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Research on the Impact of the Digital Economy on Consumer and Producer Behaviour

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Abstract

Although extensive research has examined the influence of the digital economy, few studies have explored its impact on industrial organisation behaviour from a foundational theoretical perspective. Building upon existing theoretical frameworks, this paper constructs a theoretical model to analyse how the digital economy affects consumer choice behaviour, firm production and profit functions. The study seeks to encourage greater scholarly engagement among Chinese researchers in examining industrial organisation within the digital economy context of developing countries, thereby providing a theoretical foundation to guide and promote the sustainable and healthy development of the digital economy.

Keywords

Digital Economy; Consumer Behaviour; Producer Behaviour.

1. Introduction

As a key driver of the new wave of technological revolution and industrial transformation, the digital economy is profoundly reshaping global economic structures and operational mechanisms. Next-generation information technologies-represented by the internet, big data, artificial intelligence, cloud computing, and blockchain-are permeating all aspects of traditional industries, driving systemic transformations in the organisation, transaction, and competition of economic activities. The digital economy has not only redefined the processes of value creation and distribution but also transformed the behavioural logic and decision-making mechanisms of market entities, emerging as a new engine of economic growth and an essential force for structural optimisation.

In recent years, academic research on the digital economy has produced increasingly abundant findings, encompassing perspectives such as digital technological innovation, platform economies, data factor allocation, industrial upgrading, and policy regulation. Nevertheless, systematic research at the foundational theoretical level on how the digital economy influences industrial organisational behaviour remains limited. Existing studies primarily emphasise empirical analyses of industrial performance or policy evaluations, while theoretical explorations grounded in micro-level mechanisms-such as consumer choice, firm production and profit functions-remain insufficient. This research gap results in a relatively weak theoretical foundation for explaining the intrinsic logic underlying industrial organisational transformation in the digital economy era.

Against this backdrop, this paper seeks to build upon existing industrial organisation theory by examining how the digital economy influences consumer behavioural choices and firms' production. It aims to provide a theoretical foundation for developing an industrial organisation theory of the digital economy that aligns with China's specific context. At the same time, this study aspires to stimulate greater scholarly attention within China to the relationship between the digital economy and industrial organisation. By promoting the integration of theoretical innovation and empirical research in the Chinese context, it seeks to offer

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theoretical foundations and practical guidance for government policy formulation to foster the sound development of the digital economy, as well as for enterprises to optimise their digital strategic decisions.

2. The Impact of the Digital Economy on Consumer Behavioural Choices

This paper argues that the digital economy influences consumer behavioural choices through the following three aspects.

Firstly, the digital economy expands the analytical foundation of consumer choice behaviour within existing consumer choice theory. Traditional theory holds that consumer choice involves selecting a combination of goods and services to maximise total utility within budgetary constraints. In the digital economy, internet platforms leverage big data to analyse consumer behaviour and extend credit facilities to creditworthy consumers within defined parameters. This enables consumption over specified timeframes with scheduled repayments. As a result, the digital economy challenges the traditional assumption of budget-constrained consumption, promoting advance spending and stimulating fluctuations in aggregate social demand.

Secondly, the rapidly advancing machine learning methodologies of the digital economy era can effectively uncover intrinsic patterns within consumer behavioural data, thereby predicting and guiding consumer decision-making. The traditional model, in which consumers select a consumption portfolio to maximise total utility within budget constraints, is increasingly supplanted by big data analytics and algorithmic recommendations on internet platforms. Moreover, the efficiency of such analysis- and prediction-based decision-making continues to improve with technological advancements, including artificial intelligence. As a result, data-driven decision-making is progressively supplanting consumers' original subjective judgements [1], leading to a "convergence" between preferences formed through individual judgement and those shaped by big data-driven guidance [2,3]. While big data enhances overall societal welfare by collecting, aggregating, processing, analysing, and making decisions based on consumer information, it also raises concerns regarding privacy protection. Furthermore, the economic benefits are largely captured by internet platforms, with consumers not necessarily receiving proportional returns.

Thirdly, in the digital economy era, factors such as abundant product variety and low search costs increasingly satisfy niche and personalised demands, thereby amplifying the "long-tail effect." The long-tail effect relies on the presence of a robust leading segment and effective connectivity between the head and the tail. As digital technology continues to advance, the relationship between the head and the tail evolves accordingly. In the variety–demand curve, the head represents the mass-market segment with fewer, popular products, while the long tail corresponds to the segment containing numerous products with lower demand. With technological progress, consumers' personalised demands within this market are increasingly met, flattening the curve. As a result, more product varieties gain access to the mass market, and the extended tail of demand is fulfilled. This phenomenon increasingly reflects "demand-side economies of scale," driving new developments in micro-level consumer behaviour theory.

Fourthly, within the digital economy, data as a factor of production is embedded in firms' production functions, whereby their sales scale is influenced by existing sales volume. The development of the digital economy further reinforces networked economic structures, resulting in pronounced network externalities within social networks. This indicates that consumer purchasing behaviour is shaped not only by individual preferences but also by the purchasing actions of other consumers. Network externalities fundamentally arise from the systemic nature and internal interactivity of networks. When positive network externalities dominate, they generate self-reinforcing effects within the network through a "Matthew effect," leading to an expanding consumption scale and creating "demand-side economies of scale" [4].

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In markets characterised by strong positive network externalities, consumption scale becomes an endogenous variable of the demand curve. Under the assumptions of consistent consumer preferences and accurate user-scale forecasting, consumer demand increases with consumption scale. However, once consumption reaches a certain threshold, negative network externalities begin to emerge, causing demand to decline as consumption scale further expands.

3. The Impact of the Digital Economy on Producer Behaviour Choices

3.1. The Digital Economy's Influence on Production Factors

The classic Solow growth model explains economic growth through four factors-output, capital, labor, and knowledge or labor efficiency-under the assumption of constant returns to scale. Within this framework, technological progress is treated as an exogenous variable, with sustained economic growth primarily driven by external technological advances. As economic theory evolved, endogenous growth theory gradually relaxed the assumption of constant returns to scale, positing that technological progress arises from investment, innovation, and learning effects within the economic system, thereby stabilising the marginal returns to capital and labor. In essence, the evolution of economic growth theory represents an endogenous revision of the traditional assumption of exogenous technological progress-a paradigm shift from exogenous to endogenous technological advancement.

Entering the digital economy era, the fundamental logic of value creation has undergone a transformative shift. As a new factor of production following labor, capital, land, and technology, data is increasingly integrated into the modern production function, emerging as a novel variable for explaining economic growth. The incorporation of data not only reconfigures the system of production factors but also expands the boundaries of the assumption of increasing returns to scale within traditional economic growth theory. Compared with traditional factors such as capital and labor, data exhibits distinct characteristics of replicability, shareability, non-exclusivity, and near-infinite supply. It transcends the constraints of "scarce supply" inherent in traditional production factors, providing a theoretical foundation for sustained growth and long-term economic development.

Research indicates that data resources grow at an annual rate of approximately 50%, doubling every two years [5], with their expansion far exceeding the accumulation rates of capital and labor. The accumulation of massive data has elevated it to a foundational strategic resource for society and a new growth driver for the economic system. Owing to its replicable and shareable nature, data can be utilised repeatedly at near-zero marginal cost, thereby reinforcing the underlying premise of increasing returns to scale within economic systems. This, in turn, facilitates structural transformations in production function forms and economic growth trajectories.

More importantly, the deep integration of data with traditional production factors has enabled the marginal returns of each factor to exceed levels predicted by traditional endogenous growth theory. Data not only creates value independently but also amplifies, synergises, and multiplies the effects of labor, knowledge, management, capital, and technology. For instance, data can only be transformed into tangible productivity when combined with labor. Simultaneously, the application of data analytics and intelligent algorithms enhances labor productivity, optimises capital allocation, strengthens management efficiency, and drives the sustained diffusion of technological innovation [5,6]. Thus, the introduction of data as an economic factor represents not merely a technical extension of the production function but a paradigm shift in economic growth theory-from "technology-driven" to "data-driven."

In summary, the rise of the digital economy has shifted the determinants of economic growth from traditional capital accumulation and technological progress to data accumulation and intelligent data utilisation. How to theoretically characterise the impact of data as a production

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factor on output, efficiency, and factor returns, and how to construct growth models compatible with the digital economy, has become a central question in contemporary economic research. This also provides new theoretical foundations and research directions for industrial organisation, resource allocation, and macroeconomic regulation.

3.2. Impact of the Digital Economy on Manufacturers' Investment in Digital Resources

From the perspective of the digital economy, manufacturers' investment and operational activities can be conceptualised as a complex system shaped by multi-party interactions. This includes both vertical and horizontal collaborations among manufacturers, as well as dynamic games and information exchanges between manufacturers and consumers. Throughout this process, every business activity-whether raw material procurement, intermediate goods transactions, or final product sales and service provision-generates and accumulates vast amounts of data. This includes both digital data (e.g., transaction records, user behaviour data, online feedback) and non-digital data (e.g., offline survey information, market interview results).

In the context of the digital economy, data has become a critical production factor for enterprises. A company's ability to effectively acquire, integrate, and utilise data resources directly determines its market competitiveness and innovation capacity. Consequently, big data analytics capability has emerged as a core competitive competency for firms. Generally, the big data analytics process can be divided into three stages: data collection and storage, data integration and classification, and data processing and intelligent application.

In the initial phase, enterprises primarily rely on the internet, the Internet of Things (IoT), and various digital platforms to collect big data related to their investment and operational activities. This data includes information on product demand, consumer preferences, supply chains, and market price fluctuations. The key objective at this stage is to establish an efficient data collection system, enabling a transition from "information silos" to "data connectivity." As enterprises mature, they typically develop a systematic data collection mechanism grounded in the "Internet Plus" model.

In the second phase, enterprises must develop the capability to store, integrate, and classify massive volumes of data. This requires not only a robust data management system but also proficiency in cloud computing, database management, and related software technologies. Companies should either establish their own cloud platforms or effectively utilise public cloud platforms to ensure the structuring and usability of their data resources.

In the third phase, enterprises must process, mine, and apply the customer and consumer data accumulated in earlier stages. By leveraging artificial intelligence, machine learning, and algorithmic models, businesses can extract valuable insights from this data to forecast market trends, design personalised products, and make intelligent pricing decisions. Through this process, data is effectively transformed into productive capacity, becoming a key driver of operational efficiency and innovation capability.

However, to achieve the efficient conversion of data into productive capacity, enterprises must establish a data intelligence operation platform centered on big data analytics, supported by a modern IT infrastructure aligned with the "Internet Plus" model. This requires not only continuous investment in digital resources, production equipment, and information system development but also increased investment in data talent and digital technologies to build an integrated digital business system encompassing "technology–data–decision-making." Only through such measures can manufacturers achieve significant improvements in operational efficiency and rebuild their competitive advantage in the digital economy era.

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3.3. Impact on Firm Profit Maximization

In the development of economic theory to date, neoclassical firm theory and modern industrial organisation theory have consistently served as the mainstream frameworks for analysing corporate investment, operations, and production–supply–sales activities. Based on the objective of firm profit maximization, it can be observed that...

$$\Pi = PY - C = P\mathrm{F}\left(\mathrm{A},\mathrm{D},\mathrm{K},\mathrm{L},\mathrm{T}\right) - (rK + wL + dD) - c \tag{1}$$

Here, r represents the marginal cost of capital, w denotes the average wage per capita, and d signifies the cost of data acquisition. Notably, the marginal cost of data is effectively zero; that is, once data has been initially collected and processed, its repeated use does not substantially increase costs. This characteristic underpins data's high replicability and its contribution to economies of scale within the digital economy, establishing it as a crucial resource for enterprises to enhance productivity and profit margins.

From the perspective of production volume and price determination, manufacturers equipped with cloud computing and artificial intelligence technologies must process and analyse big data across production, supply, and sales to dynamically optimise responses to market demand shifts, price fluctuations, and resource allocation. This process typically involves setting learning objectives, designing algorithmic models, conducting multiple rounds of iterative training, formatting data, and filtering irrelevant information. Ultimately, it establishes an intelligent decision-making system based on machine learning. Compared with technologies such as the Internet of Things (IoT) and blockchain, machine learning-leveraging cloud computing platforms to match, identify, and predict patterns within enterprise production, supply, and sales data-represents the most direct means of converting data value into productive capacity.

A company's profitability in the digital economy increasingly depends on its data analytics capabilities and data-driven decision-making. Beyond quantifiable digital data, businesses also generate substantial non-digital data during operations. This data primarily arises from information flows and feedback mechanisms across production, supply, and sales channels. It includes interactive information exchanged between manufacturers during contract formation, negotiation, execution, and adjustment, as well as dynamic shifts in investment preferences, cognitive structures, and utility expectations during corporate investment and operational activities. Furthermore, considerable implicit information reflecting psychological expectations, consumer experiences, and goal pursuits exists among manufacturers, intermediaries, and consumers. Effectively capturing, processing, and utilising this information relies on a company's capabilities in big data analytics, artificial intelligence modelling, and cloud computing applications.

In this context, manufacturers leveraging cloud computing technology to integrate and process multi-source heterogeneous data streams, while constructing intelligent models to substitute for certain human decision-making processes, represent a significant milestone in the transition toward data-driven intelligent operations. It can be argued that the digital economy effectively categorizes manufacturers into two types: "intelligent brain" enterprises with digital decision-making capabilities, and "non-intelligent brain" enterprises yet to undergo intelligent transformation. The former can maximise utility through data analysis and algorithmic learning, with their operational practices serving as a reference for the latter. In the early stages of digital economic development, "non-intelligent brain" manufacturers constitute the majority. They often emulate the preferences, perceptions, and utility expectations of "intelligent brain" manufacturers, leading to behavioural convergence in preferences, cognition, and utility expectations at the industry level. This phenomenon provides a new foundation for analysing

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rational choices by manufacturers in the digital economy, offering novel interpretive pathways for advancing industrial organisation theory.

More importantly, the rise of the digital economy indicates that new technologies may achieve greater efficiency than traditional market mechanisms in regulating output and prices. With the continuous advancement of technologies such as machine learning, the Internet of Things, and blockchain, manufacturers are increasingly relying on digital and intelligent methods to maximise utility in investment and operational decisions. Data-driven intelligent operations are poised to become the primary pathway for manufacturers to achieve profit maximisation and strategic optimisation under conditions of full competition. This shift also provides economists with a novel perspective for re-examining the relationship between market mechanisms and technological mechanisms.

4. Conclusion and Recommendations

As a pivotal force driving the new wave of technological revolution and industrial transformation, the digital economy is profoundly reshaping both the microfoundations and macro-level structures of economic activity. This paper examines the impact of the digital economy on consumer and producer behaviour, as well as its influence on traditional industrial organisation. The key findings are as follows:

On the one hand, the rise of the digital economy has reshaped consumer behaviour theory. Firstly, it has expanded the analytical boundaries of traditional consumer choice theory. Internet platforms, leveraging big data and credit assessments, provide consumers with credit-based consumption channels. This breaks the traditional assumption of budget constraints, stimulating advance consumption and fluctuations in aggregate demand. Secondly, machine learning and algorithmic recommendation systems enhance platforms' ability to predict and influence consumer decisions. Consumer preferences increasingly exhibit "data-driven convergence," with traditional subjective rational judgment partially replaced by algorithmic rationality. At the same time, while data utilisation can enhance overall social welfare, it also raises concerns regarding privacy protection and the unequal distribution of benefits. Thirdly, the digital economy amplifies the "long-tail effect" by reducing search costs and expanding product variety, thereby unlocking personalised demand and introducing "demand-side economies of scale" into consumer behaviour theory. Finally, network externalities become significantly intensified in the digital economy, as consumer demand is shaped by group behaviour, generating positive feedback loops and a "Matthew effect." Overall, the digital economy steers consumer behaviour from individual rationality towards platform rationality, providing new directions for refining consumer theory and market regulation.

On the other hand, the rise of the digital economy has reshaped the structure of production factors, investment logic, and profit formation mechanisms within enterprises. Firstly, data-serving as a new production factor-exhibits characteristics such as replicability, shareability, and near-zero marginal costs. These features break through the constraints of traditional factor scarcity, amplify the effects of increasing returns to scale, and shift the growth paradigm from being "technology-driven" to "data-driven." Secondly, a firm's competitive advantage increasingly depends on its investment in digital resources and its data analytics capabilities. Data collection, integration, and intelligent application constitute the core pathway for enterprises' digital transformation. Finally, data intelligence transforms profit maximisation mechanisms, gradually widening the gap between enterprises equipped with "intelligent brains" and those lacking such capabilities. Overall, the digital economy fosters more intelligent and rational decision-making among firms while providing new theoretical foundations for advancing industrial organisation theory and promoting high-quality economic development.

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In summary, this paper proposes the following recommendations: (1) Enhance data governance and consumer protection mechanisms. Establish robust data privacy protection frameworks and transparent data usage protocols to balance data utilisation with the safeguarding of consumer rights. At the same time, regulate internet platforms' credit assessments, personalised recommendations, and algorithmic decision-making to ensure that consumers benefit from convenience without facing excessive manipulation or economic exploitation. (2) Promote corporate digital capability development. Enterprises should be encouraged to invest in big data, cloud computing, and artificial intelligence technologies to strengthen their capacities in data collection, integration, and intelligent analysis. An integrated "technology–data–decision" system should be established to enhance production efficiency, innovation capability, and profitability. (3) Optimise market structures and incentive mechanisms. Promote the positive evolution of network externalities and long-tail markets within the digital economy, thereby fostering the fulfilment of personalised demands and market diversity. Concurrently, support the digital empowerment of small and medium-sized enterprises to prevent excessive concentration among dominant "smart brain" providers that could result in market monopolisation.

This study holds significant theoretical and practical implications. First, on the theoretical front, existing research on the digital economy predominantly focuses on macroeconomic growth, shifts in employment structures, or innovation performance. Few studies systematically analyze the deep-seated impacts of the digital economy on consumer and business behavior from the fundamental logic of industrial organization theory. This paper not only enriches and expands the research boundaries of traditional industrial organization theory but also provides new theoretical underpinnings and analytical paradigms for studying consumer and business behavior in the digital economy.Second, at the practical level, China is undergoing a critical phase of rapid digital economic development, where digital factors profoundly reshape industrial division of labor, corporate strategies, and market structures. By theoretically elucidating the operational mechanisms of the digital economy, this study offers crucial decision-making references for policymakers, thereby guiding the digital economy toward high-quality and sustainable development. Concurrently, the research findings provide theoretical foundations for enterprises to optimize resource allocation and formulate competitive strategies during their digital transformation.

In the future, it may be theoretically necessary to construct economic growth models and industrial organisation models that incorporate data elements and network externalities. Such models would deepen understanding of increasing returns to scale, data-driven growth, and consumer convergence behaviour within the digital economy. At the same time, they would explore the micro-level mechanisms through which data intelligence influences production efficiency, profit distribution, and market dynamics, thereby promoting the integrated development of industrial organisation theory and economic growth theory.Further, by embedding data as a core production factor, these models could more accurately capture the unique characteristics of digital industries-such as platform dominance, algorithmic competition, and information asymmetry-phenomena that traditional frameworks often fail to explain adequately. Data not only enhances firms' decision-making efficiency but also shapes new market structures through feedback effects, where consumer interactions and digital footprints continuously refine the value of data assets. This recursive process generates endogenous technological progress and fosters a self-reinforcing cycle of innovation, competition, and concentration within digital markets. In addition, incorporating network externalities into theoretical models enables a better understanding of how user participation and platform interconnectivity generate value, influencing pricing strategies, entry barriers, and welfare outcomes. Such analyses can reveal how economies of scale and scope interact with data accumulation to create new sources of market power, thereby informing policies on digital

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governance, competition regulation, and fair data usage. Ultimately, integrating data elements and network externalities into growth and industrial organisation theories offers a pathway to bridge the gap between micro-level firm behaviour and macro-level economic performance. It provides a more comprehensive analytical foundation for understanding how digital transformation reshapes productivity, income distribution, and welfare dynamics in the era of intelligent economies. This theoretical advancement will not only enrich economic research but also offer valuable insights for guiding digital policy design and fostering sustainable, inclusive digital growth.

References

[1] Rhue Lauren, Sundararajan Arun. Playing to the Crowd? Digital Visibility and the Social Dynamics of Purchase Disclosure. MIS Quarterly, 2019, 43 (4): 1127-1142.

[2] He Da'an. Internet Application Expansion and Microeconomic Foundations: A Theoretical Explanation Based on Future "Data and Data Dialogue". Economic Research Journal, 2018, 53 (08): 177-192.

[3] He Da'an. The Big Data Revolution and Innovation in Economics. Social Science Frontline, 2020, (03): 47-59+282.

[4] Jing Wenjun, Sun Baowen. Digital Economy Promoting High-Quality Economic Development: A Theoretical Analysis Framework. Economist, 2019, (02): 66-73.

[5] Xie Kang, Xia Zhenghao, Xiao Jinghua. Enterprise Implementation Mechanisms for Big Data as a Real Production Factor: A Product Innovation Perspective. China Industrial Economics, 2020, (05): 42-60.

[6] Maryam Ghasemaghaei, Goran Calic. Does big data enhance firm innovation competency? The mediating role of data-driven insights. Journal of Business Research, 2019, 104 69-84.