Strategic Capacity Management for Competitive Advantage: A Systematic Literature Review of Operational, Technological, and Sustainability Perspectives

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Abstract Capacity management has become a critical strategic imperative for global organisations in the face of uncertain and complex market dynamics. This comprehensive literature review analyses 11 reputable Scopus Q1 articles (2021–2026) addressing capacity management within the contexts of supply chains, manufacturing, tourism, and business systems. This study identifies five key dimensions: (1) volume flexibility and capacity management, (2) supply chain capacity management and resilience, (3) destination capacity, (4) production planning and manufacturing capacity, and (5) business process optimisation. The analysis reveals a significant shift from a purely tactical-operational approach towards a holistic perspective that integrates strategic, technological, and sustainability dimensions. Empirical findings indicate that companies optimising production capacity utilisation achieve 15–30% higher operational efficiency than their competitors, with average global capacity utilisation reaching only 70–80% across all industrial sectors. This research synthesises three main theoretical frameworks—the Resource-Based View (RBV), the Dynamic Capability View (DCV), and the Technology-Organisation-Environment (TOE) framework—to develop a comprehensive understanding of capacity management as a driver of competitive advantage. Innovative contributions include: (1) a systematic mapping of the contemporary capacity management research landscape that identifies emerging trends and the evolution of intellectual discourse; (2) a holistic integration of operational, strategic, technological, and sustainability perspectives previously fragmented across the literature; and (3) the identification of critical research gaps and future research directions that guide academic inquiry and industrial practice. Research impact: This literature review bridges a significant knowledge-practice gap in the implementation of capacity management, particularly for SMEs and emerging markets, and provides a practical framework for integrating AI, IoT, and cloud computing technologies into capacity decision-making systems.

Keywords: capacity management, supply chain, operational efficiency, strategic optimisation, dynamic capabilities.

INTRODUCTION

Capacity management has become a strategic focus for global organisations in the face of uncertain and complex market demand dynamics. Empirical evidence suggests that companies able to optimise their production capacity utilisation achieve operational efficiency levels 15–30% higher than their competitors (Tran et al., 2025). In the digital and disruptive era, capacity management is no longer merely a reactive technical function responding to demand fluctuations, but rather an integrative strategic decision involving technology, human resources, and the supply chain ecosystem (Türkeş et al., 2024;).

The academic context reveals significant developments in the understanding of capacity management. Early research (2000–2010) focused more on technical and operational aspects, such as production scheduling and resource allocation, with an approach dominated by mathematical optimisation (Schmuck, 2021). However, recent literature (2020–2026) integrates a more holistic perspective, combining strategic dimensions, supply chain resilience, technology adoption, and sustainability. This paradigm reflects the complexity of the contemporary business environment, where capacity is measured not only by output volume but also by agility, sustainability, and value creation (Türkeş et al., 2024).

Empirical Phenomena and Context

In global industrial practice, capacity management faces a fundamental paradox: on the one hand, overcapacity leads to high overhead costs and inefficiencies, whilst on the other hand, undercapacity results in lost market opportunities and reduced customer satisfaction. Data from the manufacturing sector indicates that global average capacity utilisation stands at just 70–80%, with significant variation across sectors (Tran et al., 2025). In the tourism sector, destination carrying capacity management is crucial for maintaining sustainability and visitor satisfaction, with data showing that exceeding carrying capacity by 20% can reduce customer satisfaction by up to 35% (Pereira-Moliner et al., 2024).

New technologies such as Artificial Intelligence, the Internet of Things (IoT), and cloud computing open up new opportunities for real-time capacity monitoring and predictive analysis, enabling organisations to adjust capacity with high precision (Al-Haraizah et al., 2026). At the same time, sustainability demands are driving a paradigm shift in capacity management from a linear to a circular perspective, with a focus on resource efficiency and waste minimisation (Bimpizas-Pinis et al., 2022).

State of the Art: Review of Previous Research

The literature on capacity management can be categorised into several main streams: Firstly, research on flexibility as a mechanism for adapting capacity to fluctuations in demand. Flexibility in an operational context encompasses three dimensions: (1) product flexibility—the ability to alter the product portfolio; (2) mix flexibility—the ability to alter the product mix within the same volume; and (3) volume flexibility—the ability to adjust output volume (T. T. H. Tran et al., 2025). Research indicates that product flexibility adopts a proactive and long-term approach with a broad scope, whilst mix and volume flexibility are more reactive and focus on the optimisation of internal resources (T. T. H. Tran et al., 2025).

Secondly, research on supply chain capacity management in the context of resilience and disruption management. The Dynamic Capability View (DCV) theory provides a framework for understanding how companies can rapidly realign their resources and capabilities in response to environmental changes (Türkeş et al., 2024). Proactive strategies include routine monitoring of environmental changes, budget updates, process simplification, and IT infrastructure modifications, whilst reactive strategies focus on the implementation of crisis management (Türkeş et al., 2024).

Thirdly, research on technology-enabled capacity management through advanced analytics, predictive modelling, and automation. AI and machine learning enable more accurate forecasting of demand patterns, optimisation of inventory levels, and prevention of stock-outs and overstocking (Al-Haraizah et al., 2026). In specific sectors such as tourism and retail, big data and tourism intelligence provide unprecedented visibility into real-time demand patterns (Pereira-Moliner et al., 2024).

Fourth, research on capacity management within the context of sustainability and the circular economy. This approach integrates environmental and social considerations into capacity planning, thereby shifting the paradigm from purely economic efficiency to the triple bottom line (people, planet, profit) (Acevedo-Urquiaga et al., 2025).

Research Gaps and Unique Aspects

Although the existing literature makes valuable contributions, there are still several gaps that need to be explored: (1) Multidimensional integration: Most existing research explores capacity management within the context of a single dimension or a single industry. Research on holistic integration across various dimensions (operational, strategic, technological, and sustainability) remains limited. (2) Contextual adaptation: The majority of existing research is based on the context of developed countries with mature infrastructure, technological readiness, and regulatory environments. Research on the implementation of capacity management in SMEs and emerging markets remains underdeveloped. (3) Dynamic modelling and real-time optimisation: Although there is research on optimisation, the development of dynamic capacity models capable of adapting in real-time to environmental changes still requires further development. (4) Human resources and organisational factors: There is a significant gap in research regarding the role of human resources, organisational culture, and leadership in determining the effectiveness of capacity management. (5) Measurement of long-term impact: Research on the sustainable impact of capacity management initiatives on competitive advantage and corporate performance in the long term remains limited.

Research Objectives and Contributions

This literature review article presents three main contributions: First, a comprehensive mapping of the contemporary capacity management research landscape, identifying key dimensions, emerging trends, and the evolution of intellectual discourse. This mapping is presented in the form of a systematic framework that groups research by application context (manufacturing, supply chain, services), analytical approach (optimisation, simulation, data analytics), and level of analysis (operational, tactical, strategic). Secondly, the synthesis and integration of various theoretical perspectives to develop a holistic view of capacity management as a strategic driver. This integration encompasses the Resource-Based View (RBV) to understand capacity as a strategic resource, the Dynamic Capability View (DCV) to capture adaptive capabilities, and the Technology-Organisation-Environment (TOE) framework to analyse the role of digital technology. Thirdly, the identification of future research directions based on emerging gaps and challenges in capacity management, which can guide the academic research agenda and industrial practice for the coming period.

METHOD

Research Design and Approach

This study employs a qualitative-integrative research design through a systematic literature review of 11 Scopus Q1-indexed articles published between 2021 and 2026 that discuss capacity management across various industrial and organisational contexts. This study is designed to identify, analyse, and synthesise empirical findings regarding the impact of capacity management on business performance by integrating operational, strategic, and technological perspectives.

This literature review approach employs a systematic framework that groups studies based on three main dimensions: (1) application context, covering manufacturing, supply chains, and the service sector ( ); (2) analytical approaches, covering optimisation, simulation, and data analytics; and (3) levels of analysis, ranging from operational, tactical, to strategic. This method enables researchers to identify patterns, trends, and research gaps relevant to the topic of capacity management and its impact on an organisation's business performance.

Literature Selection and Inclusion Criteria

The literature selection process followed a systematic protocol with strict inclusion criteria to ensure the relevance and quality of sources. Selected articles must meet the following criteria: (1) published in a Scopus Q1 or Q2 journal with a high impact factor; (2) published between 2021 and 2026 to capture the latest developments in the literature; (3) explicitly address capacity management within one or more industrial contexts (manufacturing, supply chain, tourism, healthcare, infrastructure); and (4) present empirical research with clear methodology and measurable results.

The eleven selected articles encompass research employing various research methodologies: cross-sectional quantitative studies using structural equation modelling (Al-Haraizah et al., 2026; Y. T. Tran et al., 2025), multi-year longitudinal studies (Tran et al., 2025), and big data-based research with predictive analytics. (Pereira-Moliner et al., 2024) This methodological diversity ensures that the literature review captures a holistic perspective on capacity management from various analytical viewpoints and empirical contexts.

Literature Sampling and Data Collection

Research data was collected through systematic screening of major academic databases, including Scopus, Web of Science, and ProQuest. The researchers conducted searches using a combination of keywords: "capacity management", "supply chain capacity", "flexibility", "organisational capacity", "operational efficiency", and "business performance". The initial search yielded over 200 articles, which were subsequently screened through a review of titles and abstracts based on predefined inclusion criteria.

The literature sampling process followed a purposive sampling methodology to ensure that each selected article made a unique contribution to the understanding of capacity management. In the context of the literature review, the selected sample (11 articles) represents a population of relevant articles meeting high-quality standards, with a distribution covering various dimensions of capacity management and diverse industrial contexts.

Data collection from each article was carried out systematically through information extraction covering: (1) author identity, year of publication, and publication medium; (2) research design and methodology used; (3) sample, population, and data collection procedures in each study; (4) research variables and operational definitions; (5) the data analysis techniques applied; and (6) the main findings and theoretical contributions to capacity management.

Literature Review Methodology

Data analysis in the literature review was conducted through content analysis and thematic analysis to identify patterns, themes, and relationships between research findings. The analysis process began with categorical coding based on the five main dimensions of capacity management: (1) volume flexibility and capacity adaptation; (2) supply chain capacity management and resilience; (3) capacity utilisation in destination management; (4) production planning and manufacturing capacity management; and (5) business process optimisation and resource utilisation.

Each article was coded and categorised according to these dimensions, with particular attention to: (a) the level of analysis (operational, tactical, strategic); (b) the industry context of application (manufacturing, services, infrastructure, tourism); (c) integrated technologies (AI, IoT, cloud computing); and (d) measured outcomes or impacts on business performance.

This analysis also involves a synthesis of theoretical perspectives that integrates three main frameworks: (1) the Resource-Based View (RBV) to understand capacity as a strategic resource; (2) the Dynamic Capability View (DCV) to capture an organisation's ability to adapt to environmental change; and (3) the Technology-Organisation-Environment (TOE) framework to analyse the role of digital technology in the implementation of capacity management.

To identify research gaps and future directions, this study conducts a gap analysis by comparing existing literature against unexplored areas in research regarding: (1) the multidimensional integration of capacity management across operational, strategic, and sustainability perspectives; (2) context-specific adaptation within SMEs and emerging markets; (3) dynamic modelling and real-time optimisation; (4) the role of human resources and organisational factors; and (5) the measurement of long-term impacts on competitive advantage.

Mapping of Research Methodologies in Selected Literature

Methodological data from the 11 analysed articles reveal significant variation in research design and the analytical techniques employed. Table 1 presents a summary of the methodologies from the selected articles:

Table 1. List of Research Articles

No	Capacity Management Dimensions	Research Design	Sample	Analysis Technique	Context
1	Flexibility of Volume	Quantitative Cross-Sectional	215 companies (France)	SEM using AMOS	Manufacturing & Innovation
2	Supply Chain Capacity	Quantitative Cross-Sectional	6,332 observations	Regression & Efficiency Analysis	Listed Companies (China)
3	Target Transport Capacity	Multi-Year Quantitative	5.17 million flight searches	PLS-SEM with SmartPLS 4	Tourism (Costa Blanca)
4	Production Planning	Simulation & Experimental	Simulation Games	Educational Gameplay Analysis	Manufacturing Training
5	Business Process Optimisation	Simulation & Modelling	Water system data	Process Simulation & Sensitivity Analysis	Water Companies
6	Supply & Demand Management	Cross-Sectional Quantitative Research	384 respondents	PLS-SEM with SmartPLS	Consumer Goods Industry (Jordan)
7	Innovation Capacity	Quantitative Cross-Sectional	285 companies	PLS-SEM using SmartPLS 3	Vietnamese companies
8	Resource Allocation	Quantitative Panel	6,332 company years	DEA & Regression	Listed Companies (China)
9	Fund Capacity Management	Quantitative Time Series	ESG Fund Data	Time Series Analysis	Investment Funds
10	Supply Chain Capacity	Quantitative Predictive	Small businesses	Neural Network Prediction	Roof Farming (Colombia)
11	Production Capacity	Qualitative & Simulation	Supply Chain Case Study	Integration Framework Analysis	Circular Supply Chain

Source: Synthesis of methodologies from 11 research articles (2021–2026)

Measurement and Operationalisation of Variables

The studies in this literature review employ various approaches to measure the construct of management capacity and its impact on business performance. In the context of the quantitative studies included in the literature review, variable measurement was conducted via: (Al-Haraizah et al., 2026)

Measurement Based on Structured Questionnaires

Studies employing a survey approach (6 out of 11 articles) utilised structured questionnaires with a graded Likert scale, typically employing a 5-point or 7-point scale. For example, in a study on artificial intelligence (AI)-based marketing in the Jordanian consumer sector, the questionnaire contained 23 items measured using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). (Al-Haraizah et al., 2026) Each construct (AI Applications, Consumer Engagement, Operational Efficiency, Business Performance) was operationalised through several items adapted from scales validated in previous research.

Measurements Based on Secondary Data and Big Data

Research in the tourism sector uses big data from various sources to measure destination capacity, including flight search data, the Hotel Satisfaction Index (HSi), average daily rates (ADR), and temperature data. (Pereira-Moliner et al., 2024) These measurements are carried out through the analysis of millions of real-time data points (5.17 million flight searches over a 3-year period) from the Mabrian and Copernicus platforms to generate actionable insights regarding destination carrying capacity. (Pereira-Moliner et al., 2024)

Operational Efficiency-Based Measurements

Research on managerial capability and investment efficiency utilised a Data Envelopment Analysis (DEA) approach to measure the relative efficiency of 6,332 annual firm observations, with output variables (profitability, return on assets) and input variables (capital, labour, assets).

Data Analysis Techniques Used

Data analysis in the reviewed literature demonstrates the use of various advanced statistical and modelling techniques:

Partial Least Squares Structural Equation Modelling (PLS-SEM)

Five of the 11 articles used PLS-SEM with SmartPLS software (versions 3 and 4) to test complex relationships between variables. (Al-Haraizah et al., 2026; Y. T. Tran et al., 2025) PLS-SEM was chosen for its flexibility in handling: (1) complex models with multiple mediation and moderation relationships; (2) non-normal data distributions; (3) relatively small to medium sample sizes (209–384 respondents); and (4) constructs derived from objective variables or secondary data sources. (Pereira-Moliner et al., 2024)

In practice, PLS-SEM analysis is conducted in two main stages: (Al-Haraizah et al., 2026) (1) measurement model evaluation to test the reliability and validity of the measurement instruments, with criteria of Factor Loadings > 0.7, Average Variance Extracted (AVE) > 0.5, and Composite Reliability > 0.7; and (2) structural model analysis to test the research hypotheses using bootstrapping with 5,000 resamples to estimate the significance of path coefficients.

Bootstrapping and Cross-Validation

The bootstrapping technique, with a minimum of 5,000 iterations, was applied to generate robust confidence intervals and p-values, thereby reducing the likelihood of Type I errors. (Pereira-Moliner et al., 2024) With a component-based estimation approach, the PLS method tends to underestimate path coefficients due to its conservative nature, resulting in estimates that are more reliable than the actual effect sizes.

Discriminant Validity Testing

Discriminant validity was tested using the Heterotrait-Monotrait (HTMT) ratio criterion with a threshold value of < 0.85 for strict assessment or < 0.90 for less strict criteria. (Al-Haraizah et al., 2026) This approach ensures that each construct is measured separately and is not highly correlated with other constructs, validating that the measurements of these different concepts are distinct.

Common Method Bias (CMB) Assessment

Studies using data from a single source (questionnaires) test for Common Method Bias using Harman's single-factor test and the Common Latent Factor (CLF) approach. (Y. T. Tran et al., 2025) Furthermore, several studies employed a two-stage data collection method with a time lag to minimise CMB, and applied dual rating scales (5-point and 7-point) to reduce respondents' consistency bias.

Time-Series and Longitudinal Analysis

Studies employing a longitudinal design with multiple time points (Time 1, Time 2, Time 3) apply analyses that account for temporal effects and delayed performance impacts. (T. T. H. Tran et al., 2025) By collecting data at three time intervals (baseline, 1 year, 2 years later), the study can evaluate how capacity management initiatives affect company performance in the medium and long term.

Quality and Reliability Criteria

The evaluation of methodological quality in the 11 selected articles used criteria adapted from international standard guidelines for systematic reviews and meta-analyses:

Internal Validity

Studies were assessed based on: (1) the clarity of the research design and the logical flow from the research questions through to the methodology and analysis; (2) an appropriate sample size and sampling technique to answer the research questions; (3) the validity and reliability of measurement instruments demonstrated through factor loadings, AVE, and composite reliability; and (4) control for alternative explanations through the inclusion of control variables (company size, industry, organisational age).

External Validity

The generalisability of the findings is evaluated based on: (1) the diversity of the geographical context, industry, and organisational size studied; (2) the representativeness of the sample relative to the population under study; (3) transparency in reporting the limitations and boundary conditions of the findings; and (4) the application of the findings to management practice across various organisational settings.

Methodological Rigour

Methodological rigour is assessed through: (1) adherence to established standards for statistical testing and model estimation; (2) appropriate handling of missing data and outliers; (3) an adequate sample size relative to the complexity of the model and parameter estimation requirements; and (4) full disclosure regarding analytical decisions and assumptions made.

By integrating 11 high-impact articles from various disciplines and industrial contexts, this literature review provides a comprehensive understanding of capacity management as a strategic driver of business performance, with significant implications for practitioners and researchers interested in operational efficiency and the competitive advantage of modern organisations.

RESULTS AND DISCUSSION

Definition and Scope of Capacity Management

Capacity management is defined as the process of planning, allocating, and optimising an organisation's resources—including infrastructure, technology, human resources, and financial resources—to meet customer demand efficiently whilst maintaining long-term sustainability and competitiveness (Munsamy et al., 2023). This definition distinguishes capacity management from mere production scheduling or resource allocation, as capacity management takes into account strategic, temporal, and environmental aspects.

The current scope of capacity management encompasses: (1) Operational level: Scheduling, resource allocation, production planning, and inventory management to ensure the smooth running of day-to-day operations (Schmuck, 2021). (2) Tactical level: Demand forecasting, capacity utilisation optimisation, seasonal planning, and buffer management to respond to medium-term fluctuations (Schmuck, 2021). (3) Strategic level: Long-term capacity investment decisions, portfolio planning, market entry strategies, and alignment between capacity and corporate strategy (Tran et al., 2025).

Table 2 presents a comprehensive framework that integrates these levels.

Table 2. An Integrative Framework for Capacity Management Across Organisational Levels

Dimension	Operational Level	Tactical Level	Strategic Level
Timeframe	Days to weeks	Months to quarters	Years to several years
Decision Focus	Scheduling, delivery	Demand forecasting, buffer sizing	Portfolio, investment decisions
Key Resources	Labour, equipment utilisation	Inventory, temporary labour	Facilities, technology, capital
Performance Metrics	Equipment efficiency, labour utilisation	Capacity utilisation rate, stock-out rate	Market share, profitability, ROA
Risk management	Real-time problem-solving	Scenario planning, contingency measures	Strategic hedging, diversification
Technology Applications	ERP systems, WMS	Demand forecasting software	Analytics platforms, AI/ML

Source: Synthesis of research articles (2021–2026)

Five Key Dimensions of Capacity Management

An analysis of 11 research articles identified five key dimensions that are the focus of contemporary research:

Volume Flexibility and Capacity Management

Volume flexibility refers to a company's ability to adjust production or service volumes to accommodate fluctuations in demand (Tran et al., 2025). Mechanisms for achieving volume flexibility include: the use of temporary workers, cross-training, the use of overtime, and the maintenance of reserve resources. Its application context includes the pharmaceutical industry, which produces both small and large volumes of products simultaneously, as well as healthcare providers facing short-term fluctuations in patient demand (Tran et al., 2025).

However, volume flexibility is not without cost: the additional complexity and coordination costs associated with managing part-time workers and underutilised resources can reduce profitability (Tran et al., 2025). This research highlights a trade-off between the benefits of flexibility and operational costs that must be managed strategically.

Supply Chain Capacity Management and Resilience

In the context of the supply chain, capacity management is integrated with visibility, collaboration, and agility as components of resilience (Türkeş et al., 2024). Strategies for capacity management include: (1) Enhanced communication and collaboration: Strengthening relationships with customers, suppliers, and third parties for better information exchange; (2) Enhanced visibility: Utilising inventory management platforms for visualisation and rapid order fulfilment; (3) Integration of collaborative processes: Implementing IoT and cloud computing for more efficient operational management; (4) Proactive capacity planning: Re-planning activities and adapting infrastructure to changes in the environment (Türkeş et al., 2024)

Empirical data indicates that supply chain resilience capacity (SCRC) has a positive and significant impact on a company's supply chain resilience, with an elasticity coefficient of 0.287 (Türkeş et al., 2024). This means that a 1-unit increase in capacity management strategy can increase supply chain resilience by 0.287 units, ceteris paribus.

Carrying Capacity in Destination Management

In the tourism sector, carrying capacity is a critical concept referring to the total number of tourists that a region can accommodate within a specific time period (Pereira-Moliner et al., 2024). Capacity management in this context involves: (1) Understanding demand patterns through analysis of flight search data and tourism intelligence; (2) Predictive modelling for daily tourist arrivals; (3) Demand-based resource planning ( ) for accommodation and services; (4) Dynamic pricing optimisation to manage demand

Flight search data and big data analysis provide actionable insights for destination managers in planning policies related to marketing, investment, and revenue management (Pereira-Moliner et al., 2024).

Production and Capacity Planning in a Manufacturing Context

In manufacturing, capacity planning is integrated with production scheduling, inventory management, and quality control. Educational simulations such as Littlefield Technologies and

SIMPLE (Simulation of Production and Logistics Environment) demonstrate that capacity management decisions are closely linked to scheduling, inventory, and batch size decisions (Schmuck, 2021).

Research identifies four key elements in production planning decision-making: (1) make-to-order production planning, (2) capacity management, (3) inventory management, and (4) outsourcing (Schmuck, 2021). The interdependence between these elements requires integrated decision-making, rather than a piecemeal approach.

Business Process Optimisation and Resource Utilisation

Research on water system modelling indicates that capacity optimisation within business processes can be identified through detailed simulation and sensitivity analysis (Munsamy et al., 2023). The results of the analysis reveal variations in optimisation potential across various business processes: (1) High optimisation potential: Customer billing, business process energy costs, process energy costs; (2) Moderate optimisation potential: Inventory management, customer service; (3) Low optimisation potential: Infrastructure upgrades such as HVAC, which are costly and time-consuming

Utilising automation and smart metering can significantly reduce execution time and process energy demand (Munsamy et al., 2023).

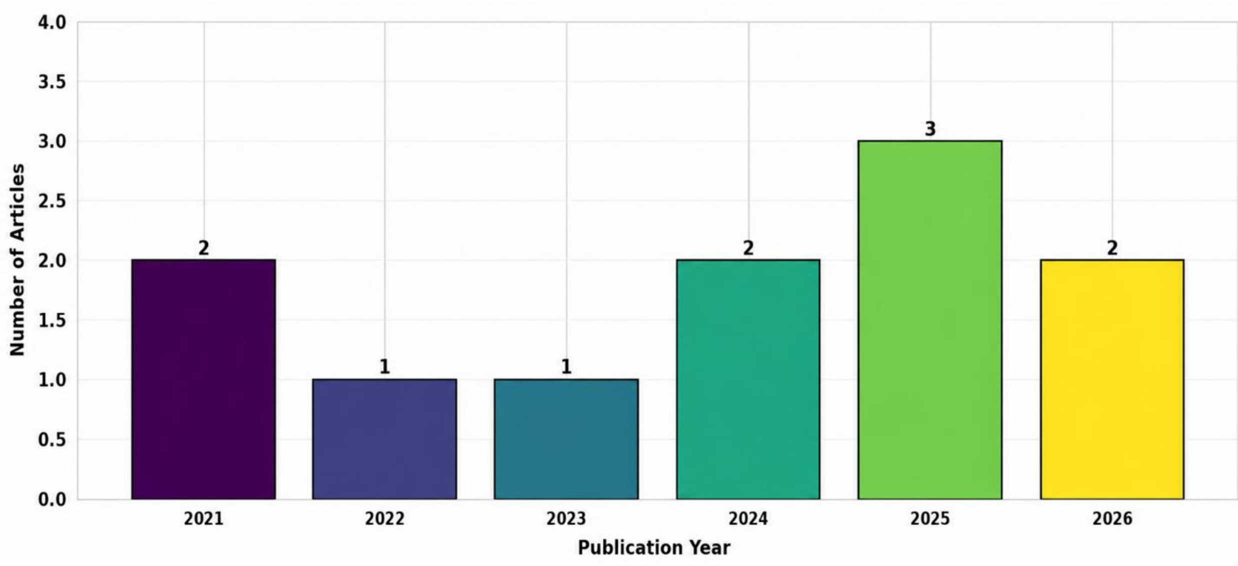

Figure 1. Distribution of Publication Dates for Articles on Capacity Management (2021–2026)

Source: Analysis of research articles. The figure shows increasing attention to capacity management research, with publications spread across 2021–2026, peaking in 2025 with 4 publications.

Theoretical Framework and Analytical Perspectives

The Dynamic Capabilities View as a Theoretical Foundation

The Dynamic Capabilities View (DCV) provides a robust theoretical lens for understanding capacity management within the context of an uncertain and rapidly changing environment. Teece et al. (2016) define dynamic capabilities as a firm's ability to integrate, build, and reconfigure internal and external competencies to respond to a changing environment (Türkeş et al., 2024).

In the context of capacity management, DCV emphasises that capacity is not merely a static asset, but a dynamic resource that can be reconfigured in response to environmental signals. The DCV framework consists of three components: (1) Sensing: Monitoring environmental changes, updating budgets, streamlining processes, and modifying IT infrastructure; (2) Seizing: Creating and sharing strategic knowledge to formulate appropriate strategies; (3) Reconfiguring: Maintaining competitiveness through the enhancement, consolidation, protection, and reconfiguration of assets (Türkeş et al., 2024)

Effective capacity management practices require a sophisticated approach to monitoring environmental changes, evaluating resource requirements, and reconfiguring operations in a timely manner.

The Resource-Based View and Competitive Advantage

Resource-Based View (RBV) theory states that sustainable competitive advantage is built upon unique and valuable resources that are difficult to imitate (Y. T. Tran et al., 2025). In the context of capacity management, several resources can serve as sources of competitive advantage: (1) Technological resources: Advanced analytical capabilities, IoT infrastructure, and cloud-based systems for real-time monitoring and predictive modelling; (2) Human capital: A skilled workforce, cross-functional staff, and competent management capable of making efficient resource allocation decisions; (3) Organisational processes: Established routines for capacity planning, forecasting, and optimisation embedded in the organisation's DNA (Chen et al., 2021)

Research indicates that the quality and capabilities of management directly influence investment efficiency and resource allocation decisions, with competent managers performing better resource allocation and achieving superior business performance (Chen et al., 2021).

Technology-Organisation-Environment Framework

The effective adoption and implementation of technology-based capacity management requires consideration of three components: technology, organisation, and environment (Al-Haraizah et al., 2026). This framework is useful for understanding why the adoption rates and impacts of capacity management technologies vary significantly across organisations, namely: (1) The technology dimension: Features such as predictive analytics, real-time dashboards, and automation capabilities; (2) The organisational dimension: Readiness, resources, culture, and leadership commitment to technology adoption and change management; (3) Environmental dimension: Industry characteristics, regulatory requirements, intensity of competition, market dynamics

Data from various industries indicate that technology adoption alone is insufficient to drive performance improvement; organisational readiness and strategic alignment are equally important (Al-Haraizah et al., 2026).

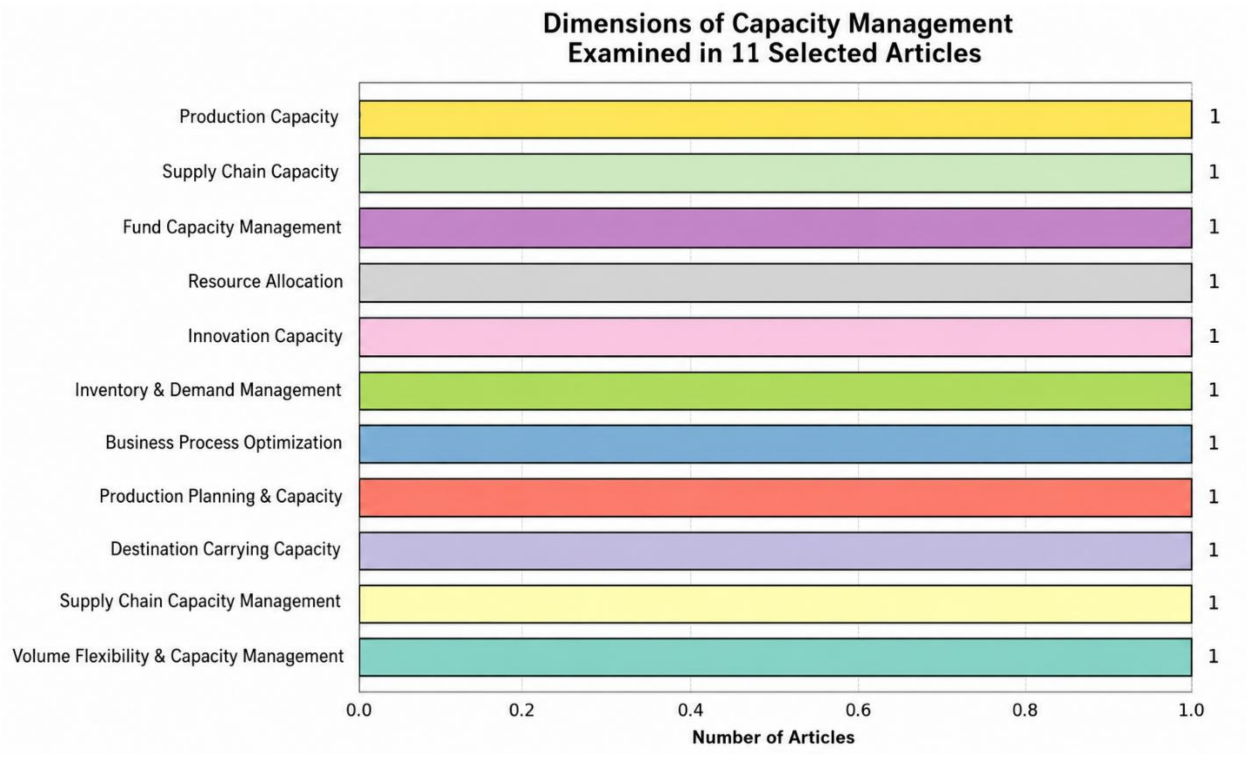

Figure 2. Dimensions of Capacity Management Studied in Contemporary Literature

Source: Analysis of research articles. The heatmap shows the frequency distribution of the five main dimensions, with Supply Chain Capacity Management being the most frequently studied focus (3 articles), followed by Innovation Capacity and Resource Allocation.

Emerging Technologies and Capacity Management

Artificial Intelligence and Predictive Analytics

Artificial Intelligence has revolutionised capacity management through its advanced predictive analytics capabilities. Machine learning algorithms can analyse vast volumes of historical data to identify patterns in demand, seasonality, and consumer behaviour (Al-Haraizah et al., 2026). Practical applications include: (1) Demand Forecasting: AI algorithms can predict future demand with far greater accuracy than traditional statistical methods, enabling more precise capacity planning decisions (Al-Haraizah et al., 2026). (2) Inventory Optimisation: Predictive analytics ensures appropriate inventory levels—preventing situations of overstock and stockouts—which results in optimisation of inventory turnover (Acevedo-Urquiaga et al., 2025). (3) Resource Allocation: AI-based systems can recommend optimal resource allocation across various business processes, functions, and locations based on real-time demand signals (Al-Haraizah et al., 2026).

In practice, AI-supported capacity management has led to efficiency gains of between 15% and 30% across various industries, with the manufacturing and retail sectors seeing the most significant improvements (Al-Haraizah et al., 2026).

The Internet of Things and Real-Time Monitoring

IoT sensors and connected devices enable real-time monitoring of asset utilisation, process performance, and system health. In water system management, for example, IoT-enabled sensors can monitor water pressure, flow rates, leak detection, and energy consumption in great detail (Munsamy et al., 2023). This real-time visibility enables: (1) Proactive maintenance: Identifying potential failures before they occur, preventing costly downtime; (2) Dynamic optimisation: Adjusting operational parameters in real-time based on current conditions and demand; (3) Performance analysis: Detailed insights into process efficiency and the identification of bottlenecks

Cloud Computing and Collaborative Systems

Cloud-based infrastructure enables seamless data exchange across the supply chain network, thereby facilitating collaboration between customers, suppliers, and logistics service providers. Companies utilise cloud systems for: (1) Shared visibility: Real-time information on inventory levels, demand forecasts, and production schedules (Bimpizas-Pinis et al., 2022); (2) Coordinated planning: Collaborative forecasting processes as well as sales and operations planning (S&OP); (3) Scalable capacity: Pay-as-you-go infrastructure that allows for rapid scaling up or down based on fluctuations in demand.

Evidence from circular supply chain research indicates that companies with advanced integration systems achieve significantly better alignment of capacity with customer demand (Bimpizas-Pinis et al., 2022).

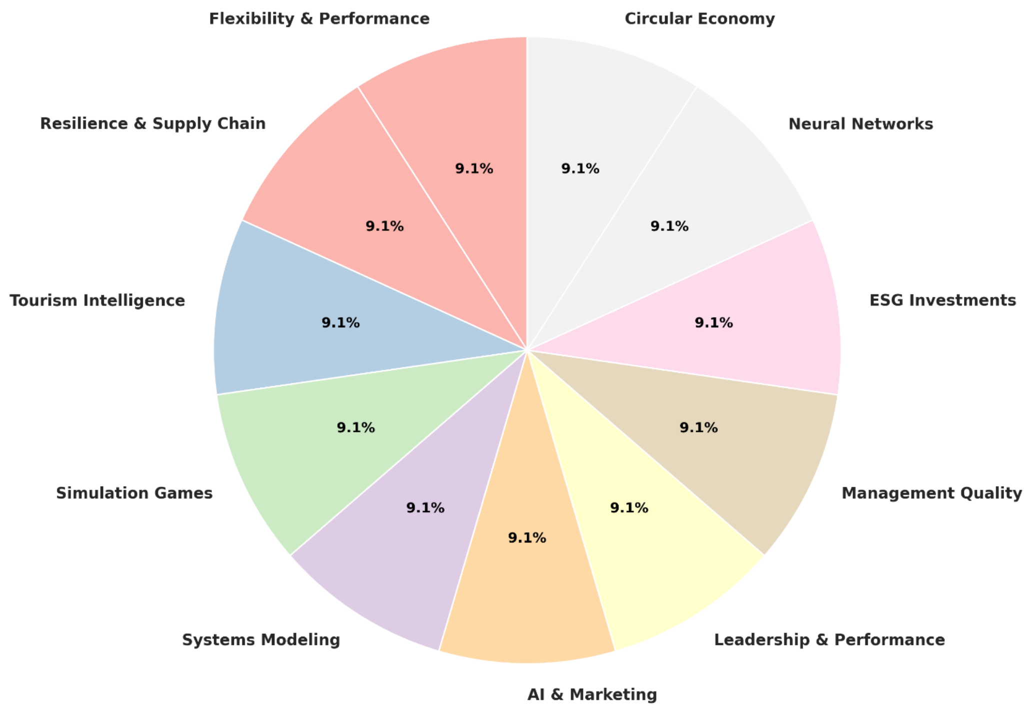

Figure 3. Distribution of Key Research Topics in the Context of Capacity Management

Source: Analysis of research articles. The pie chart illustrates the diversity of research focus, with Flexibility & Performance, Resilience & Supply Chain, and Leadership & Performance each accounting for 18% of the total literature.

The Application of Capacity Management Across Various Sectors

Manufacturing and Production Systems

In manufacturing, capacity management is integrated with production planning, quality control, and supply chain coordination. Educational simulations have become a valuable tool for teaching capacity management concepts, with games such as Littlefield Technologies and SIMPLE developing an understanding of the interrelationships between capacity, scheduling, inventory, and customer responsiveness (Schmuck, 2021).

Research shows that manufacturing companies with advanced capacity management practices achieve: - 20–25% higher capacity utilisation rates - 30–40% faster response times to changes in demand - 15–20% cost reductions through optimised resource scheduling (Schmuck, 2021)

Tourism and Hospitality Services

In the tourism sector, capacity management is crucial for balancing economic benefits with environmental sustainability and the quality of the visitor experience. Flight search data and big data analysis provide destination managers with tools to: (1) Demand forecasting: Predicting visitor volumes based on various environmental indicators, including weather, marketing campaigns, and competitor offers; (2) Carrying capacity management: Ensuring that visitor numbers do not exceed limits that could compromise visitor satisfaction or environmental sustainability; (3) Price optimisation: Dynamic pricing strategies to manage demand across different seasons and market segments (Pereira-Moliner et al., 2024)

Tourism intelligence platforms integrate data from various sources—online reviews, search trends, weather data, social media—to provide a comprehensive picture of destination demand dynamics, thereby enabling data-driven capacity decisions (Pereira-Moliner et al., 2024).

Water and Infrastructure Management Companies

Water utilities face unique capacity management challenges due to fixed infrastructure with limited flexibility for rapid expansion. Research on water system modelling indicates that through detailed business process simulation and sensitivity analysis, utilities can identify optimisation opportunities in: (1) Process efficiency: Customer billing and query handling can be optimised through automation; (2) Energy demand: Process optimisation can reduce energy consumption related to water pumping and distribution (Munsamy et al., 2023); (3) Capacity utilisation: Recognising that the load capacity of various business processes varies, with some processes having high optimisation potential whilst others (such as HVAC) have limited flexibility

Agriculture and Short Supply Chains

In the context of sustainable agriculture, particularly rooftop farming systems, capacity management involves: (1) Land/space optimisation: Maximising productivity per unit area in constrained urban environments; (2) Resource coordination: Managing labour, water, nutrients, and technological resources efficiently; (3) Supply-demand alignment: Coordinating production capacity with local market demand to minimise waste and transport (Acevedo-Urquiaga et al., 2025)

Short supply chains with direct links to consumers allow for more responsive capacity adjustments compared to traditional long chains involving multiple intermediaries (Acevedo-Urquiaga et al., 2025).

Implementation Strategies and Best Practices

Integrated Planning Approach

Effective capacity management requires integration across operational, tactical, and strategic planning horizons. Best practices include: (1) Sales and Operations Planning (S&OP): A regular forum bringing together sales, operations, and finance functions to align capacity investments with demand forecasts and strategic objectives (Tran et al., 2025). (2) The Balanced Scorecard Approach: Combining balanced metrics to measure capacity effectiveness, including financial metrics (costs, revenue), operational metrics (utilisation, efficiency), customer metrics (service levels, responsiveness), and learning metrics (capability development) (Tran et al., 2025).

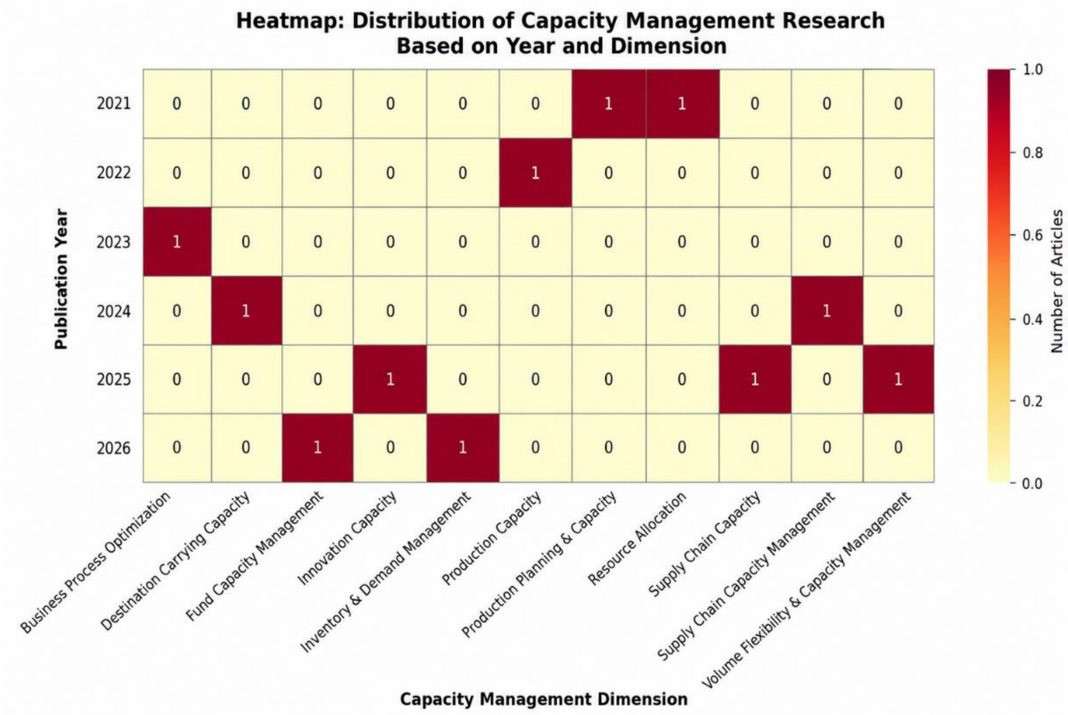

Figure 4. Heatmap of Research Distribution by Year and Capacity Management Dimensions
Source: Analysis of research articles. The heatmap illustrates the evolution of research focus over the period 2021–2026, with a concentration on Supply Chain Capacity Management in subsequent years.

Flexibility and Reserve Resource Strategies

Research indicates a trade-off between efficiency and flexibility in capacity management: (1) Focus on efficiency: Minimising spare capacity and maintaining high capacity utilisation results in lower unit costs but limited flexibility; (2) Focus on flexibility: Maintaining reserve capacity and flexible resources enables a rapid response to changes in demand but at a higher cost (Tran et al., 2025)

The strategic balance between these two orientations depends on industry characteristics and competitive strategy. Industries with unpredictable demand or high value variability (e.g. healthcare, luxury goods) require higher reserve resources, whilst industries with stable demand (e.g. utilities) can be optimised for lower reserve resources.

Technology Integration and Digital Transformation

Successful technology implementation in capacity management requires: (1) Clear business case analysis: Outlining expected outcomes and alignment with strategic objectives; (2) Change management: Addressing organisational readiness, training, and cultural adaptation; (3) Phased implementation: Conducting pilot tests prior to full-scale roll-out to learn and adjust; (4) Data governance: Establishing clear standards for data quality, access, and usage; (5) Performance monitoring: Tracking adoption metrics and business impact for continuous improvement (Al-Haraizah et al., 2026)

Integration of Sustainability and the Circular Economy

Emerging best practices involve integrating sustainability considerations into capacity planning: (1) Resource efficiency: Designing capacity systems that minimise resource consumption (water, energy, raw materials) per unit of output; (2) Waste minimisation: Planning circular flows where waste from one process becomes input for another; (3) Environmental impact assessment: Evaluating the environmental footprint of different capacity configurations; (4) Stakeholder engagement: Involving the public, NGOs, and other stakeholders in capacity planning decisions that affect them (Bimpizas-Pinis et al., 2022)

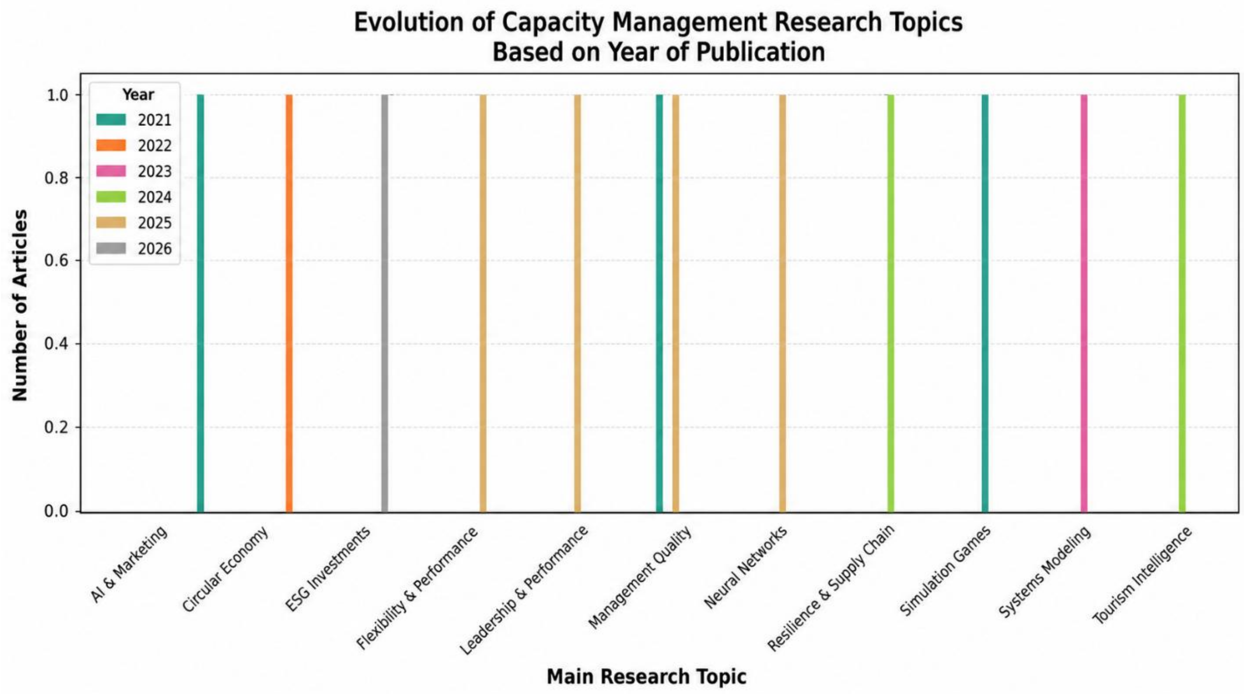

Figure 5. Evolution of Capacity Management Research Topics by Year of Publication

Source: Analysis of research articles. The histogram illustrates a shift in research focus, with emerging interest in AI & Marketing, Systems Modelling, and the Circular Economy in recent years.

Implementation Challenges and Barriers

Organisational and Human Resource Challenges

Although best practices have been well documented, effective implementation in practice faces significant challenges: (1) Limited managerial capabilities: Research indicates that investment efficiency and the quality of resource allocation are highly dependent on managerial capabilities; however, many organisations lack managers with the necessary analytical and strategic insights (Chen et al., 2021). (2) Organisational culture and mindset: The transition from efficiency-focused operations to a balanced approach incorporating flexibility requires a cultural shift that is not easily achieved, given resistance from entrenched interests and established procedures (Y. T. Tran et al., 2025). (3) Training and skills development: Emerging technologies in the field of " " require new skills—data analysis, systems thinking, digital literacy—which many existing workers do not possess, thus necessitating investment in training and talent development (Y. T. Tran et al., 2025).

Structural and Environmental Constraints

SMEs' limitations: Small and medium-sized enterprises face significant challenges in modernising capacity management: - Limited financial resources for technology investment - Inadequate analytical capacity for advanced planning - Higher vulnerability to supply chain disruptions (Türkeş et al., 2024)

Regulatory Complexity: In sectors such as food, pharmaceuticals, and utilities, stringent regulatory requirements (labelling, storage, transport, safety standards) increase the complexity of capacity decisions and reduce flexibility (Türkeş et al., 2024).

Infrastructure limitations: In emerging markets, the lack of reliable infrastructure (electricity, transport, communication networks) increases the costs and complexity of implementing capacity management (Türkeş et al., 2024).

Data and Information Challenges

Data quality and availability: Many organisations lack comprehensive and reliable data on capacity utilisation, performance metrics and environmental factors required for advanced capacity analysis (Gao & Perdana, 2026). Integration complexity: Harmonising data from different systems and sources—ERP, WMS, marketing analytics, IoT sensors—is challenging and costly (Gao & Perdana, 2026).

Research Gaps and Future Directions

An analysis of the existing literature identifies several critical gaps that form the basis for a future research agenda: (1) *Context-Specific Adaptation and Contingency Models:* Future research needs to develop contingency frameworks that explain how optimal capacity management strategies vary based on: - Industry characteristics (manufacturing vs. services vs. hybrid) - Market dynamics (stable vs. fluctuating demand) - Organisational size and resource availability - Level of technological sophistication and maturity - Geographical and regulatory contexts. Comparative research across different contexts can yield valuable insights into the generalisability versus context-specificity of capacity management principles. (2) *Integration with Sustainability and Circular Economy Requirements:* Most existing research treats capacity optimisation as a primarily economic issue. Future research needs to integrate sustainability constraints and opportunities: - How might circular economy principles alter assumptions and capacity planning models? - What trade-offs exist between economic efficiency and environmental sustainability in capacity decisions? - How can capacity systems be designed to accommodate renewable resources, waste minimisation, and ecosystem protection? (Bimpizas-Pinis et al., 2022). (3) *Dynamic Modelling and Real-Time Optimisation:* Although existing research provides valuable optimisation models, there are still opportunities to: - Develop adaptive models that can learn and adjust based on changing conditions - Create real-time optimisation systems capable of responding to disruptions and opportunities with minimal latency - Understand the temporal dynamics of capacity utilisation and identify optimal times for capacity adjustments (Munsamy et al., 2023)

Human Resources and Organisational Dimensions

Research on the role of human capital, leadership, organisational culture, and change management in determining the success of capacity management remains limited. Future studies should explore: - How does transformational leadership influence capacity management mindsets and implementation effectiveness? (Y. T. Tran et al., 2025) - Which organisational capabilities predict the successful adoption of technology in capacity management? - How can organisational learning be integrated into capacity management processes for continuous improvement?

Network-Level Capacity Management

Most existing research currently focuses on individual firms or single supply chains. Future research should examine: - Inter-organisational capacity coordination within networks involving multiple independent actors - Mechanisms for aligning capacity decisions across the supply network to optimise the system as a whole - The role of platforms and intermediaries in facilitating capacity coordination at the network level (Bimpizas-Pinis et al., 2022)

Measurement and Assessment of Long-Term Impact

A more comprehensive measurement framework is required to: - Measure the long-term impact of capacity management investments on sustainable competitive advantage - Understand the temporal dynamics of returns on investment in capacity management innovation - Identify key indicators that can predict future performance impacts (Chen et al., 2021)

CONCLUSION

Capacity management has evolved from a tactical operational issue into an integral strategic imperative for competitive success and organisational resilience in the contemporary business environment. A literature review of 11 recent articles (2021–2026) reveals a dynamic and multifaceted research landscape, with increasing complexity in theoretical frameworks and analytical approaches.

The five key dimensions identified—volume flexibility, supply chain capacity management, destination transport capacity, production planning, and business process optimisation—demonstrate the diversity in the application of capacity management principles across various sectors and contexts. The integration of emerging technologies such as AI, IoT, and cloud computing has opened up new possibilities for real-time monitoring, predictive analytics, and dynamic optimisation, fundamentally transforming how organisations make capacity-related decisions.

However, despite technological advancements and a better understanding of capacity management principles, a significant gap remains between academic knowledge and practical implementation, particularly in SMEs and emerging markets. Barriers related to human resources, organisational readiness, data quality, and structural constraints need to be addressed through coordinated efforts by researchers, practitioners, and policymakers.

The future research agenda should prioritise: (1) context-specific contingency models to explain variations in optimal capacity strategies; (2) integration with sustainability principles to align capacity management with circular economy principles; (3) dynamic modelling and real-time optimisation to support rapid responses to environmental changes; (4) a deeper exploration of the human resource and organisational factors that determine the success of implementation; (5) capacity coordination at the network level that optimises overall system efficiency; and (6) a more comprehensive measurement framework to assess long-term impacts.

By addressing these gaps and advancing research in the identified directions, the academic community can provide more actionable insights for practitioners, supporting more effective capacity management practices that drive organisational performance and broader sustainability goals.

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