

The Evolution of Business Analysis: From Manual Statistics to Intelligent Decision-Making

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Abstract. In the context of an increasingly accelerated process of globalization and digitization, enterprises face an ever more complex and dynamic market environment, making business analysis a key factor for maintaining competitive advantage. To help enterprises gain a deeper understanding of the essence of business analysis, this paper adopts a literature review approach to explore the origins, development, key turning points, and practical applications of business analysis across different industries. Through the organization of literature, this study finds that business analysis has evolved from early, simple data recording to the embryonic form of market research after the Industrial Revolution, and then to a systematic and quantitative development in the information age, driven by theoretical models and technological tools. Its evolution has been profoundly influenced by technological changes such as the Internet, big data, and artificial intelligence. In the future, business analytics is expected to evolve toward deep integration with artificial intelligence and cross-industry innovative applications.

Keywords: Business Analysis , Development History, Theoretical Models, Artificial Intelligence

1. Introduction

Since the 21st century, data has been quietly transforming the World, and traditional business models can no longer adapt to this data-driven era. In the age of big data, data is ubiquitous and can help enterprises obtain valuable information. As different industries have different business objectives, different business analysis techniques are required to achieve these goals [1]. Business analysis makes the commercial application of big data possible, which is also why, since the emergence of the term 'business analytics,' it has gradually developed into an emerging discipline.

Some scholars classify business analytics into five stages based on the depth of data value: descriptive analytics, real-time analytics, diagnostic analytics, predictive analytics, and prescriptive analytics. Each stage further evolves on the basis of the previous one, progressively addressing specific needs in data analysis and decision-making. Business analytics is closely linked with requirements management, stakeholder analysis, and solution evaluation, which enables it to better capture enterprise needs and fulfill business interests compared to data analysis alone.

This paper uses a literature review research method to study the development stages, key turning points and practical applications of business analytics across different industries, providing new

perspectives for organizing the knowledge system of business analytics and advancing its theoretical development.

2. Literature review

Early business analysis originated from business intelligence (BI) systems in the 1980s and is now regarded as the foundation for smart business and enterprise system development and design. The development of business analysis is closely linked to the formation of key theories, the evolution of methodologies, and the innovation of technological tools.

2.1. Key theories

2.1.1. Porter's Five Forces Model

Porter proposed the Five Forces Model in 1979, aiming to help enterprises assess their business value and formulate business strategies to gain a competitive advantage within their industry. This model surpassed the traditional narrow focus on competition among existing firms within an industry by revealing the five core forces that determine industry competition and profitability from the underlying economic logic of the industry. It provides a comprehensive analytical framework for strategic business decision-making.

The core content of the Five Forces Model revolves around the five forces that shape industry competition: the threat of new entrants (with the level of threat depending on the height of entry barriers and the expected response of existing firms), the bargaining power of buyers, the bargaining power of suppliers, the threat of substitutes, and the intensity of rivalry among existing competitors [2]. Porter argued that these five fundamental forces collectively drive industry competition, and the overall strength of these forces directly determines the ultimate profit potential of the industry. The contribution of the Five Forces Model to business analysis lies not only in identifying these forces but also in guiding strategy formulation through three main approaches: precise positioning (accepting the industry structure as given and aligning the enterprise's strengths and weaknesses with the 'weak points' of the industry forces), proactive influence (changing the root causes of the five forces through strategic actions to reshape the balance of forces and create advantages for the enterprise), and trend anticipation (industry transformations alter the configuration of the five forces, requiring enterprises to anticipate future trends in order to proactively deploy strategies) [2]. Therefore, the essence of Porter's Five Forces Model is a dynamic analytical tool that assists enterprises in actively shaping the competitive landscape.

Prior to the emergence of the Five Forces Model, business analysis often relied on managerial experience or scattered data, lacking a unified logical framework, and results were easily influenced by subjective factors. By clearly identifying the core influencing factors of the five forces, Porter advanced business analysis from experience-based decision-making to structured, cause-and-effect analysis, establishing a reusable and verifiable cognitive paradigm.

2.1.2. SWOT analysis

The SWOT analysis method is a comprehensive analytical tool widely used in strategic planning, business decision-making, and project evaluation. Systematically identifying key internal and external factors of the subject under study provides a clear logical framework for decision-making. Its name derives from the initials of four core elements in English: Strengths, Weaknesses, Opportunities, and Threats. Strengths and Weaknesses focus on the internal attributes of the subject,

while Opportunities and Threats focus on the external environmental influences. The combination of these four elements provides a comprehensive view of the current situation and development potential of the subject. SWOT analysis does not have a formally documented history, and its origin is debated in the academic community [3]. Some scholars believe that SWOT analysis originated from Albert Humphrey at Stanford University, who proposed the stakeholder concept and SWOT analysis; however, this view lacks authoritative documentation. Turner, in 2002, attributed the origination of SWOT analysis to Igor Ansoff, who is renowned for the Ansoff Matrix.

Although SWOT analysis does not have a specific 'foundational document,' since its gradual formation and promotion in the 1950s, it has become one of the core tools in the field of business analysis. Before the popularization of this analytical method, traditional business analysis often fell into the problem of 'overemphasizing parts while neglecting the whole.' Managers tended to overlook internal issues when focusing on external factors or to assess internal resources without considering the market environment. SWOT analysis, with its four-element structure of Strengths (internal), Weaknesses (internal), Opportunities (external), and Threats (external), compels analysts to consider both internal and external dimensions, forming an integrated perspective of internal capabilities—external environment.

2.2. Evolution of methodologies and innovation of technological tools

2.2.1. Evolution of methodologies

The methodology of business analysis has experienced a transition from qualitative to quantitative approaches. In the early stages, business analysis largely relied on case studies and expert judgment. Today, with the introduction of statistics and mathematical models, quantitative analysis has become mainstream. For instance, restaurants in the past could only estimate peak customer flow based on practical experience and prepare in advance. However, with the development of quantitative analysis, businesses can now accurately calculate ingredient procurement, optimize menu structures, and predict holiday sales peaks by analyzing customer flow at different times, average spending per customer, and dish order rates.

2.2.2. Innovation of technological tools

The development of business analytics is inseparable from innovations in technological tools. In the 1980s, the popularization of spreadsheet software such as Excel transformed the efficiency of data analysis. Prior to this, financial personnel had to calculate data manually, which was time-consuming and prone to errors. Excel made data computation, sorting, and filtering more convenient, enabling ordinary employees to perform basic data analysis. In the 2010s, the emergence of data visualization tools made complex data easy to understand. Business managers could quickly grasp key information through charts, dashboards, and other visual formats. In recent years, the rise of cloud computing technology has addressed the challenges of enterprise data storage and processing. Companies no longer need to invest heavily in building servers and can instead pay for scalable computing power as needed, easily handling petabyte-scale data and enabling large-scale data analysis.

3. The current state and practical uses of business analytics

3.1. Key turning points in business analytics and the industry transformations

With the rise of the internet, channels for data acquisition have been expanded. Through websites, social media, e-commerce platforms, and other avenues, enterprises can collect massive amounts of user behavior and market trend data. This shift has directly given rise to entirely new business models such as e-commerce, online services, and digital marketing. The competitive boundaries of traditional industries have been broken, and enterprise competition has expanded from offline presence to the battle for online user attention and data. The ability to efficiently leverage internet data for user insight and agile strategy adjustment has become a critical dividing line for enterprise survival and development.

As data volumes grow exponentially, traditional data processing methods have become inadequate. Big data technology has emerged in response, enabling enterprises to handle different types of data (structured, semi-structured, and unstructured) and to uncover hidden patterns within massive datasets, thereby achieving precise marketing while optimizing operational efficiency. This shift has directly propelled a wave of precision operations across various industries, significantly refining the granularity of enterprise decision-making, moving from 'groups' to 'individuals,' and allowing the large-scale implementation of personalized marketing and services, greatly enhancing operational efficiency and customer experience.

In recent years, the deep integration of artificial intelligence and machine learning has also elevated business analytics to a new level, transforming it from passive data interpretation to proactive data prediction and decision support, becoming the engine of business analysis. This transformation is driving automated decision-making and intelligent innovation across industries. The role of business analytics has evolved from supportive reference to an embedded decision engine in core business operations, giving rise to emerging models such as intelligent advisory services and precision medicine, and redefining the paths of production efficiency and business model innovation.

3.2. Specific applications of business analytics

3.2.1. Application in retail – the case of Amazon

With rapidly changing consumer preferences, seasonal demand fluctuations, and intensified competition, the complexity faced by retail enterprises is increasing. Leveraging data-driven insights has become crucial for companies to optimize product portfolios, pricing strategies, and inventory management [4]. As a leading company in the retail industry, Amazon has successfully driven systemic transformation and upgrades through the deep application of business analytics. Its core approach is data-driven, reconstructing inventory management and supply chain operation systems. In terms of inventory management, Amazon integrates historical sales records, real-time user behavior data, and external market dynamics to build machine learning-based dynamic demand forecasting models, achieving precise control of inventory levels while significantly reducing stockout risks and effectively controlling storage costs. In the supply chain segment, Amazon utilizes business analytics to optimize supplier performance evaluation and logistics route planning and, combined with IoT technology and intelligent warehouse systems, enables end-to-end visualization and coordination from procurement to delivery. This series of data-centered operational practices not only significantly enhances customer satisfaction and supply chain resilience but also

provides the retail industry with a practical path and development direction for leveraging data analytics to drive refined operations and intelligent transformation.

3.2.2. Application in financial services – the case of Goldman Sachs

Business analysis plays a critical role in driving the digital transformation of financial institutions, enabling organizations to leverage patterns within massive datasets to enhance decision-making and optimize operational performance [5]. As a leading international investment bank, Goldman Sachs has reshaped its trading execution, risk management, and customer service operations through deep integration of data analytics. In trading, Goldman Sachs employs sophisticated algorithmic trading systems to process vast amounts of market data in real time, dynamically optimizing trading strategies to improve execution efficiency and reduce costs. In risk management, the firm has developed machine learning-based risk assessment models to achieve precise quantification and proactive forecasting of multidimensional risks, including credit risk and market volatility, significantly strengthening its capability to withstand the complexities of the financial environment. On the customer service front, Goldman Sachs leverages business analytics to gain deep insights into clients' asset allocation preferences and behavioral patterns, offering highly personalized investment advice and wealth management solutions. This series of data-driven initiatives not only enhances Goldman Sachs' operational efficiency and decision-making quality but also demonstrates how data analytics can break down interdepartmental data silos and foster a collaborative analytical culture, continuously advancing financial services toward intelligence, personalization, and compliance. The case of Goldman Sachs illustrates that strategic investment in and systematic integration of data analytics has become a crucial foundation for financial institutions to achieve sustainable growth and innovative breakthroughs in rapidly changing markets.

4. Future trends in business analytics

Business analytics in the future may be influenced by several key trends, including the increased use of machine learning and deep learning algorithms, the integration of artificial intelligence with other emerging technologies such as blockchain and the Internet of Things, and the growing importance of explainable AI [6].

4.1. Evolution of machine learning and deep learning algorithms

Although current algorithms can achieve accurate predictions in specific scenarios, they are still unable to autonomously balance multiple dynamic objectives and generate globally optimal strategies. In the future, systems based on deep reinforcement learning and multi-agent collaboration will be able to simulate complex business ecosystems, autonomously completing the entire decision-making cycle—from strategy generation and effect simulation to continuous optimization—under rapidly changing market conditions, supply chain fluctuations, and resource constraints. For example, retail enterprises could use such systems to simultaneously optimize omnichannel pricing, inventory allocation, and marketing resource distribution, achieving collaborative intelligence across business units, whereas current technologies still rely on manually set goals and rule boundaries. This evolution will drive business analytics from decision support to autonomous management, truly enabling business systems to be adaptive and self-optimizing.

4.2. Integration of artificial intelligence with emerging technologies

Artificial intelligence (AI) is forming a synergistic ecosystem with technologies such as blockchain and the Internet of Things (IoT). The IoT continuously generates high-granularity real-time operational data through sensing devices, providing dynamic input for analysis. On this basis, artificial intelligence enables intelligent alerts and adaptive optimization for scenarios such as predictive maintenance and dynamic pricing. Blockchain, with its immutable and traceable characteristics, ensures the security and reliability of data during transfer and use, making it a critical trust infrastructure in areas such as supply chain finance and regulatory auditing. This integration will give rise to more intelligent, automated business solutions with inherent trust mechanisms.

4.3. Development of explainable artificial intelligence

As AI becomes increasingly involved in, and even takes the lead in, business decision-making, the compliance risks and trust crises arising from its 'black box' nature are drawing growing attention. Explainable artificial intelligence enhances transparency and auditability in the analytical process by providing visual traceability of decision logic, feature attribution analysis, and confidence assessment. This not only helps meet increasingly stringent data regulation requirements (such as GDPR) but also strengthens the trust of users, regulators, and stakeholders in AI systems and business analytics, facilitating the transition of AI from an auxiliary tool to a reliable decision-making partner and improving the credibility of business analytics systems.

5. Conclusion

This paper systematically explores the development history, key turning points, industry applications, and future trends of business analytics. The study indicates that business analytics has evolved from manual statistics to intelligent decision-making, with the Internet, big data, and artificial intelligence representing three major turning points in its development. These advances have not only driven innovations in analytical methods but also given rise to new business models such as e-commerce and precision services. Case analyses demonstrate that business analytics can significantly enhance enterprise operational efficiency and decision-making quality. Looking ahead, machine learning, multi-technology integration, and explainable AI are expected to propel business analytics toward greater automation and reliability. Although this study has limitations in terms of case coverage and forward-looking dimensions, it nonetheless provides a practical reference for enterprises promoting digital transformation and offers a systematic perspective for understanding business evolution in the data-driven era.

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