

Driving Competitive Advantage: A Study of Dynamic Capability and Digital Maturity in the Electronic Manufacturing Industry

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Abstract

This study investigates the interplay between dynamic capability, digital maturity, and competitive advantage in electronic manufacturing enterprises. Through literature review, conceptual modeling, and empirical analysis of 325 valid questionnaires, the research reveals several key findings. Firstly, dynamic capability significantly impacts competitive advantage, with timely decision-making ability being the most influential. Secondly, dynamic capability positively affects digital maturity, particularly in terms of digital transformation management intensity and digital business intensity. Thirdly, digital maturity enhances competitive advantage, with both dimensions playing crucial roles. Lastly, digital maturity mediates the relationship between dynamic capability and competitive advantage, acting as a key mechanism. These findings provide insights into how enterprises can navigate the challenges of digital transformation to enhance competitiveness.



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1. Introduction

1.1 Background of Study

Since the 20th century, more than half of the Fortune 500 companies have disappeared, indicating the onset of profound digital disruption (Nanterme, 2016). In this era of "digital Darwinism," businesses must continually adapt to survive. The COVID-19 pandemic has further transformed the global economic landscape, emphasizing the importance of digitalization for enterprise survival (Peter, 2020). The rapid advancement of digital technologies like big data, AI, IoT, and 5G has reshaped business models, shortening the lifecycle of traditional enterprise models and enabling new digital enterprises to achieve significant valuations in record time. Countries worldwide are implementing digital transformation strategies to foster economic growth. Japan aims to lead in IT development by 2020, Germany is leveraging the digital economy for sustained growth, and the UK is enhancing its competitiveness through digital advancements. In China, digital transformation has become crucial, particularly following the economic challenges posed by the pandemic. China's digital economy is pivotal in maintaining consumption, stabilizing markets, and driving economic revitalization. Policies such as the Cyberspace Administration's "Cloud based Digital Empowerment" plan and the National Development and Reform Commission's "Digital Transformation Partnership Action" highlight the strategic importance of digital transformation (Sun & Zuo, 2022).

Digitalization supports sustainable development across the environment, society, and economy. Companies like Facebook, Amazon, and Google leverage digital technologies for innovation and competitive advantage, while traditional firms adopt digital transformations to stay competitive (Hess, 2020). The integration of digital technologies blurs traditional industry boundaries, necessitating dynamic capabilities for enterprises to thrive. Dynamic capabilities enable firms to sense, seize, and reconfigure resources to respond to internal and external threats, enhancing competitiveness (Mikalef & Pateli, 2016). Despite the opportunities, digital transformation poses significant challenges. Dynamic capabilities are essential for companies to adapt and maintain competitive advantages in unpredictable environments. For instance, IBM's transformation in the 1990s significantly increased its market value, while Nokia's failure to innovate led to its decline (Harreld, 2007; Laamanen, 2016). Therefore, cultivating dynamic capabilities is crucial for successful digital transformation and long-term competitive advantage.

Scholars have explored the impact of dynamic capabilities on firm performance and competitive advantage, particularly in dynamic markets (Drnevich, 2011; Jiao, 2013). Dynamic capabilities help firms adapt to rapid changes and leverage digital opportunities. However, the specific capabilities required for digital transformation remain abstract, posing challenges for business leaders (Karimi, 2015). The concept of digital maturity, encompassing technological capability, digital platform capability, and technological innovation, emerges as a critical outcome of dynamic capabilities (Protogerou, 2011). Thus, research on dynamic capabilities within the digital context offers valuable insights for both academic understanding and practical application.

1.2 Problem Statement

Given the correlation between digital transformation and dynamic environments, exploring the necessary resources and capabilities has become a key academic focus. Although the concept of dynamic capability has gained significant attention, its outcomes remain vague and complex. Future research should investigate the relationship between dynamic capabilities and intermediate outcomes, and how these outcomes influence performance (Schilke & Helfat,

2018). Empirical studies on dynamic capabilities and competitive advantage in the context of digital transformation are sparse, particularly regarding the mediating role of digital maturity.

1.3 Research Questions and Objectives

The competitive landscape necessitates that manufacturing firms continuously enhance their competitive edge. One pertinent question is whether a company's dynamic capability influences its performance. Digital transformation is a prominent trend across various industries, yet significant disparities in digitalization levels and maturity persist among enterprises in the Yangtze River Delta region. This leads to several key questions: How does dynamic capability impact the market competitiveness of electronic manufacturing enterprises in this region? Does this impact significantly affect their performance? Does dynamic capability positively influence digital maturity as digital transformation progresses? Finally, does digital maturity play a mediating role between dynamic capability and competitive advantage? This research aims to explore these relationships, providing valuable insights for enterprises to devise accurate digital transformation strategies and implement them effectively. The primary objective of this research is to examine the impact of digital maturity on dynamic capability and corporate performance. Specifically, it seeks to understand why some electronic manufacturing companies succeed in digital transformation while others do not. By focusing on the interplay between dynamic capability, digital maturity, and competitive advantage, this research aims to offer a reference for how these enterprises can navigate digital transformation. The findings will aid companies in developing their dynamic capabilities, promoting digital transformation, and gaining a competitive edge. This study will provide management insights into how to cultivate and improve dynamic capacities to swiftly respond to market changes and enhance digital levels. The specific objectives are:

- (1) To analyze the significant relationship between enterprise dynamic capabilities and competitive advantage.
- (2) To analyze the significant relationship between enterprise dynamic capabilities and digital maturity.
- (3) To analyze the significant relationship between digital maturity and competitive advantage.
- (4) To analyze the mediating role of digital maturity in the relationship between dynamic capability and competitive advantage.

1.4 Research Significance

This study contributes to the relatively scarce academic research on dynamic capability and digital transformation, particularly the potential mediating role of digital maturity between dynamic capability and competitive advantage in enterprises. By focusing on electronic manufacturing enterprises in the Yangtze River Delta region, this research explores how dynamic capabilities can enhance competitive advantage through digital maturity. The study employs standardized empirical research methods to investigate the following: how enterprises develop dynamic capabilities to bolster competitive advantage; how dynamic capabilities affect digital maturity; and the mediating role of digital maturity. This research fills a gap in empirical studies on dynamic capability and competitive advantage within the context of digital transformation, thereby advancing theoretical research in strategic management and related fields. Practically, this research aims to understand why some companies thrive in a digital transformation environment while others do not. By examining the relationship between dynamic capability, digital maturity, and competitive advantage, the findings provide relevant enterprises with guidance on how to undertake digital transformation effectively. The insights gained from this study will help enterprises develop their dynamic capabilities, promote digital transformation, and achieve a competitive advantage. Moreover, the research

offers management strategies for enhancing dynamic capabilities and digital levels, thereby enabling companies to respond more effectively to market changes and challenges.

2. Literature Review

2.1 Competitive Advantage

Competitive advantage arises when a company can offer superior products or services at lower costs or greater benefits than competitors. Porter (1985) defines it as the value created for buyers that exceeds the costs, categorizing it into cost leadership and differentiation. The resource-based view (RBV), proposed by Barney (1991), suggests that unique, valuable, and irreplaceable resources are the source of sustained competitive advantage. This perspective is reinforced by the relational view, which emphasizes the role of relationships and alliances in generating competitive advantage (Dyer & Singh, 1998). The theoretical development of competitive advantage spans several decades and includes the market-based view (MBV), the resource-based view (RBV), the knowledge-based view, and the capability-based view. The MBV posits that external market factors are the primary determinants of competitive advantage (Porter, 1980). Conversely, the RBV focuses on internal resources and capabilities as the main sources of competitive advantage (Barney, 1991). The knowledge-based view highlights knowledge as a critical resource, arguing that it is more difficult to replicate than other assets (Hamel & Prahalad, 1994). The capability-based view asserts that organizational capabilities are essential for achieving and sustaining competitive advantage (Grant, 1991; Amit & Shoemaker, 1993). Competitive advantage can be measured using objective and perceptual indicators. Objective indicators, such as financial performance metrics, are convenient and direct but may not fully capture the complexity of competitive advantage (Guo, 2002). Perceptual indicators, which include relative financial and non-financial performance measures, are more commonly used in academic research. These indicators assess competitive advantage through dimensions like profit growth, revenue growth, operating costs, market share, customer satisfaction, and product and service quality relative to competitors (Morgan & Berthon, 2008; Leonidou, 2015; Feng & Sun, 2010).

2.2 Dynamic Capability

Teece and Pisano first introduced the concept of dynamic capability in 1994, which gained substantial attention after their 1997 article "Dynamic Capability and Strategic Management" (Teece et al., 1997). This concept has since permeated various subfields of management, including organizational processes, innovation, and human resource management (Law et al., 2019). Initially, dynamic capability was defined as the ability of a company to integrate, construct, and reconfigure internal and external resources to cope with turbulent market environments. This concept encompasses three core elements: process (organization and management), positioning (resource allocation), and path (strategic trajectory) (Eisenhardt & Martin, 2000; Zollo & Winter, 2002). Zahra et al. (2006) expanded this definition to include the role of entrepreneurs and senior decision-makers in reconfiguring resources and optimizing procedures based on strategic decisions. Helfat (2007) further broadened the definition to the organization's ability to build, expand, or reconfigure its resources purposefully. Barreto (2010) defined dynamic capability as the potential of enterprise systems to solve problems through resource base reconfiguration and market orientation. Li and Liu (2014) adapted this definition to the context of transitional economies, focusing on strategic decision-making and implementation (Li & Liu, 2014). Ali (2016) and Cheng (2016) have contributed to understanding dynamic capability from an innovation and knowledge perspective, respectively, while Mikalef and Pateli (2016) emphasized the role of IT resources in developing dynamic capabilities in response to rapidly changing business environments.

Based on the analysis of these definitions, dynamic capability is understood as the potential of manufacturing enterprises to systematically solve problems by perceiving opportunities and threats, making timely decisions, and effectively implementing strategic changes (Li & Liu, 2014). The dimensions of dynamic capability have been subject to various interpretations. Scholars commonly decompose it into abilities such as perception/search, decision-making/selection, and reconfiguration/deployment (Teece, 1998; Helfat, 2007). Barreto (2010) identified four dimensions: changing the resource base, perceiving opportunities and threats, making timely decisions, and market orientation. Li and Liu (2014) modified these dimensions to strategic perception, timely decision-making, and implementation ability, aligning them with the Chinese economic context. This study adopts the dimensions identified by Li and Liu (2014), which are strategic sense-making capacity, timely decision-making ability, and change implementation ability, as these are pertinent to the digital transformation context of Chinese manufacturing enterprises (Karl, 2019; Yeow & Soh, 2018).

2.3 Digital Maturity

Maturity models represent the growth stage theory, which suggests that organizational capacity develops in stages along predictable paths, with each stage described by benchmark variables (Earl, 2000; Subba Rao, 2003). Digital maturity refers to the state of a company's digital transformation process at a specific point in time (Chanas & Hess, 2016). Digital transformation encompasses changes brought by digital technology to a company's business model, potentially altering products, organizational structure, or automating processes. Recent literature distinguishes digital maturity from digital readiness. Digital readiness denotes the state before any transformation begins, while digital maturity indicates progress in the transformation process (De Carolis, 2017; Lokuge, 2019). Digital maturity measures the degree to which an organization has achieved its desired state of digital transformation, reflecting responses to digital disruption within an industry (Lahrman, 2011). Bharadwaj (2013) views digital maturity as the extent to which an organization's operations are based on information technology, while Gottschalk (2009) sees it as the outcome of digital transformation efforts. Gassmann (2014) describes digital maturity as an organization's evolving digital capabilities. Digital maturity, therefore, indicates the extent of an organization's digital transformation. Companies use this concept to assess their progress and the competitive advantages gained through digital processes (Chanas & Hess, 2016; Deloitte, 2018; Anna, 2020). Digital maturity involves multiple dimensions to help managers evaluate their companies. Westerman and McAfee (2012) divide digital maturity into digital business intensity (DBI) and digital transformation management intensity (DTMI). DBI measures changes in operations through technology investments, while DTMI assesses leadership skills for driving digital transformation. Westerman, Bonnet, and McAfee (2014) further evaluate digital maturity through leadership and digital capabilities. McKinsey & Company (Catlin, 2015) developed a Digital Quotient (DQ) score, measuring digital maturity across digital strategy, capability, and culture. Lichtblau et al. (2015) proposed a one-dimensional model with six maturity stages and three prototypes: novice, vertical integrators, and digital champions. Valdez de Leon (2016) suggested a six-level model for telecommunications service providers, incorporating strategy, customers, ecosystem, operations, technology, and innovation. Berghaus (2016) introduced five linear stages of digital maturity, while PwC (2016) proposed four paths: beginners, vertical integrators, horizontal integrators, and digital champions. Von Blixen Finecke et al. (2017) measured digital maturity across digital marketing, digital experience, e-commerce, E-CRM, and social media. This research synthesizes these dimensions to characterize digital maturity using DBI and DTMI. DBI reflects an enterprise's ability to invest in technology for competitive advantage, while DTMI represents the leadership skills needed to leverage technology for transformative change.

2.4 Management Theory

2.4.1 Resource-based Theory

The resource-based view (RBV) emphasizes internal analysis to understand how companies achieve and sustain competitive advantage (Makhija, 2003). Penrose (1959) introduced the concept of resources as assets, capabilities, knowledge, and information that companies control, highlighting their role in gaining competitive advantage (Lin Song, 2005). Resources, as semi-permanent assets, can be described as attributes, assets, processes, or knowledge utilized for strategic effectiveness (Daft, 1983). Amit and Schoemaker (1993) intertwined capability with resources, while Barney (1991) defined resources as assets contributing to competitive advantage according to the VRIN criteria. Debate exists on whether RBV is static or dynamic; Grant (1991) argues for its relevance in turbulent markets, while Priem (2001) criticizes its static assumptions. Prahalad and Hamel (1990) introduced core competencies, influencing dynamic capability perspectives (Teece, 1997), stressing adaptability to changing environments. Dynamic capability theory enhances RBV by focusing on organizational change and adaptation (Teece & Pisano, 1994). It integrates evolutionary economics, emphasizing organizational renewal in response to environmental changes (Lavie, 2006). Despite consensus on its adaptive nature, research varies in defining and applying dynamic capability, reflecting its multifaceted contributions to competitive advantage (Teece, 2014a). Dynamic capability complements RBV, offering insights into how firms respond to dynamic environments.

2.4.2 Dynamic Capacity Theory

Dynamic capability theory underscores adaptability to changing environments (Teece & Pisano, 1994), providing a dynamic perspective on organizational change (Lavie, 2006). It emphasizes resource reconfiguration to sustain competitive advantage amidst environmental shifts. Drawing from evolutionary economics, dynamic capacity theory views organizational change as embedded in repetitive patterns (Nelson & Winter, 1982), with habits shaping gradual improvement through learning (Helfat & Peteraf, 2009). Despite consensus on its adaptive nature, differentiation exists in defining dynamic capability, reflecting its multifaceted contributions to competitive advantage (Teece, 2014a). Dynamic capability complements RBV, offering insights into how firms respond to dynamic environments.

2.6 Research Framework

This study proposes a conceptual model divided into three components: dynamic capability, digital maturity, and competitive advantage. The research aims to explore how dynamic capability levels influence competitive advantage and the mediating role of digital maturity. First, the study investigates the impact of dynamic capability on competitive advantage. Dynamic capability includes strategic sense-making, timely decision-making, and change implementation abilities. These capabilities allow enterprises to perceive and seize opportunities, integrate and reconfigure resources, and enhance their responsiveness to threats, thereby improving competitiveness in dynamic environments. This aligns with the view that dynamic capabilities contribute to organizational effectiveness and resilience (Teece, 2014a). Second, the research examines how digital maturity mediates the relationship between dynamic capability and competitive advantage. Digital maturity encompasses digital business intensity and digital transformation management intensity. Digital business intensity reflects a company's ability to leverage technological investments for competitive advantage, emphasizing strategic investments in digital technologies. Companies with strong dynamic capabilities can recognize opportunities in digital transformation, reallocate resources, and develop beneficial technologies to enhance their competitive advantage (Sun & Zuo, 2023). Digital transformation management intensity involves the leadership skills and resource allocation necessary for managing strategic changes during digital transformation. Effective

change management and leadership are crucial for thriving in a digital business environment (Sun et al., 2024). Third, the study explores the direct impact of digital maturity on competitive advantage. Higher levels of digital maturity correlate with faster innovation, task automation, and enhanced digital asset utilization, leading to a better understanding of digital technology implementation for value creation (Sun & Zuo, 2022). Companies with advanced digitalization can outperform competitors by leveraging these innovations effectively.

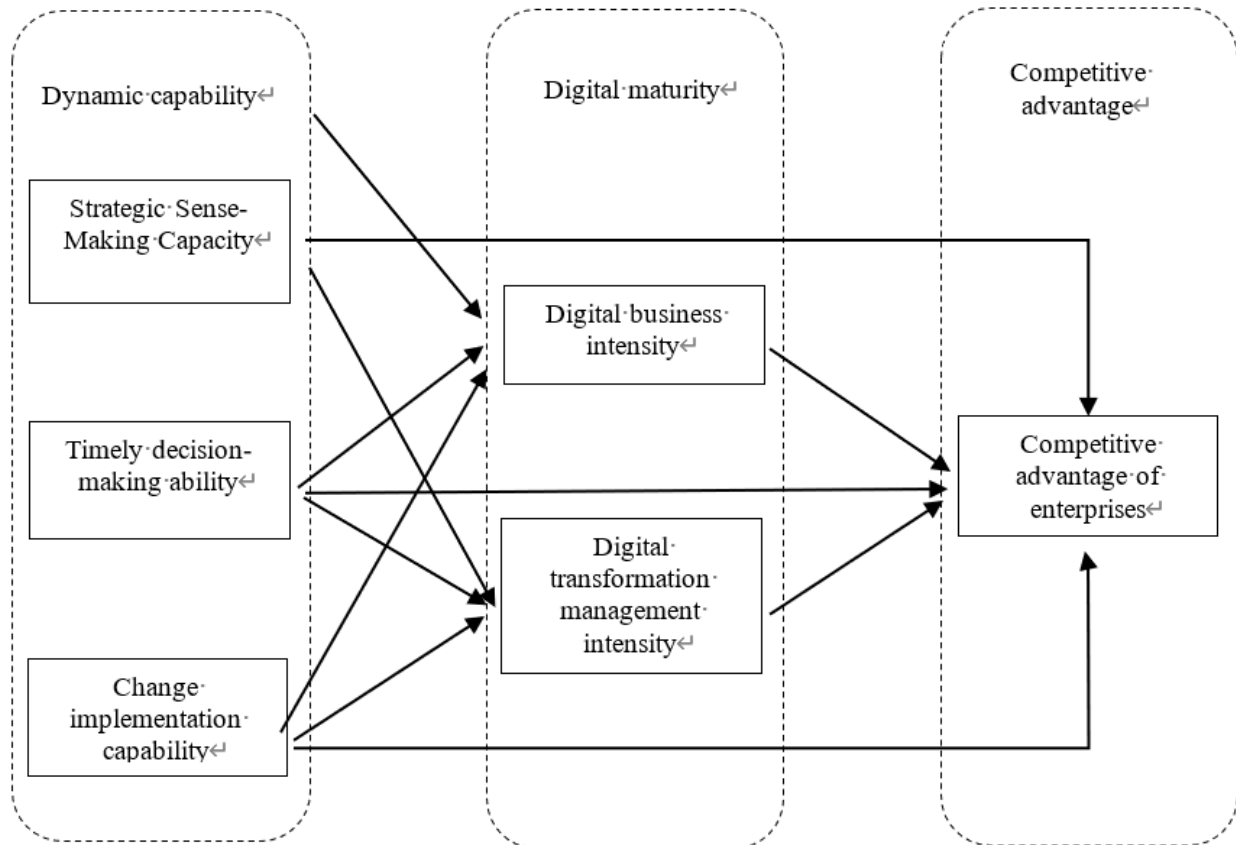


Figure 1: Conceptual Model

In summary, to enhance competitive advantage, manufacturing enterprises should focus on improving their digital maturity and effectively utilizing their dynamic capabilities. This study's conceptual model integrates these elements to provide a comprehensive framework for understanding the interplay between dynamic capability, digital maturity, and competitive advantage.

2.7 Research Hypotheses

Based on the analysis of the causal relationships between dynamic capability, digital maturity, and competitive advantage, this study proposes 17 hypotheses, summarized as follows:

- (1) H1: The stronger a company's strategic sense-making capacity, the more significant its competitive advantage.
- (2) H2: The stronger a company's ability to make timely decisions, the more significant its competitive advantage.
- (3) H3: The stronger a company's ability to implement change, the more significant its competitive advantage.
- (4) H4: A company's strategic sense-making capacity positively affects its digital business intensity.

- (5) H5: A company's strategic sense-making capacity positively affects its digital transformation management intensity.
- (6) H6: A company's timely decision-making ability positively affects its digital business intensity.
- (7) H7: A company's timely decision-making ability positively affects its digital transformation management intensity.
- (8) H8: A company's ability to implement change positively affects its digital business intensity.
- (9) H9: A company's ability to implement change positively affects its digital transformation management intensity.
- (10) H10: The higher the level of an enterprise's digital business intensity, the more significant its competitive advantage.
- (11) H11: The higher the level of an enterprise's digital transformation management intensity, the more significant its competitive advantage.
- (12) H12: An enterprise's digital business intensity mediates the relationship between strategic sense-making capacity and competitive advantage.
- (13) H13: An enterprise's digital business intensity mediates the relationship between timely decision-making ability and competitive advantage.
- (14) H14: An enterprise's digital business intensity mediates the relationship between change implementation ability and competitive advantage.
- (15) H15: The intensity of digital transformation management mediates the relationship between strategic sense-making capacity and competitive advantage.
- (16) H16: The intensity of digital transformation management mediates the relationship between timely decision-making ability and competitive advantage.
- (17) H17: The intensity of digital transformation management mediates the relationship between change implementation capability and competitive advantage.

3. Methodology

3.1 Research Design

This study employs literature research, questionnaire surveys, empirical analysis, and mathematical statistical analysis to investigate the relationship between dynamic capability, digital maturity, and competitive advantage. Firstly, existing theories and literature are systematically reviewed to guide the research framework construction. Secondly, data on each variable are collected through questionnaire surveys. Thirdly, empirical testing of research hypotheses is conducted within the theoretical framework. Lastly, mathematical and statistical analysis methods are used to analyze the collected data, ensuring scientific rigor. To elucidate the impact of dynamic capabilities on competitive advantage in China's electronic manufacturing enterprises and the role of digital maturity, a standardized questionnaire survey method is adopted. Initially, an exploratory questionnaire is developed based on literature review and enterprise research, refined with input from mentors and industry experts. Subsequently, feedback from enterprise managers refines the questionnaire further, resulting in the final version. Standard empirical research methods are employed to construct a conceptual model of the relationship between dynamic capability, digital maturity, and competitive advantage. Hypotheses are proposed, verified, and the model is refined using empirical data analysis primarily in the third and fourth chapters. Data collected from the questionnaire are processed using statistical software. Reliability and validity analysis, correlation analysis, and multiple linear regression analysis are conducted to verify the relationships among the independent, mediator, and dependent variables.

3.2 Sample Selection for Analysis

This study employs empirical research via questionnaire surveys. Given the varying degrees of digitalization across industries, with some more advanced than others, the research focuses on the electronic manufacturing sector due to its substantial digital investment and transformative potential. Industries like automation equipment manufacturing, electronic manufacturing services (EMS), and communication equipment manufacturing exhibit higher digital investment and significant room for improvement, particularly in areas like network integration. Hence, electronic manufacturing enterprises in the Yangtze River Delta region of China are selected as the primary research subjects. These enterprises are better positioned to leverage dynamic capabilities for digital transformation, enhancing their competitive edge. The choice of this industry sector ensures alignment with market trends and addresses the pressing need for digital adaptation. Moreover, these enterprises possess the requisite capabilities and financial resources for successful digital transformation.

3.3 Questionnaire Design

Given the widespread use and convenience of questionnaire surveys in empirical management research, this study predominantly employs this method. The questionnaire design adheres strictly to established standards, comprising three main sections. Firstly, the survey introduces its background, elucidating its purpose, significance, and ensuring respondents' understanding of key concepts. Emphasizing anonymity and confidentiality, it assures participants of the research's academic nature. Secondly, it collects pertinent information from respondents, including company details and individual demographics, such as industry, size, and personal characteristics. Finally, the questionnaire encompasses the variable analysis scale, focusing on dynamic capability, digital maturity, and competitive advantage. Through scale pretesting and reliability analysis, the validity of the scale is confirmed, ensuring robust content coverage.

3.4 Instrumentation

Conducting empirical research via questionnaire surveys is crucial for effectively measuring variables. This study primarily adopts existing scales from previous research to measure variables such as dynamic capability, digital maturity, and competitive advantage. Six variables are identified: strategic sense-making capacity, timely decision-making ability, and change implementation ability within dynamic capability; digital business intensity, digital transformation management intensity, and competitive advantage within digital maturity. Measurement indicators are obtained by reviewing academic literature and adjusting for practical relevance. To ensure precision, the Likert 5-point scale is utilized, allowing participants to rate items from "1" for "completely inconsistent" to "5" for "completely consistent" (Sun & Zuo, 2022). Dynamic capability, as conceptualized by Barreto (2010) and adapted by Li & Liu (2014), encompasses strategic sense-making capacity, timely decision-making ability, and change implementation ability. Items are sourced from existing scales, with additional modifications to suit the research context. For instance, the strategic sense-making capacity includes continuous capability monitoring, reflecting companies' ability to scan capabilities against competitors (Barreto, 2010; Schreyogg & Kleisch Eberl, 2007). Defined as the state of a company's digital transformation, digital maturity involves digital business intensity and digital transformation management intensity. Joseph (2017) and Mario (2019) provide insights into digital business intensity, emphasizing investment in digital technologies for operational transformation. Meanwhile, leadership theories by Westerman et al. (2014) and Anna (2020) inform digital transformation management intensity, focusing on strategic vision, cultural change, and empowerment. Competitive advantage is operationalized using subjective indicators, aligning with strategic research practices (Li & Liu, 2014; Tippins & Sohi, 2003). It includes financial and non-financial dimensions, measuring profit growth, revenue

growth, operating costs, market share, customer satisfaction, and product/service quality relative to competitors. Items are directly adopted from previous research, ensuring consistency and reliability (Sun & Zuo, 2022).

3.5 Questionnaire Pre test

The pre-test questionnaire conducted in this research aimed to evaluate the quality of the scale. A small-scale pre-survey was conducted, distributing questionnaires to members of the Jiangsu Automation Association. Through electronic questionnaire QR codes displayed on the association's activity site, 92 questionnaires were collected, with 80 valid ones obtained after removing invalid responses. Statistical software SPSS 25.0 was used for data analysis, including reliability and validity testing. Reliability analysis, using Cronbach's Alpha coefficient, was employed to test the internal consistency of the scale. A coefficient above 0.7 indicates high internal consistency. The scale's reliability was confirmed with a Cronbach's Alpha coefficient of 0.933 for Strategic Sense Making Capacity (SSMC), 0.932 for Timely Decision-Making Ability (TDMC), 0.912 for Change Implementation Capability (CIC), 0.928 for Digital Business Intensity (DBI), 0.951 for Digital Transformation Management Intensity (DTMI), and 0.928 for Competitive Advantage (CA). Validity was ensured by adapting or borrowing measurement tools from existing scales. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test were conducted to confirm the factor structure using exploratory factor analysis (EFA). The scales showed good structural validity, with cumulative variance interpretation rates meeting the requirements. The pre-test results indicate that all scales have good reliability and validity, leading to the formation of a formal questionnaire consisting of 37 items for the formal research.

3.6 Data Collection Process

The data collection process for this study aimed to investigate how electronic manufacturing enterprises can leverage dynamic capabilities to advance digital transformation and bolster competitive advantage. To ensure representative sampling, enterprises in the Yangtze River Delta region, particularly those heavily invested in digital technology, were targeted. Well-known enterprises like Alcatel Lucent, FLEX, and Suzhou Dongshan Precision Manufacturing Co., Ltd., among others, were selected for on-site investigations. Additional recommendations from the Jiangsu Automation Association and mentors expanded the sample pool. Data were gathered through offline field research and electronic distribution methods, resulting in a total of 400 questionnaires distributed and 325 qualified responses obtained, yielding an effective rate of 86.9%.

3.7 Data Analysis Methods and Process

The data analysis process for this study involves several key methods facilitated by SPSS 25.0 statistical software. Descriptive statistical analysis is first conducted to summarize sample data, providing a foundation for subsequent reliability and validity analyses. Reliability analysis assesses the consistency and stability of the data using Cronbach's alpha coefficient. Validity analysis measures the accuracy of measurement items through content and structural validity checks, including factor analysis. Canonical correlation analysis explores the correlation between sets of variables, focusing on discovering correlation characteristics. Pearson correlation coefficient is used to judge correlation levels. Multiple regression analysis investigates the relationship between dependent and independent variables, determining the influence of each variable and assessing model fit. SPSS 25.0 is utilized for regression analysis to examine the relationship between dynamic capabilities, digital maturity, and competitive advantage in electronic manufacturing enterprises.

4. Results and Discussion

4.1 Profile of Respondents

The analysis encompasses 325 valid questionnaires, detailing the industry, nature, scale, age, and revenue of surveyed enterprises, as well as respondent demographics. Industry distribution reveals a balanced representation across automation equipment manufacturing (18.15%), EMS manufacturing (30.15%), communication equipment manufacturing (17.85%), household appliance manufacturing (28.00%), and others (5.85%). Enterprise nature highlights private enterprises (52.92%) as the majority, followed by state-owned (26.50%) and joint ventures (19.69%). Regarding scale, the majority of enterprises employ between 1000-2000 individuals (31.08%), followed by 500-1000 (25.23%) and 300-500 (19.38%). Enterprise age is predominantly 10-20 years (45.85%), with fewer under 10 (21.23%) or over 30 years (8.92%). Sales revenue is evenly distributed, with notable proportions in the 5-10 billion yuan bracket (44.92%). Respondent positions mainly consist of grassroots managers (67.69%), followed by middle managers (26.77%), and senior management (4.93%). Gender distribution skews male (60.30%), and education levels vary, with undergraduates comprising the majority (57.85%). Age distribution primarily falls within the 30-39 years bracket (41.85%). Overall, the sample adequately represents enterprise demographics and positions, meeting research requirements.

4.2 Descriptive Statistical Analysis

The descriptive statistical analysis conducted on the sample data from 325 valid questionnaires offers insights into the variables of dynamic capability, digital maturity, and competitive advantage. For dynamic capability, encompassing strategic sense-making capacity, timely decision-making ability, and change implementation capability, the sample exhibits an average rating of 3.216, 3.091, and 3.053, respectively, on a scale of 1 to 5. Standard deviations range from 0.910 to 1.044, indicating moderate variability within the sample. Digital maturity, assessed through digital business intensity and digital transformation management intensity, yields average scores of 3.186 and 2.996, respectively, with standard deviations ranging from 0.914 to 0.921. The data suggest moderate levels of digital maturity within the surveyed enterprises. Concerning competitive advantage, the average rating is 3.274, with a standard deviation of 1.021, indicating moderate variability in perceived competitive advantage across the sample.

Table 1: Descriptive Statistics of Sample Data for Each Variable

Variable	Dim	SS	Min	Max	Avg	Std Dev	Var
Dynamic capability	Strategic sense-making capacity	325	1	5	3.216	1.044	1.089
	Timely decision-making ability	325	1	5	3.091	0.971	0.942
	Change implementation capability	325	1	5	3.053	0.910	0.828
Digital maturity	Digital business intensity	325	1	5	3.186	0.921	0.848
	Digital transformation management intensity	325	1	5	2.996	0.914	0.835
Competitive advantage	Competitive advantage	325	1	5	3.274	1.021	1.043

These findings provide a foundational understanding of the distribution and variability of key variables within the surveyed enterprises, essential for subsequent analysis and interpretation.

4.3 Data Reliability & Validity Analysis

In the analysis of data reliability and validity, reliability assessment was first conducted, focusing on the internal consistency of the scales used in the study. For dynamic capability, digital maturity, and competitive advantage scales, Cronbach's Alpha coefficients were computed to evaluate reliability. Results indicated high reliability, with all Cronbach's Alpha values exceeding 0.8, suggesting strong internal consistency within each scale.

Table 2: Reliability Test Results for Dynamic Capability

MV	IN	CTI-CITC	CAV-DI	CAV	OCAV
Strategic sense-making capacity	SSMC1	0.775	0.897	0.914	
	SSMC2	0.707	0.905		
	SSMC3	0.730	0.902		
	SSMC4	0.759	0.899		
	SSMC5	0.755	0.900		
	SSMC6	0.720	0.903		
	SSMC7	0.723	0.903		
Timely decision-making ability	TDMC1	0.809	0.876	0.907	0.944
	TDMC2	0.771	0.885		
	TDMC3	0.722	0.895		
	TDMC4	0.744	0.890		
	TDMC5	0.779	0.883		
Change implementation capability	CIC1	0.742	0.851	0.882	
	CIC2	0.759	0.847		
	CIC3	0.683	0.865		
	CIC4	0.706	0.860		
	CIC5	0.697	0.862		

Table 3: Reliability Test Results for Digital Maturity

MV	IN	CTI-CITC	CAV-DI	CAV	OCAV
Digital business intensity	DBI1	0.826	0.929	0.940	
	DBI2	0.824	0.929		
	DBI3	0.800	0.932		
	DBI4	0.810	0.930		
	DBI5	0.824	0.929		
	DBI6	0.839	0.927		
Digital transformation management intensity	DTMI1	0.843	0.942	0.950	0.959
	DTMI2	0.818	0.944		
	DTMI3	0.809	0.944		
	DTMI4	0.785	0.946		
	DTMI5	0.788	0.945		
	DTMI6	0.824	0.943		
	DTMI7	0.836	0.942		
	DTMI8	0.832	0.943		

Table 4: Reliability Test Results for Competitive Advantage

MV	IN	CTI-CITC	CAV-DI	CAV
Competitive Advantage	CA1	0.771	0.924	0.932
	CA2	0.851	0.914	
	CA3	0.782	0.923	
	CA4	0.785	0.922	
	CA5	0.809	0.920	
	CA6	0.821	0.918	

Validity analysis, essential for ensuring the accuracy of survey results, was performed next. It aimed to ascertain if the survey effectively measured its intended constructs. Content validity, ensuring items adequately represent the constructs, was confirmed by employing established scales. Structural validity, assessing if the survey accurately measures theoretical constructs, was tested through exploratory factor analysis (EFA) using SPSS.

Table 5: KMO Values and Bartlett's Test Results

Vars	BST			KMO	Suitability of FA
	χ^2	df	P-value		
SSMC	1337.675	21	.000	0.924	Very suitable
TDMC	995.336	10	.000	0.889	Suitable
CIC	800.221	10	.000	0.880	Suitable
DBI	1609.249	15	.000	0.927	Very suitable
DTMI	2249.793	28	.000	0.953	Very suitable
CA	1480.187	15	.000	0.929	Very suitable

Before conducting EFA, prerequisites were evaluated through the Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test. Results demonstrated the suitability of factor analysis for all variables, with KMO values exceeding 0.8 and Bartlett's test yielding significant results ($p < 0.05$).

Table 6: Exploratory Factor Analysis Results for Dynamic Capability

Vars	QIs	FLC		
		Factor 1	Factor 2	Factor 3
Strategic sense-making capacity (SSMC)	SSMC1	0.781	0.239	0.217
	SSMC2	0.688	0.285	0.244
	SSMC3	0.740	0.226	0.231
	SSMC4	0.793	0.207	0.196
	SSMC5	0.694	0.354	0.263
	SSMC6	0.676	0.345	0.238
	SSMC7	0.753	0.211	0.217
Timely Decision Making Ability (TDMC)	TDMC1	0.263	0.797	0.285
	TDMC2	0.230	0.799	0.251
	TDMC3	0.341	0.705	0.243
	TDMC4	0.337	0.728	0.227
	TDMC5	0.320	0.753	0.261
Change Implementation Capability (CIC)	CIC1	0.191	0.144	0.835
	CIC2	0.260	0.253	0.774
	CIC3	0.198	0.318	0.705
	CIC4	0.350	0.236	0.696
	CIC5	0.242	0.264	0.726
	CV	8.989	1.504	1.248
	EPV	0.2673	0.21762	0.20579

Table 7: Exploratory Factor Analysis Results for Digital Maturity

Vars	QIs	FLC	
		Factor 1	Factor 2
Digital Business Intensity (DBI)	DBI1	0.326	0.822
	DBI2	0.327	0.818
	DBI3	0.324	0.801
	DBI4	0.348	0.796
	DBI5	0.339	0.812
	DBI6	0.392	0.799
Digital Transformation Management Intensity (DTMI)	DTMI1	0.798	0.374
	DTMI2	0.804	0.321
	DTMI3	0.797	0.318
	DTMI4	0.798	0.270
	DTMI5	0.742	0.387
	DTMI6	0.814	0.310
	DTMI7	0.788	0.384
	DTMI8	0.792	0.369
	CV	1.449	9.138
	EPV	34.74%	40.89%

Table 8: Exploratory Factor Analysis Results for Competitive Advantage

Vars	QIs	FLC
		Factor 1
Competitive Advantage (CA)	CA1	0.812
	CA2	0.861
	CA3	0.866
	CA4	0.875
	CA5	0.832
	CA6	0.857
	CV	9.096
	EPV	0.7536

EFA results for dynamic capability, digital maturity, and competitive advantage scales are respectively. Factor extraction revealed the underlying structure of each construct. For dynamic capability, three factors were identified, explaining 69.071% of the variance. Digital maturity comprised two factors, explaining 75.624% of the variance. Competitive advantage demonstrated a single factor, explaining 75.478% of the variance. Factor loadings indicated the relationship between items and factors, confirming the validity of the scales. In summary, reliability and validity analyses ensured the robustness and accuracy of the survey data, laying a solid foundation for subsequent data interpretation and analysis in the study.

4.4 Analysis of Correlation

In the correlation analysis, Pearson correlation coefficients were computed to assess the relationships between key variables before hypothesis verification. Dynamic capability, the main variable, consists of three dimensions: strategic sense-making capacity (SSMC), timely decision-making ability (TDMC), and change implementation capability (CIC). Digital maturity includes digital business intensity (DBI) and digital transformation management intensity (DTMI), while competitive advantage serves as the dependent variable.

Table 9: Descriptive Statistics and Correlation Coefficient Matrix

	SSMC	TDMC	CIC	DBI	DTMI	CA
SSMC	1					
TDMC	.545**	1				
CIC	.462**	.523**	1			
DBI	.558**	.601**	.529**	1		
DTMI	.612**	.671**	.609**	.652**	1	
CA	.621**	.643**	.611**	.686**	.786**	1

Results revealed significant correlations between competitive advantage and the dimensions of dynamic capability and digital maturity. Competitive advantage exhibited a strong positive correlation with SSMC ($r = 0.621$, $p < 0.001$) and TDMC ($r = 0.643$, $p < 0.001$). It also showed a significant positive correlation with CIC ($r = 0.611$, $p < 0.001$), DBI ($r = 0.686$, $p < 0.001$), and DTMI ($r = 0.786$, $p < 0.001$). Further analysis indicated that TDMC exhibited a stronger correlation with competitive advantage compared to SSMC and CIC. Similarly, within digital maturity dimensions, DTMI demonstrated a more significant correlation with competitive advantage than DBI. In summary, the correlation analysis highlighted the strong relationships between competitive advantage and various dimensions of dynamic capability and digital maturity, emphasizing the importance of timely decision-making and effective digital transformation management in enhancing competitive advantage.

4.5 Hypothesis Test Result

The hypothesis testing results regarding the main effects of dynamic capability on competitive advantage in electronic manufacturing enterprises are analyzed. Additionally, the mediating effects of digital maturity are summarized. The hypothesis test results indicate that all hypotheses are valid. Specifically, H1 to H3 suggest that a stronger strategic sense-making capacity, timely decision-making ability, and change implementation capability in a company lead to a more significant competitive advantage. H4 to H9 show that these dynamic capabilities positively affect digital business intensity and digital transformation management intensity. Moreover, H10 and H11 demonstrate that higher levels of digital business intensity and digital transformation management intensity in an enterprise are associated with a more significant competitive advantage.

Table 10: Regression Results for Dynamic Capability and Competitive Advantage Relationship

Vars		Competitive advantage				
		Model 1	Model 2	Model 3	Model 4	Model 5
CV	Enterprise nature	.108	.022	-.014	.030	-.035
	Enterprise scale	-.017	.009	-.004	-.046	-.012
	Enterprise age	-.046	-.033	-.058	-.006	-.026
IV	Strategic sense making capacity		.617**			.309**
	Timely decision-making ability			.646**		.323**
	Change implementation capability				.608**	.302**
	R ²	.015	.388	.417	.376	.582
	Adjusted R ²	.006	.380	.410	.368	.574
	F	1.638	194.708**	220.753**	185.269**	143.850**

Table 11: Regression Results for Dynamic Capability and Digital Business Intensity Relationship

Vars		Digital business intensity				
		Model 1	Model 2	Model 3	Model 4	Model 5
CV	Enterprise nature	.157	.082	.046	.092	.029
	Enterprise scale	-.028	.005	-.016	-.053	-.021
	Enterprise age	-.064	-.052	-.075	-.003	-.05
IV	Strategic sense making capacity		.544**			.266**
	Timely decision-making ability			.593**		.333**
	Change implementation capability				.517**	.225**
	R ²	.032	.321	.370	.293	.477
	Adjusted R ²	.023	.313	.363	.284	.467
	F	3.540	136.498**	172.043**	117.907**	90.228**

Table 12: Regression Results for Dynamic Capability and Digital Transformation Management Intensity Relationship

Vars		Digital transformation management intensity				
		Model 1	Model 2	Model 3	Model 4	Model 5
CV	Enterprise nature	.148	.064	.023	.072	.004
	Enterprise scale	-.024	.001	-.011	-.053	-.019
	Enterprise age	-.069	-.057	-.082	-.029	-.052
IV	Strategic sense making capacity		.601**			.275**
	Timely decision-making ability			.667**		.372**
	Change implementation capability				.599**	.284**
	R ²	.030	.382	.458	.380	.596
	Adjusted R ²	.021	.374	.451	.372	.588
	F	3.266	182.497**	252.909**	181.013**	148.478**

Table 13: Regression Results for Digital Maturity and Competitive Advantage Relationship

Vars		Competitive Advantage		
		Model 1	Model 2	Model 3
CV	Enterprise nature	.000	-.009	-.028
	Enterprise scale	.002	.002	.006
	Enterprise age	-.002	-.009	.015
MV	Digital business intensity	.685**		.305**
	Digital transformation management intensity		.788**	.593**
	R ²	.470	.618	.671
	Adjusted R ²	.463	.613	.666
	F	274.600**	505.278**	318.310**

Furthermore, the mediating effects of digital maturity are supported by H12 to H17. These hypotheses suggest that digital business intensity and digital transformation management intensity play mediating roles between dynamic capability dimensions and competitive advantage. Specifically, digital business intensity mediates the relationship between strategic sense-making capacity, timely decision-making ability, change implementation capability, and

competitive advantage. Similarly, digital transformation management intensity mediates the relationship between these dynamic capabilities and competitive advantage.

Table 14: Mediating Role Regression Analysis Results for Digital Business Intensity

Vars	Competitive advantage				
	Model 1	Model 2	Model 3	Model 4	
CV	Enterprise nature	.108	-.019	-.036	-.016
	Enterprise scale	-.017	.011	.003	-.020
	Enterprise age	-.046	-.007	-.023	-.009
IV	Strategic sense making capacity		.349**		
	Timely decision-making ability			.368**	
	Change implementation capability				.348**
MV	Digital business intensity		.494**	.468**	.504**
	R ²	.015	.553	.555	.556
	Adjusted R ²	.006	.546	.548	.549
	F	1.638	118.198**	98.878**	129.314**

Table 15: Mediating Role Regression Analysis Results for Digital Transformation Management Intensity

Vars	Competitive Advantage				
	Model 1	Model 2	Model 3	Model 4	
CV	Enterprise nature	.108	-.002	-.029	-.017
	Enterprise scale	-.017	.008	.003	-.011
	Enterprise age	-.046	.004	-.005	.014
IV	Strategic sense making capacity		.226**		
	Timely decision-making ability			.215**	
	Change implementation capability				.213**
MV	Digital transformation management intensity		.651**	.646**	.660**
	R ²	.015	.650	.643	.646
	Adjusted R ²	.006	.644	.637	.641
	F	1.638	239.019**	201.937**	243.567**

These findings highlight the importance of dynamic capabilities and digital maturity in enhancing competitive advantage in electronic manufacturing enterprises. They emphasize the need for companies to focus on developing these capabilities and managing digital transformation effectively to gain a competitive edge in the industry.

4.6 Discussion

The impact of dynamic capability on competitive advantage and digital maturity is thoroughly examined. Firstly, regarding the impact of dynamic capability on competitive advantage, the study confirms the significant positive correlation between strategic sense-making capacity, timely decision-making ability, change implementation capability, and competitive advantage. The empirical results, based on data from 325 electronic manufacturing enterprises, support the theoretical hypotheses proposed earlier. Specifically, strategic sense-making capacity is identified as crucial for organizations to adapt and survive in dynamic environments. This capability enables firms to perceive changes, acquire necessary resources, and innovate, ultimately leading to competitive advantage. Similarly, timely decision-making ability emerges as pivotal in the digital era, facilitating rapid responses to opportunities and challenges, thereby enhancing competitive advantage. Moreover, the study verifies that change implementation capability contributes significantly to sustained competitive advantage by enabling organizations to adapt and optimize operational processes effectively. Secondly, the study explores the impact of dynamic capability on digital maturity. The empirical findings affirm the positive correlation between strategic sense-making capacity, timely decision-making ability, change implementation capability, and both digital business intensity and digital transformation management intensity. These results align with theoretical expectations, highlighting the role of dynamic capabilities in improving digital maturity. Specifically, strong

strategic sense-making capacity allows organizations to respond effectively to digital opportunities and threats, guiding the development of digital strategies. Similarly, timely decision-making ability facilitates agile responses to digital transformations, enabling enterprises to seize opportunities promptly. Furthermore, robust change implementation capability enables organizations to allocate resources flexibly and drive digital initiatives, thus enhancing digital maturity. Lastly, the mediating role of digital maturity in the relationship between dynamic capability and competitive advantage is examined. The study confirms the mediating effects of both digital business intensity and digital transformation management intensity. These mediating roles underscore the importance of digital maturity in leveraging dynamic capabilities to achieve competitive advantage. Specifically, high digital business intensity enables organizations to capitalize on digital opportunities effectively, while strong digital transformation management intensity ensures strategic alignment and sustained momentum in digital transformation efforts. Overall, the findings emphasize the critical role of dynamic capability in shaping both competitive advantage and digital maturity in electronic manufacturing enterprises. They highlight the importance of strategic sense-making, timely decision-making, and change implementation capabilities in navigating digital transformations and gaining competitive edge in dynamic markets. Moreover, the mediating effects of digital maturity underscore the interconnectedness of dynamic capability and organizational success in the digital age.

5. Conclusion

This study investigates the impact of digital maturity on dynamic capability performance and explores the reasons behind the varying success of businesses in digital transformation. By reviewing existing literature, defining key concepts, constructing a conceptual model, and testing hypotheses, this research makes several important findings. Firstly, it confirms that dynamic capability positively influences competitive advantage in electronic manufacturing enterprises. Strategic sense making capacity, timely decision-making ability, and change implementation ability all contribute to competitive advantage, with timely decision-making ability having the most significant impact. Secondly, the study shows that dynamic capability also positively affects digital maturity, particularly in terms of digital transformation management intensity and digital business intensity. This suggests that enterprises with strong dynamic capabilities are more likely to achieve higher levels of digital maturity. Thirdly, the research demonstrates that digital maturity positively impacts competitive advantage. Both digital transformation management intensity and digital business intensity play a crucial role in enhancing competitive advantage, with digital transformation management intensity having a slightly greater impact. Lastly, the study reveals that digital maturity acts as a mediator between dynamic capability and competitive advantage. Specifically, digital transformation management intensity and digital business intensity mediate the relationship, indicating that digital maturity is a key mechanism through which dynamic capability influences competitive advantage.

These findings contribute to the understanding of how dynamic capability affects performance, the factors influencing digital transformation success, and the effectiveness of dynamic models in strategic management. The study also makes theoretical innovations by introducing the concept of digital maturity and examining its impact empirically, providing valuable insights for future research and practical implications for electronic manufacturing enterprises. Moving forward, future research could expand the study to other industries or regions to enhance the generalizability of the findings. Additionally, further exploration of the bidirectional impact between dynamic capability and digital maturity could provide a more comprehensive understanding of the dynamics of digital transformation. Overall, this research provides a solid

foundation for future studies on enhancing enterprise competitiveness in the context of digital transformation.

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