandates gatekeepers to submit updated data on consumer profiling mechanisms to the Commission. This enables the regulator to assess the level of gate-keepers’ compliance with best practices on their various platforms. Under the digital services package, users have the options to withdraw from algorithmically influenced prices as companies are restricted on the use of private data. Under the DSA, online pricing platforms are obligated to expressly disclose the parameters utilised in their recommender systems under their terms and conditions, for informed guidance of users. The Digital Market Competition and Consumers Act 2024 (DMCCA) brings up to speed, all legal developments in force in the UK on 3rd May 2025 respecting consumer rights within the e-commerce landscape.[[109]](#footnote-109) The DMCCA gives the Competition and Markets Authority (CMA) extensive powers on consumer protection which powers cover practices enabling anti-competitiveness in practice and effect, having UK nexus threshold.[[110]](#footnote-110) The introduction of digital market regime brings the big tech under the regulatory powers of the CMA. It is posited that online pricing algorithms comfortably fits into the regulatory boundaries of the CMA as it falls into digital activities captured under the law.[[111]](#footnote-111)

China's regulatory infrastructure on AI and online pricing algorithms is influenced by China's quest for supremacy over the US in smart technology. China's flagship instrument for regulation of e-commerce is the Regulations of the Administration of Internet Information Service Recommendation Algorithms which became enforceable in March 2022.[[112]](#footnote-112) Hao identifies the salient point of the Regulation as the statutory vires accorded regulators to open up the ‘black box’ of the algorithms to the public through the Cyberspace Administration of China (CAC).[[113]](#footnote-113) China's evolving regulatory network targets undesirable algorithmic outcomes in order to limit corporate data-siloing and encourage state use of platforms for economic and political ends. It is less focused on enhancing individual consumer rights or digital privacy rights, unlike the GDPR and the Sherman’s Act. [[114]](#footnote-114) The Regulation has, however been used to bar algorithmic price discrimination by granting users the option to decline. It is, therefore, illegal to manipulate information using algorithmic technology for the purpose of exploitation or monopoly in the online marketplace under the laws of China.[[115]](#footnote-115) Article 3 of the Anti-Monopoly Law of China applies to regulate algorithmic price differentiation in cases where the controller of the algorithms has established a dominant market status.[[116]](#footnote-116) Consequently, the law intervenes where the controller issues discriminatory prices or decisions lacking in reasonable grounds or rotationality. The law has been successfully applied to stop Alibaba and other members of the Chinese big tech from exhibiting monopoly and abuse of dominance in the Chinese digital economy.[[117]](#footnote-117)

Algorithmic pricing is evolving at the same speed as other smart technologies generally in Nigeria, though with the knowledge of its operations limited within the elite. In 2019, Jumia, a foremost e-business platform (besides *Uber)* was alleged of engaging pricing algorithms for differentiated prices of commodities at its Black Friday trading show. Sahad Stores, a notable retail store outlet in Abuja recently in 2024 introduced algorithmic pricing techniques for profiteering. Fintech platforms such as Palm Credit, Migo and Fairmoney have been identified as using algorithmic pricing technologies to determine potential credit risks and establish differentiated lending products.[[118]](#footnote-118) Given that Nigeria has no blueprint on AI governance, the principal statute regulating data access and utilisation in Nigeria is the National Data Protection Act 2023 (NDPA). Since the operations of pricing algorithmic depend on availability of data, the statutory data regulation flagship has been extended to checkmate data abuses by big data companies engaged much more in consumer exploitations. The judiciary has been applauded in this respect for interpreting the principles of law to align data sanctity to constitutionally guaranteed rights to privacy. Section 37 of the Constitution of the Federal Republic of Nigeria 1999 (CFRN) enshrines the fundamental right to privacy, making the right enforceable against abusive firms, corporate individuals and the state.[[119]](#footnote-119) Thus, in *Incorporated Trustees of Digital Rights Lawyers Initiative (DRLI) v I. T. Solutions & Multi-media Ltd,*[[120]](#footnote-120) the court held that a citizen’s private information is protected under the right to privacy. Consequently, the courts have reiterated the obligation on data controllers to comply with the prescriptions of the Nigerian Data Protection Regulations 2019 (NDPR) for the protection of citizens’ rights.[[121]](#footnote-121) The Constitution and the NDPA collaborate with the Federal Competition and Consumer Protection Act (FCCPA) 2019 to protect users and enhance fair competition within the online market spaces with Nigerian nexus. Sections 89 and 90 of the FCCPA proscribes bid-rigging, price-fixing and sundry conducts that endanger free competition in the market economy.[[122]](#footnote-122) The Act governs every commercial transaction engaged-into for profit making and satisfaction of the participating public within Nigeria. The Watchdog of Nigeria data protection policy is the National Information Technology Development Agency (NITDA) which upon its establishment in 2019, enacted the NDPR. NITDA, like the Federal Trades Commission (FTC) in the USA, has the authority to police pricing algorithms and prevent unfair trade techniques in the absence of a specific legislation for AI governance in Nigeria.[[123]](#footnote-123)

1. **ALGORITHMIC HARMS: SUGGESTED LEGAL REFORMS**

To mitigate incidents of consumer dilemma in online market spaces policymakers should expand access to information to reduce the effect of behavioral prejudices. This underscores the fact that the increasing popularity of algorithms bequeaths new threats to consumer protection. Furthermore, legislators may engage antitrust laws to weaken market power as well as widen the citizens’ privacy domain.

Another step in the reduction of algorithmic harm on consumers is the elevation of the right to algorithmic transparency to a global standard. The US holds lenders to account by requiring reasonable level of disclosure within the Fair Credit Reporting Act of 1970, particularly of factors that injure a consumer’s credit score. The GDPR has provided for the right to explanation in Europe. Bar-Gill *et al* contend that such exposure to ‘sunlight’ could validly disinfect the infested black-box and scale-down the overall harmful impact of algorithmic pricing. This would fortify the consumer with the requisite knowledge to withdraw or continue with transactions powered by pricing algorithms.112 The extant regulatory approaches maintain an unbalanced scale in favour of technological applications at the disposal of the seller against those within consumers’ reach. Regulatory policy should strike an equilibrium by fortifying the digital tools accessible to consumers, civil society and the general public.

Finally, there should be intentional efforts by the regulators to get more involved in the design and engagement of pricing algorithms. This could implicate mandatory non-discrimination constraint which should be inbuilt in the computer device-code or outright ban of such harmful devices in most vulnerable market spaces. To effectively implement the foregoing suggestion, the regulator should engage monitoring algorithms for the purpose of policing sellers’ algorithms. The judiciary or administrative tribunals should be proactive in holding sellers accountable under a principle of liability, particularly in cases where a consumer is offered excessive price or inferior products. To this end, courts should hold that subtle manipulations targeting emotional traits or attitudinal prejudices for sales maximisation are unfair commercial practices. **113** The Court should clarify the extant rules in such a manner as to leave the impermissible behavioral categories beyond doubt.

1. **CONCLUSION**

Pricing algorithms have come to stay. Their indispensability in driving digital economy is manifest in their growing patronage across jurisdictions. Their impacts are visible wherever internet data is accessible. The phenomenon justifies regulatory frameworks to address information privacy of users as well as transparency and fairness in the entire process. The consumer has a right to transact with his or her rights to privacy and freedom from discrimination intact as much as a seller is in business to maximise profit. Regulatory mechanisms, therefore, must strike this balance of equity. The EU GDPR, the US Sherman’s Act are global models ensuring consumers’ right security in e – commerce. The UK’s recent Digital Market Competition and Consumers Act which came into force in April 2025 has improved on existing regulations aimed at holding big data firms accountable. China’s bold step to open up the black box is commendably different and only reinforces the clamour for transparency. A case has been made for policing algorithms and the proliferation of monitor-tools to enable users and the civil society track the evolving algorithmic pricing patterns that are detrimental to consumers’ interests, and in breach of extent laws. This is because, despite the utility of pricing algorithms, constitutional rights of individual citizens must be prioritised without hindering economic activities. Individual rights and economic activities must co-exist!

The relevant UK and Nigerian Laws on the subject matter are yet to be tested, given their recency. There is therefore need to subject and transform these laws-in-the-books to laws-in-action for clearer understanding of how much protection (from exploitation) the law truly affords consumers within the named jurisdictions. A working synergy between the regulators across jurisdictions is necessary to effectively apply sanctions as in the case of Asus GmbH which was made much easier because both France and Germany subscribe to EU regulatory authority. This collaboration is important as the cyberspace is without marked geographical, political boundaries and digital governance by sovereign states is but for administrative exigency.

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