

The impact of supply chain management on tourism efficiency: A conceptual and literature based analysis

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Abstract: *Tourism is a fragmented, service-intensive industry in which value is co-produced across a chain of interdependent actors, including transport providers, accommodation operators, tour operators, travel agencies, destination management organizations, and a wide array of local suppliers. Although supply chain management (SCM) has long been recognized as a primary source of competitive advantage in manufacturing and retail, its systematic application to tourism has developed more slowly, constrained by the sector's intangibility, perishability, and the coexistence of tangible (transport, food, merchandise) and intangible (experience, service) flows. This paper synthesizes the literature on supply chain management and tourism performance to examine how SCM practices integration and coordination, information sharing and technology adoption, supplier and partner relationship management, demand management and forecasting, and sustainability-oriented (green) practices influence tourism efficiency, understood as the ability of tourism firms and destinations to convert inputs (capital, labor, natural and cultural resources) into desired outputs (visitor satisfaction, revenue, occupancy, value added) with minimal waste. A conceptual framework is proposed that maps five core SCM practice domains onto four efficiency dimensions: cost efficiency, operational efficiency, service-quality efficiency, and environmental efficiency. The discussion highlights the mechanisms through which these relationships operate, the moderating role of destination governance and firm size, and the methodological challenges of measuring tourism supply chain performance, including the applicability of Data Envelopment Analysis (DEA) and the Supply Chain Operations Reference (SCOR) model to tourism settings. The paper concludes that supply chain integration constitutes a critical, though still underutilized, lever for improving tourism efficiency, and it outlines an agenda for future empirical research.*

Keywords: Destination management, supply chain management, tourism efficiency, tourism supply chain,

I. Introduction

Tourism is among the most economically significant service industries in the world, contributing substantially to global GDP, employment, and foreign exchange earnings, particularly in destinations where alternative sources of economic development are limited. Unlike manufacturing industries, in which a supply chain typically culminates in a single physical product delivered to a distinct point of sale, the tourism product is an assembled experience: it is produced through the temporary integration of transport, accommodation, catering, entertainment, retail, and destination-level services that are usually owned and operated by different, often small and independent, organizations (Zhang, Song, & Huang, 2009). This structural fragmentation means that no single actor typically controls the full chain of activities that determines a visitor's experience, and the coordination problems that arise are, in essence, supply chain management problems.

Supply chain management, as developed in manufacturing and retail contexts, is concerned with the management of flows of materials, information, and finances across a network of organizations, from raw material suppliers through to the end consumer, with the goal of maximizing value while minimizing waste and cost (Christopher, 2016). The transfer of these principles to tourism is not straightforward. Tourism supply chains handle flows of both tangible goods (food, beverages, souvenirs, fuel) and intangible services (hospitality, guiding, entertainment), and the ultimate 'product' - the visitor experience is co-created in real time through interactions between the tourist and multiple service providers, several of which the tourist may access directly rather than through an intermediary (Piboonrungrroj & Disney, 2009). These characteristics create specific challenges: the impossibility of holding inventory for perishable services such as an unsold hotel room or an empty airline seat, high sensitivity to demand volatility and seasonality, the difficulty of standardizing quality across independently owned businesses, and the need to coordinate simultaneously with upstream suppliers (transport, food, energy) and downstream intermediaries (tour operators, online travel agencies, destination marketing organizations).

Despite these differences, a growing body of literature argues that the core logic of supply chain management integration, coordination, information sharing, and relationship management is directly applicable to tourism and can meaningfully improve the efficiency with which tourism organizations and destinations operate (Yilmaz & Bititci, 2006; Song, 2012). Efficiency, in this context, refers to the extent to which tourism firms and destinations convert available inputs into desired outputs with minimal waste of resources, time, and capacity. Given the labor intensity, seasonality, and resource dependency of tourism, even modest improvements in supply chain coordination can translate into significant gains in cost efficiency, service quality, and environmental performance.

This paper has three objectives. First, it reviews the literature on tourism supply chain management and on the conceptualization and measurement of tourism efficiency. Second, it develops a conceptual framework that links five core domains of supply chain management practice to four dimensions of tourism efficiency. Third, it discusses the mechanisms, moderating factors, and methodological challenges involved in studying this relationship, and it proposes directions for future empirical research.

II. Literature review

2.1. Supply Chain Management: Concept and Evolution

Supply chain management emerged in the 1980s and 1990s as a response to the recognition that competitive advantage increasingly depends not on the performance of individual firms but on the performance of entire networks of firms working together to deliver value to the final customer (Christopher, 2016). Supply chain management is integrator of all business functions, practices, processes and activities within the uniquely established flows of materials, information and finances of the strategic alliance, which serve to improve the business indicators of the members of the alliance and the entire business system (Samaržija, 2015). Core SCM practices include strategic supplier partnerships, customer relationship management, information sharing, internal process integration, and postponement strategies that delay product differentiation until closer to the point of actual demand (Li, Ragu-Nathan, Ragu-Nathan, & Rao, 2006). The Supply Chain Operations Reference (SCOR) model, developed by the Supply Chain Council, formalized this thinking by decomposing supply chain activity into five standard processes plan, source, make, deliver, and return that can be benchmarked and improved across industries (Huan, Sheoran, & Wang, 2004).

A central theoretical proposition of SCM is that competition increasingly occurs between supply chains rather than between individual firms, and that the firms best able to integrate and coordinate their activities with upstream and downstream partners will outperform those that manage these relationships in an arm's-length, transactional manner (Lambert & Cooper, 2000). This proposition has obvious relevance to tourism, where the visitor experience is inherently the outcome of a multi-actor chain, even though the formal application of SCM concepts to tourism developed considerably later than in manufacturing and retail.

2.2. Tourism as a Supply Chain: Actors and Structure

The tourism supply chain has been characterized as encompassing all suppliers of goods and services that enable a tourism product to be delivered to consumers, including transport carriers, accommodation providers, catering and food suppliers, attractions, retailers, tour operators, travel agents, and destination management organizations, connected by physical, informational, and financial flows (Zhang et al., 2009). Buhalis and Laws (2001) emphasized the particular importance of distribution channels in tourism, noting that intermediaries such as tour operators and travel agencies have historically played a disproportionately powerful role in shaping which suppliers gain access to the market, a role that has been substantially reconfigured by the rise of online travel agencies and direct-to-consumer digital distribution.

Several authors have highlighted structural features that distinguish tourism supply chains from manufacturing supply chains. First, tourism supply chains are typically dominated by small and medium-sized enterprises (SMEs) at the destination level, which often lack the scale, capital, and managerial expertise to invest in sophisticated SCM systems (Zhang et al., 2009). Second, tourism supply chains are simultaneously vertical (from suppliers through intermediaries to consumers) and horizontal (competing and complementary businesses at the same destination), which complicates coordination because destination-level efficiency depends not only on individual firm performance but on the collective performance of many independent actors competing for the same visitors while jointly constituting the same destination product (Cooper, Fletcher, Fyall, Gilbert, & Wanhill, 2008). Third, because tourism combines tangible product flows with intangible, co-produced service flows, and because the consumer often travels to the point of production rather than the

product being shipped to the consumer, classical inventory and logistics concepts require substantial adaptation (Piboonrungrroj & Disney, 2009).

2.3. Efficiency in Tourism: Conceptualization and Measurement

Efficiency in tourism has most commonly been studied at the level of individual firms, particularly hotels and airlines, using frontier estimation techniques such as Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA), which estimate the extent to which a decision-making unit (a hotel, airline, or destination) produces the maximum feasible output from a given set of inputs, or uses the minimum feasible input to produce a given output, relative to comparable units (Barros, 2005; Assaf & Josiassen, 2012). Typical inputs used in hotel efficiency studies include the number of rooms, employees, and operating costs, while typical outputs include occupancy rate, revenue, and guest satisfaction indices. At the destination level, efficiency studies have examined how effectively a region converts tourism-relevant resources natural attractions, infrastructure, marketing expenditure, and accommodation capacity into visitor arrivals, tourism receipts, and value added (Assaf & Josiassen, 2012).

Notably, efficiency studies in tourism have traditionally focused on the internal operations of individual firms rather than on the coordination and integration of firms within a supply chain. This represents a significant gap, because for many efficiency losses in tourism such as delayed transfers, mismatched booking and capacity information, food waste due to poor demand forecasting, or inconsistent service quality across a multi-supplier itinerary, the source of inefficiency lies not within any single firm's operations but in the interfaces and coordination failures between firms in the chain (Yilmaz & Bititci, 2006). This observation motivates the conceptual integration of SCM and tourism efficiency research pursued in this paper..

III. Theoretical framework: linking SCM to tourism efficiency

Building on the general SCM literature and its more limited application to tourism, this section develops the theoretical linkages between five core domains of SCM practice and tourism efficiency.

3.1. Integration and Coordination

Supply chain integration refers to the degree to which a firm strategically collaborates with its supply chain partners and manages intra- and inter-organizational processes in a coordinated manner (Flynn, Huo, & Zhao, 2010). In tourism, integration can take horizontal forms (e.g., cooperative marketing consortia among independent hotels or attractions at a destination) and vertical forms (e.g., contractual or ownership linkages between tour operators and accommodation or transport providers). Vertically and horizontally integrated tourism firms and destinations are able to synchronize capacity, pricing, and scheduling decisions across the chain, reducing the mismatches between supply and demand that are a primary source of inefficiency in a perishable-inventory industry such as tourism (Zhang et al., 2009). Destination management organizations (DMOs) that actively coordinate local suppliers rather than merely marketing the destination have been argued to reduce transaction costs and improve the consistency of the visitor experience across the chain (Presenza, Sheehan, & Ritchie, 2005).

3.2. Information Sharing and Technology Adoption

Information sharing is widely regarded as the connective tissue of effective supply chain management, enabling partners to align capacity, demand forecasts, and service delivery in real time (Li et al., 2006). In tourism, the adoption of shared reservation and property management systems, global distribution systems, and, more recently, cloud-based platforms and application programming interfaces (APIs) connecting accommodation providers, transport operators, and online travel agencies, has substantially reduced information asymmetries that previously caused overbooking, underutilized capacity, and poor coordination of transfers and itineraries (Buhalis & Laws, 2001). Real-time information sharing also supports dynamic pricing and revenue management systems, which are now standard practice in the airline and hotel sectors and which directly target efficiency by matching price to time-varying demand and thereby smoothing capacity utilization (Ivanov, 2014).

3.3. Supplier and Partner Relationship Management

Because tourism SMEs frequently lack the resources to manage complex supplier networks independently, the quality of relationships characterized by trust, long-term orientation, and mutual investment between tourism firms and their suppliers (food and beverage suppliers, transport operators, maintenance providers) and intermediaries (tour operators, travel agents, online platforms) has a direct bearing on cost and service efficiency (Zhang et al., 2009). Relational governance mechanisms, as opposed to purely transactional, price-based sourcing, have been associated in the broader SCM literature with reduced opportunism, more reliable delivery, and greater willingness of suppliers to invest in quality improvements that benefit the whole chain (Lambert & Cooper, 2000). In a tourism context, such relationships also facilitate joint problem-solving when unexpected disruptions occur for example, flight delays, extreme weather events, or sudden demand surges, which are common sources of realized inefficiency in tourism operations.

3.4. Demand Management and Forecasting

Because most tourism services cannot be stored, accurate demand forecasting is essential to efficient capacity planning across the supply chain: overestimating demand leads to wasted capacity (empty rooms, underused transport, food waste), while underestimating demand leads to lost revenue and service failures (Song, Witt, & Li, 2009). Collaborative forecasting practices, in which downstream intermediaries share booking and search data with upstream suppliers, have been shown in general SCM research to reduce forecast error and the so-called bullwhip effect, whereby demand variability is amplified as it moves upstream through the chain (Lee, Padmanabhan, & Whang, 1997). In tourism, analogous benefits can be expected from data sharing between online travel agencies, destination marketing organizations, and individual accommodation and transport providers, allowing more precise matching of staffing, procurement, and pricing decisions to anticipated visitor flows.

3.5. Sustainability and Green Supply Chain Practices

Environmental considerations have become an increasingly central dimension of both supply chain management and tourism competitiveness. Green supply chain management practices including supplier environmental screening, waste reduction, energy-efficient logistics, and sustainable procurement have been shown in the general SCM literature to improve resource efficiency while, under many conditions, also reducing operating costs (Zhu, Sarkis, & Lai, 2008). In tourism, sustainability-oriented supply chain practices are particularly salient because tourism activity depends directly on the natural and cultural resources that unsustainable practices can degrade, creating a long-term efficiency threat that extends beyond the individual firm to the destination as a whole (Font, Tapper, Schwartz, & Kornilaki, 2008). Certification schemes, sustainable procurement guidelines for hotels and tour operators, and destination-level environmental management systems represent supply-chain-based mechanisms through which tourism destinations attempt to reconcile short-term operational efficiency with the long-term efficiency of the resource base on which the industry depends.

IV. Proposed conceptual framework

Drawing on the theoretical linkages developed above, Table 1 maps the five SCM practice domains onto four dimensions of tourism efficiency commonly used in the literature: cost efficiency (minimizing input cost per unit of output), operational efficiency (maximizing capacity utilization and minimizing process waste and delay), service-quality efficiency (achieving consistent, high-quality visitor experiences with minimal variability across suppliers), and environmental efficiency (minimizing resource consumption and environmental impact per unit of tourism output).

Table 1. Mapping of SCM Practice Domains onto Dimensions of Tourism Efficiency

SCM Practice Domain	Cost Efficiency	Operational Efficiency	Service-Quality Efficiency	Environmental Efficiency
Integration & coordination	Reduces duplication and transaction costs across suppliers	Synchronizes capacity and scheduling across the chain	Improves consistency of the visitor experience across suppliers	Enables coordinated resource-sharing (e.g., joint transport, shared facilities)
Information sharing & technology	Reduces overbooking and idle-capacity losses	Enables real-time capacity and pricing adjustment	Improves accuracy of service delivery and personalization	Supports monitoring of resource use across the chain
Supplier & partner relationship management	Lowers procurement costs via long-term partnerships	Increases reliability of inputs (food, transport, maintenance)	Encourages supplier investment in quality standards	Facilitates joint sustainable-sourcing initiatives
Demand management & forecasting	Reduces waste from over- or under-provisioning	Aligns staffing and procurement with anticipated demand	Reduces service failures caused by capacity mismatches	Reduces overproduction-related resource waste (e.g., food, energy)
Sustainability & green SCM practices	Can reduce long-run operating costs (energy, waste)	Encourages efficient use of shared infrastructure	Increasingly valued by visitors as a quality attribute	Directly targets reduced environmental footprint

Source: developed by the author based on the literature reviewed in Sections 2 and 3.

The framework suggests that SCM practices do not map one-to-one onto a single efficiency dimension; rather, most practices contribute simultaneously to several dimensions, which is consistent with the broader SCM literature's emphasis on integration as a source of multiple, mutually reinforcing performance gains rather than a single isolated benefit (Flynn et al., 2010). The framework also implies that the marginal efficiency gains from SCM investment are likely to be largest where destinations or firms currently operate with low levels of integration and information sharing that is, where fragmentation, rather than technical operational inefficiency within individual firms, is the primary constraint on performance.

V. Discussion

5.1. Mechanism and Moderating factors

The relationship between SCM practices and tourism efficiency is unlikely to be uniform across contexts. Several mechanisms and moderating factors merit discussion. Because tourism destinations comprise many independently owned firms, the extent to which SCM-style coordination can be achieved depends heavily on destination governance arrangements. Destinations with strong, well-resourced destination management organizations capable of convening local suppliers, sharing market intelligence, and coordinating joint initiatives (marketing, sustainability certification, shared booking platforms) are structurally better positioned to realize supply-chain-level efficiency gains than destinations characterized by fragmented, purely competitive local industry structures (Presenza et al., 2005). Governance capacity therefore likely functions as a moderator: the same SCM practice may yield larger efficiency gains in a well-governed destination than in a fragmented one, because coordination mechanisms that work in vertically integrated manufacturing supply chains do not automatically translate to networks of independent, horizontally competing tourism SMEs without an intermediating governance structure.

The tourism sector's SME-dominated structure constrains the extent to which individual firms can invest in sophisticated SCM systems, such as integrated property management and revenue management platforms, that larger hotel chains and airlines have adopted extensively (Zhang et al., 2009). This suggests that firm size is likely to moderate the SCM-efficiency relationship, both directly, because larger firms have greater capacity to invest in and benefit from formal SCM systems, and indirectly, because larger firms are more likely to have the bargaining power needed to secure favorable, collaborative relationships with suppliers and intermediaries. For SME-dominated destinations, collective or destination-level SCM initiatives such as shared technology platforms coordinated by a DMO may be a more realistic path to efficiency gains than firm-level SCM adoption. Tourism demand is frequently highly seasonal and subject to external shocks (economic cycles, geopolitical events, extreme weather, pandemics), which increases the value of the demand-management and information-sharing practices discussed above but also increases the difficulty of achieving stable, efficient coordination across the chain (Song et al., 2009). Destinations and firms with more diversified demand bases (e.g., multiple source markets, a mix of leisure and business travel) may find it easier to achieve stable capacity utilization

through SCM coordination than those heavily dependent on a single, highly seasonal demand segment. The growing dominance of large online travel agencies and metasearch platforms in tourism distribution has altered the locus of supply chain power, in some respects analogous to the role that large retailers play in manufacturing supply chains (Buhalis & Laws, 2001). This raises the question of whether efficiency gains from digital information sharing are captured primarily by platform intermediaries, through commission structures and control over demand data, rather than being distributed across the chain in a way that improves the operational efficiency of individual suppliers. This tension between platform-level efficiency and supplier-level efficiency represents an important area for further conceptual and empirical development.

5.2 . Managerial and Policy Implications

For tourism firm managers, the framework developed in this paper suggests that efficiency gains are unlikely to be achieved through internal operational improvements alone; rather, systematic attention to supplier relationships, information-sharing infrastructure, and coordinated demand forecasting with both upstream suppliers and downstream intermediaries is likely to yield efficiency benefits that purely internal process improvement cannot achieve. In particular, investment in interoperable booking and property management systems, participation in destination-level data-sharing initiatives, and long-term relational (rather than purely transactional) sourcing arrangements are practical steps consistent with the SCM literature reviewed above.

For destination management organizations and policymakers, the framework highlights the potential efficiency returns to strengthening destination-level coordination infrastructure, particularly for SME-dominated destinations that lack the scale to invest individually in SCM systems. Shared digital platforms, joint procurement or sustainability certification schemes, and destination-level demand forecasting and data-sharing arrangements represent policy-relevant interventions that could shift a destination's overall position on the efficiency frontier, in the sense measured by DEA-based tourism efficiency studies, without requiring efficiency gains within any single firm.

5.3. Limitations and Directions for Future Research

This paper is conceptual rather than empirical: it synthesizes existing literature and proposes theoretical linkages and a conceptual framework, but it does not test these relationships against primary or secondary data. This is an important limitation, and the framework proposed here should be understood as a set of testable propositions rather than established empirical findings.

Several directions for future empirical research follow directly from this limitation. First, empirical studies could combine DEA or Stochastic Frontier Analysis of firm- or destination-level efficiency with survey-based measures of SCM practice adoption (integration, information sharing, relationship management, demand forecasting, and green SCM practices) to test the strength and direction of the relationships proposed in Table 1. Second, given the moderating role proposed for destination governance and firm size, future research should examine these as explicit moderators rather than control variables, potentially using multi-level modeling to separate firm-level and destination-level effects. Third, longitudinal research designs would help address the likely bidirectionality of some relationships—for example, more efficient firms may have more resources available to invest in SCM systems, in addition to SCM systems improving efficiency which cross-sectional designs cannot fully disentangle. Fourth, given the rapid evolution of digital distribution platforms, future research should examine how the concentration of market power among large online travel agencies affects the distribution of supply-chain-derived efficiency gains between platforms and individual suppliers. Finally, comparative research across destinations with differing levels of DMO governance capacity would provide a direct empirical test of the destination-governance moderation mechanism proposed in Section 5.1.

VI. Conclusion

This paper has argued that supply chain management, despite its origins in manufacturing and retail, offers a theoretically coherent and practically relevant lens for understanding and improving tourism efficiency. Because the tourism product is assembled through the temporary coordination of many independent, often small, service providers, much of the inefficiency observed in tourism, capacity mismatches, service inconsistency, resource waste, and environmental impact arises not from the internal operations of individual firms but from the interfaces and coordination gaps between firms in the chain. The conceptual framework developed here maps five core SCM practice domains: integration and coordination, information sharing and technology adoption, supplier and partner relationship management, demand management and forecasting, and sustainability-oriented practices onto four dimensions of tourism efficiency, and it identifies destination governance capacity, firm size, demand seasonality, and digital platform dependence as key factors likely to moderate the strength of these relationships.

The central implication is that improving tourism efficiency is not solely, or even primarily, a matter of improving

the internal operations of individual hotels, airlines, or attractions; it is substantially a matter of improving the coordination, information flow, and relational quality across the network of organizations that jointly produce the tourism experience. As tourism destinations face increasing pressure to do more with limited natural, infrastructural, and human resources, supply chain management offers both a diagnostic framework for identifying the sources of inefficiency and a practical set of levers achievable through firm-level investment and destination-level governance for addressing them. Translating the conceptual propositions developed in this paper into rigorously tested empirical findings represents a valuable and, as yet, only partially realized agenda for tourism management research.

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