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Use of Microeconomic Theories in the Development of Data Asset Management

Summary

This study examines the economic role of data assets, highlighting that in the digital economy, data have become a new type of resource, providing companies with competitive advantages and efficiencies. The authors analyze data asset management based on microeconomic theories, focusing on market structures, cost-benefit analysis, and regulatory issues. The analysis shows that data management involves significant initial and operational costs, but with the right strategies, the benefits can be maximized. The dynamics of state regulation and market competition significantly influence the commercialization and utilization of data assets. Effective data asset management, approached from a microeconomic perspective, can yield strategic advantages and sustainable economic growth if companies also consider technological, legal, and ethical factors.

Keywords: data asset management, microeconomic model application business potential, competition, cost-benefit analysis

JEL-codes: C81, O12, D01, D04

Introduction

The economy of the 21st century is increasingly transforming into an information and knowledge-based society, where the role of data is not only passive but also actively shapes economic systems. Data is not merely a by-product of the digital economy; it has become a key economic resource that provides new competitive advantages for companies and more effective tools for government and regulatory purposes. The term 'data asset management' encompasses all activities related to the collection, storage, processing, analysis, and utilization of data to generate valuable economic benefits. Thus, data competes with traditional means of production and capital in the economy, particularly in the digital sector, as it enables companies to create innovative business models, products, and services.

Data assets are not just a new type of resource; they have also emerged as key determinants of competition between industries and companies. Data has the potential to enhance productivity, lower costs, promote innovation, and improve decision-making processes.

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Consequently, data assets as an economic resource introduce several new challenges that are closely related to microeconomics, particularly regarding efficiency, market structures, and incentive mechanisms. The decisions and challenges surrounding data asset management can largely be understood and optimized through microeconomic theories.

Microeconomics as a discipline can be especially helpful in addressing the issues of data asset management within the digital economy. It focuses on the examination of market mechanisms, resource allocation, competition, and corporate decision-making, allowing it to model the functioning of data markets effectively. Economic efficiency can be enhanced through the microeconomic analysis of data as a resource, information asymmetries, competitive structures, and market incentives.

Objectives and research questions

This article explores the relationship between data asset management and microeconomics, particularly focusing on how microeconomic theories can be applied to optimize data asset management. Our aim is to investigate how microeconomic models can enhance the efficiency of data asset management and connect data management decisions to economic benefits. This research is crucial as the ongoing development of the digital economy presents new challenges for businesses and governments in effectively managing data assets.

Questions to be addressed in the research include:
- How can microeconomic models improve the efficiency of data asset management?
- Which market structures and incentive mechanisms can maximize development opportunities?
- How do the unique characteristics of data asset markets influence competitive dynamics?
- What role do state regulations and legal frameworks play in the functioning of data markets?

A microeconomic approach to data assets
Data assets as a public good or private good

The data are basically located on the spectrum between public goods and private goods. (Hardin, 1968) Public goods are resources that do not reduce accessibility for others and that have no exclusive costs. (Samuelson, 1954) Data can also be treated as a public good, if properly managed, in particular data that is freely available, such as public information on the internet or the results of scientific research. (Benkler, 2006) This type of data can be valuable to the economy, but accessing it does not reduce the possibility of being used by others.

In contrast, some types of data can function as private goods. Personal data, company data and other sensitive information, the ownership and use of which is subject to stricter regulations, cannot be freely accessed. (Solove, 2021) The management of this type of data asset raises particularly complex legal and economic issues, as the issues of ownership of the data asset and the legality of data use require complex ethical and legal considerations. (Zuboff, 2019) The legal protection of data assets and the regulation of access are fundamental issues of data management. (Lynskey, 2017)

From the perspective of microeconomic theory, the effectiveness of data asset management depends on whether the data is treated as a public good or a private good, and on the regulations that determine the scope of access and use. (Varian, 2000) The tragedy of the commons, which occurs when public goods are overused and their value decreases, can also appear in the market of data assets. (Hardin, 1968) Companies often over-collect and use data without considering its long-term effects, which can lead to distorted market situations. (Tufekci, 2015)

Data Markets and the Economics of Competition

In the digital economy, data markets are developing rapidly and different competitiveness structures are emerging (Varian, 2000). From the point of view of microeconomics, it is important to look at data markets from the point of view of oligopolies and monopolies. Oligopolies are formed when a few large players dominate the market and build a stronger market position through the accumulation of data assets (Zuboff, 2019). In an oligopolistic market, the acquisition of data as a competitive advantage becomes a decisive factor, and access to data plays a key role in the success of companies (Benkler, 2006).

The emergence of monopolies in the data market also has significant economic impacts. When a single actor dominates the data asset, it may be able to determine data prices, manipulate market competition, and limit other companies' entry into the market (Solove, 2021). Monopolies create a kind of anti-competitive environment in the data market that can harm the economy in the long run by reducing innovation and increasing social inequalities (Hardin, 1968).

The application of microeconomic models can help to better understand and regulate these competitiveness structures, as well as to ensure that the market outcomes of data asset management are economically and socially sustainable (Samuelson, 1954).

Analyzing the costs and benefits of data management
Microeconomic analysis of costs

Data asset management, like any resource management, involves significant costs that require careful planning and continuous optimization (Varian, 2000). As the strategic role of data grows, it is becoming increasingly important for companies to be aware of the cost structures associated with data management and their economic impacts (Zuboff, 2019). The aim of this thesis is to present in detail the types of data processing costs, their optimization possibilities and how to ensure the return on costs (Tufekci, 2015). Data processing costs can be divided into two main categories: initial investment costs and operating costs (Solove, 2021).

Initial investment costs

Initial investments encompass the IT infrastructure, databases, and data processing systems required to collect, store, and manage data. Acquiring such devices usually incurs substantial initial costs. These tools may include:

– high-performance servers and data storage systems.
– cloud-based data management platforms.
– analytical and artificial intelligence-based tools to process data.

The return on initial investments will be realized in the long run if the company can effectively utilize the benefits provided by the data assets. This can include generating new revenue streams, increasing efficiency, and leveraging innovation opportunities.

Operating Costs

Operating expenses refer to the expenses related to the ongoing management and maintenance of the data assets. These include:

– *Data Maintenance:* Continuously updating, cleaning, and maintaining the integrity of data.
– *Regular updates:* Keeping software and hardware up to date.
– *Ensuring data quality:* Checking the accuracy, completeness, and consistency of the data.
– *Security measures:* maintaining data protection and cybersecurity at all times, including compliance with data protection laws (e.g. GDPR).

To optimize operating costs, companies should use automated systems, artificial intelligence, and predictive maintenance techniques that can reduce human resource requirements and increase efficiency.

Return on investment and cost-effectiveness

To ensure the cost-effectiveness of data asset management, we can use microeconomic analyses to explore the relationship between costs and benefits. These analyses can include key indicators such as:

– return on investment (ROI).
– the cost-benefit ratio (CBA).
– an increase in revenues from data assets.

Using the analytics mentioned earlier, companies can identify which data management strategies will deliver the highest value gains while keeping costs low. (Solove, 2021). Data asset management is a complex process that involves significant initial and ongoing costs. To maximize the value of data assets, companies need to take a strategic approach to data management investments and effectively optimize operating costs. Continuous analysis of costs and ROI can ensure that data asset management provides a sustainable competitive advantage for companies (Hardin, 1968).

Benefit analysis

In today's digital economy, data has become a key resource that provides strategic benefits to companies. (Varian, 2000). Measuring the usefulness of data assets is becoming increasingly important in both the scientific and business spheres. (Zuboff, 2019) To assess this, three fundamental factors need to be taken into account: marginal benefit, innovation benefits and competitive advantage. The aim of this study is to present these factors in detail and to explore their practical applications.

Marginal utility and its role in the valuation of data assets
The concept of marginal utility is based on economics and measures the added value of a given resource or asset (Varian, 2000). For data, marginal utility is the extent to which each data element contributes to improving the company's performance. This factor is especially important when optimizing data analytics processes, as by identifying relevant and valuable data, companies can avoid unnecessary data collection and storage, while maximizing the amount of information that can be used. (Zuboff, 2019)

To measure marginal utility, quantitative methods such as predictive modeling and statistical analysis can be used to explore the relationships between data and business outcomes (Tufekci, 2015). Data quality, availability and integrability are also decisive factors in assessing marginal benefits. (Solove, 2021)

Innovation benefits and data-driven improvements
The use of data assets greatly enhances innovation processes. Data creates opportunities to develop new products and services while transforming existing business models. (Varian, 2000). Through data analytics, companies are able to identify market trends, uncover consumer needs, and predict future demand. For example, machine learning and artificial intelligence tools enable in-depth analysis of data, which can lead to new solutions in the areas of predictive maintenance, personalized recommendation systems, or even automated decision-making (Zuboff, 2019). To measure innovation benefits, companies should use indicators such as the speed of market introduction of new products and services, the number of patents or the return on investment in research and development (Tufekci, 2015).

Competitive advantages and market dominance
Data assets provide companies with a competitive advantage by providing an opportunity to gain a deeper understanding of customer preferences and fine-tune market strategies (Varian, 2000). Through data-driven decision-making, firms are able to react dynamically to market changes, reduce risks, and increase efficiency (Zuboff, 2019). One of the key areas of competitive advantage is developing personalized marketing strategies. With the help of data, companies are able to create offers and campaigns that increase customer engagement and loyalty (Tufekci, 2015). Additionally, real-time data analysis allows for quick decision-making, which can be a critical factor in the competitive marketplace (Solove, 2021).

In summary, we can assert that assessing the usefulness of data assets necessitates a multidisciplinary approach that integrates the methodologies of economics, information technology, and business strategy. By considering marginal utility, innovation benefits, and competitive advantages, companies can optimize the value of their data assets and establish sustainable competitive advantages. Future research should further enhance the methodology for valuing data assets, with particular emphasis on data security and ethical considerations.

The importance of state involvement and regulation
Establishment of regulatory frameworks
The importance of regulating data assets is becoming more and more important in parallel with the development of the digital economy. From the point of view of microeconomics, the key question is what role the state plays in the operation of data markets. State regulation must ensure that the use of data does not jeopardise privacy and that competition is fair. Government regulation can help ensure that access to data assets is not reserved exclusively for larger players and that smaller companies are also able to compete with data assets.

Microeconomic theories can help to determine what types of regulations encourage innovation while ensuring fair and sustainable competition in the design of regulatory frameworks.

Market Structures of Data Asset Management
Data market competition and regulation
As a result of the spread of the digital economy, the role of data markets is steadily increasing. The microeconomic approach to data management and trading has a profound impact on the dynamics of competition, which focus on issues of access, value and regulation of data markets. (Samuelson, 1954). The regulation of competition has an important role to play in ensuring that monopolies do not develop in data markets that can inhibit innovation or crowd out smaller players. (Chander, Lianos, 2019). To stimulate competition, states use various regulatory mechanisms, such as data protection laws and market regulations, which aim to maintain fair competition, provide adequate oversight of data processing, and ensure equal access. (European Commission, 2016) The GDPR and other data protection laws that apply in the European Union and around the world have a significant impact on the way data markets operate. (Lynskey, 2017). The regulations not only serve to protect personal data, but also aim to ensure competition in the markets for data assets. (Zuboff, 2019)

Microeconomics can fundamentally help us understand how government regulations shape the structure of the market and how these regulations can help maintain market balance and competition (Kesan, Shah, 2004). Regulation should encourage new entrants to the data market while preventing the creation of dominant positions that could have anti-competitive effects.

However, stricter regulation of data markets affects not only competition, but also the strategic decisions of companies. (Chander, Lianos, 2019) Regulations also determine the conditions for participation in the market and influence the models and strategies used in data governance. The management of data assets therefore raises complex issues not only from an economic but also from a legal point of view, which can be analyzed and optimized with microeconomic tools. (Lynskey, 2017)

Structural optimization and corporate strategies
Optimizing data assets is key to creating and maintaining a competitive advantage for companies. (Shapiro, Varian, 1999) The role of network externalities and data integration in the market is reflected in strategies that increasingly transform data into a common resource. (Katz, Shapiro, 1985) Network externalities appear when a new user's connection to the database creates value for all existing users. (Bakos, Katsamakas, 2008) In the data market, players with larger data assets gain a competitive advantage, as they are able to collect more data and process the data in better quality and more accurately. (Binns, 2020)

For companies, proper strategic integration is essential, as the interconnection and integration between different data sources can result in significant cost savings and competitive advantage when leveraging data assets. (Gandal, 1994) By connecting different data sources, it is possible to take advantage of economies of scale, which is particularly important for digital platforms and companies that handle different types of data from a data management perspective, often complex.

These aspects of microeconomic theories can help companies and regulators better understand the dynamics in the data market and make the decisions that shape the competition between market participants to sell and use data assets in a fair way. (Casadesus-Masanell, Hervas-Drane, 2017)

Development strategies in data asset management
<u>The role of technology and human resources</u>
The proper management and exploitation of data assets is not only a matter of financial, but also of technological and human resources. (Brynjolfsson, McAfee, 2014) The use of artificial intelligence (AI), machine learning, and automation in data processing offers significant benefits for companies. Technological advances in artificial intelligence and machine learning allow for faster processing of data, recognition of patterns, and prediction of future trends, which helps to make strategic decisions. Technological advancements are constantly increasing the efficiency of data management systems, while reducing costs and increasing competitiveness. (Agrawal, Gans, Goldfarb, 2018)

Training and the use of appropriate human resources is also fundamental to the success of data asset management. (Chien, Chang, 2021) To maximize the value of data, companies need to employ data management professionals, data scientists, programmers, and other IT experts who are able to create value from data by using the latest technological tools and methods. The continuous development of the competencies required for data management and the development of educational strategies are therefore essential for companies to succeed in the digital economy. (Westerman, Bonnet, Ferraris, 2014)

The proper management of data assets is increasingly based on automated systems and intelligent algorithms that can reduce human error, speed up decision-making processes and increase efficiency. (Brynjolfsson, McAfe, 2017)

Sustainability and long-term value creation
Special attention should also be paid to the long-term sustainability of data asset management development strategies. The issue of sustainability in data management raises complex problems that go beyond financial benefits. Data processing must ensure that data is collected, stored and used in an ethical manner, taking into account the basic requirements of data protection and data security. Data asset management will be sustainable for companies in the long term if the principles of data protection and social responsibility are taken into account at all levels of data governance.

When micro-economically optimizing, companies must also pay attention to the fact that the sustainable management of data assets creates long-term value for society and the economy. To align data strategy planning with sustainability, companies need to make decisions that not only focus on short-term financial benefits, but also on long-term social and economic bene-fits. The future of data management is therefore not only about the sale and use of data, but also about how it contributes to the development of society and economic sustainability. (Agrawal, Gans, Goldfarb, 2018) (Davenport, Ronanki, 2018)

Conclusions
The microeconomic study of data asset management is fundamental to successfully navigating the digital economy. The use of microeconomic models provides an opportunity for companies and regulators to optimise data management processes through more efficient data asset management, thus improving economic and social outcomes. Competition, the determination of the value of data, and government intervention are all factors that will determine the future of data governance.

For companies, the efficient management of data can be a strategic advantage, which can be exploited to the maximum by developing technological and human resources, as well as taking sustainability and social responsibility into account. Micro-economic decision-making can help companies gain a competitive advantage, while at the same time contributing to strengthening social responsibility and long-term economic sustainability.

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