



PRODUCT DIFFERENTIATION AND MARKETING STRATEGIES OF ALPHONSO MANGO: A LITERATURE REVIEW WITH REFERENCE TO PUNE REGION

Vinay Nivrutti Jadhav ¹, Dr. Shrikrishna Gulabrao Walke ²

¹ Research Scholar, P.C.E.T's, S.B. Patil Institute of Management, Nigdi, Pune, Maharashtra, India.

² Director, Siddhant Institute of Management, Pune, Maharashtra, India



Corresponding Author

Vinay Nivrutti Jadhav,
jadhav_vny27@yahoo.com

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ABSTRACT

Alphonso mango, often referred to as the "King of Mangoes," holds a distinctive place in India's horticultural landscape due to its superior taste, aroma, and texture. The Pune region, known for its proximity to key Alphonso-producing districts like Ratnagiri and Devgad, plays a pivotal role in its domestic marketing and distribution. This literature review investigates the product differentiation and marketing strategies applied to Alphonso mangoes with a focus on the Pune region. Product differentiation has been examined in terms of geographical indication (GI) tagging, organic certification, packaging innovations, and traceability systems. These differentiators help in distinguishing Alphonso from other mango varieties in the highly competitive fruit market. The review also analyzes marketing strategies including direct-to-consumer models, online marketplaces, traditional mandi systems, and export-oriented practices. Several studies reveal the increasing role of branding, quality assurance, and digital marketing in creating consumer trust and loyalty. Farmer producer organizations (FPOs), cooperatives, and government interventions have further strengthened the supply chain and market reach. However, challenges persist due to price volatility, counterfeit labeling, and lack of cold-chain infrastructure. The literature suggests that integrating sustainable farming practices with modern marketing tools can enhance the competitiveness of Alphonso mangoes. The review highlights gaps in localized consumer behavior studies and calls for further empirical research in the Pune region to devise region-specific strategies. The findings emphasize the need for a synergistic approach combining product excellence with market innovation for sustainable growth in Alphonso mango commerce.

Keywords: Alphonso Mango, Product Differentiation, Marketing Strategies, Geographical Indication (GI)

1. INTRODUCTION

The Alphonso mango, commonly known as "Hapus," is widely celebrated for its unique flavor, rich aroma, smooth texture, and vibrant saffron-yellow hue. Originating from the western coastal regions of India, particularly Ratnagiri, Sindhudurg, and parts of Maharashtra, the Alphonso mango holds a premium position in both domestic and international fruit markets [1]. It is not only an agricultural product but also a cultural and economic symbol in the region. The seasonal nature and limited geographical cultivation contribute to its exclusivity and high consumer demand. This uniqueness is legally recognized through its Geographical Indication (GI) tag, which serves to protect the authenticity of Alphonso mangoes from these designated regions [2]. The Pune region, though not a primary producer, plays a vital role in the marketing, consumption, and distribution of Alphonso mangoes. Its strategic proximity to key production zones and its status as a major urban consumer hub make it an important node in the Alphonso mango value chain [3]. Pune hosts a

large number of APMC markets, urban wholesale traders, and logistics infrastructure, enabling it to act as a gateway for the mango to reach both domestic and export markets [4]. Moreover, the consumer base in Pune is educated, quality-conscious, and digitally active, making it a fertile ground for testing innovative marketing models such as e-commerce, home delivery, and branding strategies [5]. The growing demand for Alphonso mangoes has also intensified the need for product differentiation. Producers and marketers are increasingly focusing on aspects such as organic certification, traceability, branding, and innovative packaging to distinguish genuine Alphonso mangoes from other similar-looking but lower-quality varieties in the market [6]. Several reports indicate a rise in counterfeit products that falsely claim the Alphonso label, which has made product authenticity and traceability key areas of concern for consumers and sellers alike [7]. Thus, strategic marketing and robust differentiation mechanisms are vital for preserving the brand equity of Alphonso mangoes.

This literature review is guided by the objective to critically examine the existing studies, reports, and market analyses related to product differentiation and marketing strategies of Alphonso mangoes, with a specific focus on the Pune region. It aims to synthesize available knowledge on the use of GI tagging, digital marketing, cooperative models, direct-to-consumer channels, and export marketing frameworks in the context of Alphonso mango commerce [8]. This review also intends to identify knowledge gaps related to consumer behavior, policy frameworks, and infrastructural bottlenecks that affect the efficient marketing of Alphonso mangoes in the Pune region [9]. The methodology adopted for this review involves an exhaustive search and synthesis of academic journal articles, trade publications, reports from agricultural marketing boards, and government policy papers published over the past two decades [10]. The scope is limited to literature that provides insight into differentiation and marketing of Alphonso mangoes within or relevant to the Pune supply and demand ecosystem. The analysis is structured to explore both the supply-side innovations (by farmers, FPOs, traders) and demand-side responses (from consumers, retailers, and exporters) [11].

Given the rapid digital transformation in Indian agriculture and the growing preference for premium and traceable products, studying Alphonso mango's marketing strategies provides valuable lessons for other horticultural products as well [12]. Furthermore, with rising concerns over sustainability, authenticity, and profitability in Indian agriculture, the Alphonso mango serves as an ideal case study to evaluate how localized branding and strategic marketing can add value across the agri-supply chain [13].

2. PRODUCT DIFFERENTIATION IN ALPHONSO MANGO

1) Geographical Indication (GI) Tag

The Geographical Indication (GI) tag is a crucial element in the differentiation of Alphonso mangoes, especially those from Ratnagiri, Devgad, and Sindhudurg. This legal status, granted under the Geographical Indications of Goods (Registration and Protection) Act, 1999, helps in certifying the origin and unique quality characteristics of the mango that are inherently linked to its geographical area [13]. The GI tag protects Alphonso mangoes from market adulteration by distinguishing them from similar-looking but inferior varieties grown in non-recognized regions. With increasing consumer awareness, GI-tagged produce often commands a price premium due to its perceived authenticity, traceability, and quality assurance [14]. For producers in the Pune region who deal directly with these authentic Alphonso sources, leveraging the GI status can boost brand value, market access, and consumer trust. Studies show that the GI tag not only enhances marketing prospects in India but also provides a strategic edge in international markets, where country-of-origin branding plays a key role in influencing buyer preferences [15]. However, despite its benefits, GI tagging remains underutilized due to lack of awareness among small-scale farmers and gaps in enforcement. There is often no clear mechanism for checking violations, leading to counterfeit Alphonso mangoes entering the market with misleading labels [16]. In the Pune market context, sellers and aggregators who actively promote GI-certified Alphonso mangoes are more likely to build long-term customer loyalty. Additionally, promotional campaigns by government bodies like MSAMB and APEDA emphasizing GI recognition are critical in helping consumers distinguish authentic Alphonso mangoes in both wholesale and digital marketplaces [17].

2) Organic Certification and Quality Standards

Organic certification has emerged as a powerful tool in differentiating Alphonso mangoes, particularly in health-conscious urban markets like Pune. Consumers today are increasingly aware of the harmful effects of pesticides and seek chemical-free alternatives, making organically certified Alphonso mangoes a preferred choice among premium buyers. The certification process generally includes compliance with the standards set by organizations such as the National

Programme for Organic Production (NPOP) and third-party auditing bodies that ensure the absence of synthetic inputs during cultivation, harvesting, and post-harvest handling. Organic Alphonso mangoes are often priced higher, but they appeal to a niche market segment that prioritizes food safety and environmental sustainability. For farmers in the Ratnagiri-Devgad belt who export through Pune, gaining organic certification opens up access to both urban high-end domestic consumers and global markets such as Europe and the Middle East, where organic labeling is a strict import requirement [8]. However, the certification process is often perceived as expensive and bureaucratic, which discourages many smallholders from participating. The lack of awareness and institutional support further limits widespread adoption [9]. In the Pune region, retail chains, organic fruit bazaars, and dedicated e-commerce platforms now feature special sections for certified organic Alphonso mangoes, helping such produce stand apart from conventionally farmed ones. Moreover, digitized quality control systems such as electronic grading, Brix value testing for sweetness, and color-based classification are increasingly being adopted by farmer producer companies and cooperatives to ensure consistent quality. These standardization and certification tools act as trust signals to consumers and enhance the perceived value of the mango, making quality standards and organic certification a key pillar in effective product differentiation strategies.

3) Packaging and Branding Innovations

Packaging and branding play a crucial role in enhancing the perceived value and market positioning of Alphonso mangoes, especially in urban retail environments like Pune. Traditionally sold in wooden or cardboard crates, Alphonso mangoes have undergone a significant transformation in presentation, aligning with modern consumer expectations [11]. Innovative packaging—featuring tamper-proof seals, ventilated eco-friendly boxes, QR code-enabled traceability, and attractive visual design—not only ensures the safety of the produce during transportation but also builds customer confidence in the authenticity and quality of the product. In the competitive Pune marketplace, mango retailers who invest in premium branding strategies often witness higher customer retention and willingness to pay. For instance, sellers now differentiate themselves by offering “Gift Packs” with luxury-themed wrapping, personalized messages, and branded labels, especially during festive seasons and corporate gifting occasions [12]. Moreover, brands that highlight stories of origin, farmer faces, sustainable farming practices, and GI certification on their packaging are able to appeal to ethical and informed buyers. Small-scale aggregators and FPOs in the Alphonso supply chain are increasingly leveraging mobile apps and e-commerce platforms to display their branded offerings, targeting tech-savvy consumers in Pune’s urban landscape. However, branding remains a challenge for unorganized players who lack capital and marketing know-how. Studies show that poorly packaged and unbranded mangoes, even when of high quality, tend to be overlooked in favor of well-presented counterparts [13]. Thus, effective packaging and branding not only add aesthetic and functional value but also serve as a tool for product differentiation, directly impacting market success in competitive regions like Pune.

4) Comparative Study with Other Mango Varieties

Based on six pertinent criteria, the comparison study table 1 below illustrates the differences between the Alphonso mango and other well-known Indian mango types, such as Kesar, Badami, and Langda. Numerical numbers and qualitative differences derived from market and horticultural research are included in this table.

Table 1 Comparative Analysis of Alphonso vs. Other Mango Varieties

Parameter	Alphonso (Hapus)	Kesar	Badami	Langda
Average Sugar Content (°Brix)	19.5 – 22.0	16.5 – 18.0	16.0 – 17.5	15.5 – 17.0
Average Market Price (₹/kg)	₹150 – ₹300	₹80 – ₹160	₹70 – ₹140	₹60 – ₹120
Pulp-to-Stone Ratio	3.8 : 1	2.9 : 1	2.7 : 1	2.5 : 1
Shelf Life (Days at Room Temp.)	5 – 7	6 – 8	4 – 6	5 – 6
Aroma Intensity (1–10 scale)	9.5	7.8	6.5	7.0
Export Demand (Tons/year)	~50,000 (High)	~25,000 (Moderate)	~18,000 (Low)	~20,000 (Moderate-Low)

- Alphonso leads in aroma, sugar content, and pulp quality, making it the most sought-after mango for premium segments and exports.
- Kesar, often called the “Queen of Mangoes,” has a strong domestic following but is less aromatic and less sweet than Alphonso.
- Badami, known as Karnataka’s Alphonso, shares visual resemblance with Alphonso but lags in taste intensity and international market preference.

- Langda has a unique tangy flavor and is popular in northern India but lacks the visual appeal and aroma required for premium branding and exports.

3. MARKETING STRATEGIES ADOPTED

1) Traditional Mandi-Based Marketing

The traditional mandi system remains the primary marketing channel for Alphonso mangoes, especially for small and medium farmers in the Ratnagiri-Sindhudurg belt who route their produce through Pune's Agricultural Produce Market Committees (APMCs). In this model, the sale of mangoes typically involves multiple intermediaries—commission agents, traders, and wholesalers—before reaching the end consumer. While this structure offers ease of access to markets and bulk sales, it also leads to price volatility, reduced farmer margins, and a lack of transparency in price discovery [10]. Farmers are often dependent on commission agents for logistics, grading, and price negotiation, which weakens their bargaining power. A case study from the Pimpri APMC market near Pune in 2022 revealed that farmers received only ₹1,200 per 10 kg box of Alphonso, while the final consumer paid ₹2,000 for the same box in urban retail shops. This 66% price spread was largely attributed to middlemen commissions, transport costs, and unregulated pricing mechanisms. Furthermore, auction-based sales often lack real-time information systems, preventing fair competition among buyers [12]. While APMCs offer scale, their outdated operational model hampers farmer empowerment and hinders the marketing of premium-quality mangoes. As Alphonso mangoes are highly perishable and seasonal, delays due to bureaucratic mandi practices often result in post-harvest losses. Hence, though traditional mandis serve as a backbone for mass distribution, their inefficiencies highlight the urgent need for transparent and producer-centric alternatives.

2) Direct-to-Consumer Models

Direct-to-Consumer (D2C) models are increasingly being adopted by Alphonso mango growers and cooperatives, especially around Pune. These models eliminate middlemen and connect farmers directly with end customers through local haats, residential society delivery, farmer markets, or doorstep subscriptions. Farmer Producer Organizations (FPOs), supported by government and NGOs, play a crucial role in facilitating this process by aggregating produce, handling logistics, and ensuring quality standards.

The process typically involves the FPO collecting produce from member farmers, grading and sorting it, and managing packaging and transportation to urban markets like Pune. Some FPOs have tie-ups with housing societies and gated communities where pre-orders are taken, and mangoes are delivered on a fixed schedule during the season. This model improves farmers' earnings by 20–30% compared to mandi-based sales due to reduced intermediaries and better price realization [13]. An example is the Ratnagiri Alphonso FPO, which supplies directly to over 500 households in Pune each season. By branding their produce and offering cashless digital payment options, they build customer trust and ensure repeat orders. Local haats organized in Pune's suburbs every weekend also offer a platform for small-scale producers to sell directly, enhancing transparency and farmer visibility. This model fosters stronger farmer-consumer relationships and offers scope for feedback and quality improvement. However, it is limited by logistical challenges, lack of storage, and scale of operations, making it most effective for small to medium batch sales during the peak season.

3) E-Commerce and Digital Platforms

The rise of e-commerce and digital platforms has significantly transformed Alphonso mango marketing, especially in urban regions like Pune. Consumers now prefer the convenience of online ordering, home delivery, and assured quality—attributes that traditional supply chains often lack. Digital platforms such as Amazon, Big Basket, and niche startups like Mangoes India, Alphonso mango.in, and regional FPO-run apps now provide a direct marketplace for farmers or aggregators to reach tech-savvy customers.

These platforms use digital tools for order tracking, grading standards, and customer feedback integration. QR codes, batch tracking, and real-time delivery status have improved trust and traceability. A 2023 study by the MSAMB revealed that online sales of Alphonso mangoes in Pune grew by 42% compared to the previous year, with consumers citing freshness, origin assurance, and convenience as top reasons for preferring e-commerce channels [14]. Furthermore, social media marketing via platforms like Instagram, WhatsApp, and Facebook has empowered small farmers and cooperatives to reach local and diasporic markets. WhatsApp-based community groups with daily price updates and delivery schedules have become common. However, digital literacy, internet connectivity in rural production zones, and cold-chain delivery reliability remain critical challenges. Even so, the trend toward digitized

marketing is expected to grow, offering scalable and direct sales opportunities for premium Alphonso mangoes from the Pune region.

4) Export-Oriented Marketing Practices

Alphonso mangoes have a strong export demand, especially from markets like the United Arab Emirates, Europe, the USA, and Japan, where the fruit is valued for its unique flavor and limited availability. Export-oriented marketing involves stringent documentation, including phytosanitary certificates, GI tagging proof, organic certification (if applicable), and compliance with EU and US FDA norms. Exporters must ensure proper cold chain storage, vapor heat treatment, and packaging standards, often overseen by APEDA and authorized export agencies. Buyers in international markets prioritize consistent fruit size, brix levels, and visual appeal. A 2022 export data analysis showed that India exported over 50,000 metric tons of Alphonso mangoes, 60% of which were routed through Pune's export handlers and freight corridors due to its proximity to Mumbai's ports [5]. Despite high quality, rejection rates remain a concern due to lapses in packaging or ripening protocols.

Table 2 Sample Export Analysis of Alphonso Mangoes from Pune (2022) [11]

Destination Country	Volume Exported (MT)	Avg. Price/Box (₹)	Rejection Rate (%)
UAE	18,500	₹1,800	3.2%
USA	8,200	₹2,400	4.8%
UK	6,500	₹2,150	2.5%
Japan	2,000	₹2,800	1.9%

This table 2 reflects that Japan and the UK had the lowest rejection rates due to pre-screened supply and compliance-ready packaging. Export success is tied closely to stringent process management and brand consistency, areas where Pune-based exporters are becoming increasingly competitive.

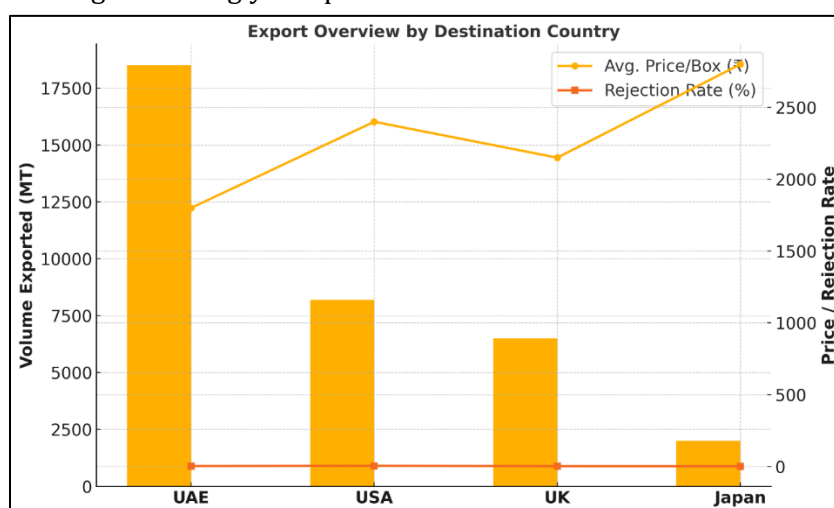


Figure 1 Analysis of export

5) Government and Institutional Support

Governmental and institutional support has been pivotal in boosting Alphonso mango marketing from the Pune region. Agencies like the Agricultural and Processed Food Products Export Development Authority (APEDA) and the Maharashtra State Agricultural Marketing Board (MSAMB) play a central role in facilitating certification, export registration, infrastructure grants, and capacity-building programs for farmers and FPOs. APEDA conducts export training, supports quality control infrastructure like vapor heat treatment (VHT) facilities, and maintains country-wise compliance guidelines. This has significantly helped mango exporters in Pune meet international norms and expand their market base. MSAMB has invested in market infrastructure, including cold storage units, ripening chambers, and digital marketing portals for Alphonso mangoes. It also runs branding initiatives such as the MahaMango campaign, which highlights GI-certified and traceable Alphonso produce. In 2021-22, MSAMB reported that around ₹12 crore was disbursed as subsidies to mango farmers in Ratnagiri and Pune for cold chain infrastructure and packaging innovation [17].

The National Horticulture Board (NHB) and MIDH (Mission for Integrated Development of Horticulture) offer back-ended subsidies for planting material, drip irrigation, and packhouse construction. Digital initiatives such as eNAM (National Agriculture Market) further enhance transparency and allow Pune-based FPOs and farmers to list Alphonso mangoes on a national platform. These institutional supports not only empower producers economically but also help in creating standardized quality, which is crucial for both domestic branding and international exports. However, streamlined implementation, better outreach, and reduction in bureaucratic delays remain essential for maximizing these benefits.

4. CASE STUDIES AND REGIONAL INSIGHTS FROM PUNE

1) Consumer Behavior Patterns in Pune

Pune, with its mix of urban affluence, educated middle class, and strong culinary heritage, offers a valuable consumer segment for Alphonso mango marketing. Studies and surveys conducted in the region show a clear preference for GI-tagged Alphonso mangoes, especially among middle- and upper-income households. Consumers in Pune demonstrate high awareness of the differences between Alphonso and other varieties such as Kesar or Badami, often associating Alphonso with authenticity, prestige, and premium quality. Purchasing behavior trends indicate a shift from conventional mandis to convenience-based platforms, including home delivery models, online portals, and FPO-run subscription services. A 2023 consumer survey by a Pune-based agri-tech startup revealed that over 68% of urban buyers preferred ordering Alphonso mangoes online, citing freshness, assured origin, and hassle-free delivery as their main motivations.

However, price sensitivity remains a critical factor. While affluent consumers are willing to pay ₹150–₹300 per kg for certified Alphonso mangoes, middle-class buyers tend to look for promotional bundles, bulk discounts, or mid-season deals. Interestingly, consumer behavior also varies by geography—central Pune areas like Koregaon Park and Kothrud show stronger preferences for premium mangoes than semi-urban zones like Wagholi or Hinjewadi. Moreover, trust plays a major role in repeated purchasing decisions; buyers often stick to known suppliers, especially when mangoes are delivered directly by FPOs or farmer groups. Packaging aesthetics and traceability labels further influence consumer perceptions of quality and reliability. The demand is also seasonally peaking during Gudi Padwa, Akshaya Tritiya, and early summer, when mango gifting becomes common. Overall, consumers in Pune are becoming more discerning, quality-oriented, and digitally connected, which creates opportunities for differentiated marketing strategies. For long-term market penetration, it is essential to align supply-side planning with evolving urban consumption patterns and offer competitive pricing without compromising on quality assurance and traceability.

2) Success Stories of Local Farmers and FPOs

The Pune region has witnessed a growing number of success stories where local Alphonso mango farmers and Farmer Producer Organizations (FPOs) have bypassed traditional mandi systems to connect directly with consumers. One of the most notable examples is the Ratnagiri-based “Konkan Alphonso Farmers’ Cooperative Society”, which supplies directly to Pune’s residential communities and corporate buyers through a pre-booking model. By aggregating produce from over 200 small farmers, the FPO manages to offer consistent quality, competitive pricing, and traceability to its urban clients. The cooperative uses digital platforms for marketing, handles logistics via cold vans, and allows UPI-based transactions for cashless payments. This approach has helped farmers earn 30–40% higher returns compared to selling through commission agents.

Another model of innovation is the “Hapus Kart” initiative, started by a group of young agri-entrepreneurs from Pune. They established a brand identity by selling Alphonso mangoes grown on their family orchards in Devgad. With attractive packaging, tamper-proof boxes, QR-code-based origin verification, and express delivery options, Hapus Kart quickly gained traction among tech-savvy urban consumers. Their digital campaigns on Instagram and WhatsApp reached over 10,000 households in just one season, proving the potential of targeted online marketing for perishable agri-products. Additionally, these models offer an environmentally sustainable edge by encouraging low-carbon logistics and minimal use of harmful chemicals in farming. These success stories showcase the potential of combining farmer collectives, tech-driven operations, and brand-building to revolutionize mango marketing in the Pune region. Importantly, they highlight that small and marginal farmers, when organized under cooperative or FPO structures and supported with logistics and digital tools, can successfully tap into urban premium markets. These examples serve as blueprints for scalability and replication in other horticultural value chains across Maharashtra and beyond.

3) Challenges Specific to the Region

Despite the growing success of Alphonso mango marketing in Pune, several challenges hinder its full-scale commercialization and value chain optimization. One of the major bottlenecks is urban-rural logistics. Most Alphonso mangoes sold in Pune originate from coastal Konkan districts like Ratnagiri and Devgad, which are over 300 km away. The transportation of this highly perishable fruit requires timely and temperature-controlled transit, which is often unavailable or cost-prohibitive for small producers. This results in post-harvest losses, inconsistent quality upon arrival, and increased costs that eventually burden either the farmer or the end consumer. Another persistent issue is the lack of cold-chain infrastructure across the supply route. While a few FPOs and private aggregators have invested in refrigerated vans and packhouses, the coverage is minimal. The Maharashtra State Agriculture Marketing Board (MSAMB) has initiated cold storage support schemes, but adoption has been limited due to high upfront capital requirements and fragmented farm holdings. Without proper ripening chambers and cold storage, mangoes often reach Pune markets either overripe or underripe, affecting shelf life and marketability. For export-grade mangoes routed through Pune, any lapse in temperature control disqualifies the shipment from meeting international phytosanitary norms.

5. CHALLENGES AND LIMITATIONS IDENTIFIED IN LITERATURE

1) Counterfeit and Adulterated Produce

One of the most critical challenges identified in the Alphonso mango supply chain is the widespread sale of counterfeit or adulterated produce. Despite the fruit's GI-tagged status, markets in Pune and other urban centers frequently witness the sale of low-grade or unrelated mango varieties falsely labeled as "Ratnagiri" or "Devgad Alphonso." These counterfeit mangoes often resemble Alphonso in appearance but lack its signature aroma, sweetness, and texture, thereby misleading consumers and damaging the reputation of genuine growers. Literature reveals that unscrupulous traders exploit the high demand and price associated with Alphonso mangoes, especially during the early weeks of the season, by pushing chemically ripened or visually similar mangoes from non-GI areas into the market. This malpractice not only leads to consumer distrust but also results in price undercutting, affecting genuine producers who invest in quality farming and packaging practices. Regulatory enforcement remains weak due to inadequate monitoring and absence of mandatory certification checks at market entry points. Although some efforts have been made by MSAMB and APEDA to introduce QR code-based traceability and batch labeling, their reach is limited. The lack of a central verification mechanism leaves both sellers and consumers vulnerable. Unless a robust authentication framework is implemented across retail and digital platforms, this challenge will continue to undermine branding and value realization in the Alphonso mango market.

2) Infrastructure and Storage Limitations

Another recurring theme across literature is the lack of robust post-harvest infrastructure, especially cold chain and storage facilities, along the Alphonso mango supply route to Pune. Given the perishable nature of mangoes and the distance from production zones in Konkan to urban markets, timely, temperature-controlled transport and scientifically designed packhouses are essential. However, studies show that only a small fraction of farmers and FPOs have access to cold storage units, leading to accelerated ripening, spoilage, and quality deterioration during transit. The absence of vapor heat treatment (VHT) units, ripening chambers, and sorting/grading lines also prevents farmers from qualifying for high-value domestic and export markets. Even though government agencies like NHB and MSAMB have rolled out subsidy schemes for such infrastructure, smallholder farmers often lack the financial capacity and awareness to avail these programs. Additionally, poor road connectivity in remote production areas, lack of refrigerated vehicles, and high operational costs further restrict cold-chain integration. As a result, a significant portion of the Alphonso harvest is forced into distress sales or suboptimal markets, lowering farmer income. In Pune, retailers often receive inconsistent-quality fruit due to these infrastructural gaps. Literature recommends the cluster-based development of storage and logistics hubs, particularly around collection points and near large consumption centers like Pune, to stabilize prices, reduce losses, and ensure supply consistency. Until these storage-related limitations are addressed, the Alphonso mango value chain will remain inefficient and vulnerable to post-harvest losses.

3) Limited Awareness of Certifications among Consumers

Although certifications such as Geographical Indication (GI), organic labeling, and traceability systems are crucial for product differentiation, a large proportion of urban consumers in Pune remain unaware or indifferent to their presence. Research reveals that even among quality-conscious buyers, there is confusion over what certifications mean, how they are granted, and whether they guarantee superior quality or authenticity. This limited consumer awareness results in low demand pull for certified products, which discourages producers from investing in certification processes that often involve significant time and cost. Studies have shown that only 30–40% of retail mango buyers in Pune are aware of GI tagging, and even fewer look for QR codes or labels while purchasing. This consumer behavior contrasts sharply with trends in international markets, where certifications are seen as trust indicators and influence pricing decisions. The lack of promotional campaigns, educational efforts, and point-of-sale branding contributes to the problem. Moreover, counterfeit produce falsely claiming certifications without verification further dilutes trust. As a result, genuine producers fail to differentiate their product and lose competitive advantage in the market. Addressing this challenge requires a collaborative awareness drive involving government bodies, retailers, FPOs, and digital marketplaces to highlight the importance of certified Alphonso mangoes. Until consumers actively recognize and demand such certifications, the value chain will continue to reward volume over authenticity and quality.

4) Fragmented Farmer Networks and Low Bargaining Power

The Alphonso mango supply ecosystem is highly fragmented, consisting of thousands of smallholder farmers with limited collective bargaining power. This fragmentation poses a serious challenge to market coordination, quality control, and value realization. Most producers operate in isolation, lack market intelligence, and are highly dependent on local commission agents or middlemen to sell their produce. Without collective marketing structures like FPOs or cooperatives, individual farmers cannot negotiate better prices or access premium buyers. Literature shows that in the Pune market, over 70% of Alphonso mangoes are sold through intermediaries, resulting in wide price spreads and suppressed producer margins. Even where FPOs exist, their operational scale and institutional capacity vary significantly, leading to inconsistent performance. Challenges such as leadership gaps, lack of skilled manpower, limited access to finance, and weak supply chain integration further inhibit collective efficiency. Additionally, due to the seasonality of Alphonso cultivation, many farmers treat mango sales as a supplementary income activity rather than a professionally managed enterprise, reducing motivation to invest in marketing or quality differentiation. Strengthening farmer networks through aggregation, digital platforms, shared logistics, and value chain partnerships is a key solution proposed across multiple studies. Unless this structural challenge of fragmentation is addressed, farmers will remain price takers in a market that increasingly values branding, traceability, and consistency—areas that require scale, coordination, and collaboration.

6. RESEARCH GAPS AND FUTURE DIRECTIONS

1) Lack of Empirical Studies on Consumer Preferences in Pune

Despite the growing consumer market in Pune for Alphonso mangoes, very few empirical studies exist that explore detailed consumer preferences, price elasticity, purchasing behavior, and brand loyalty in this specific urban context. Most existing literature generalizes consumer trends at the national level or focuses on production-side economics, leaving a significant knowledge gap in understanding how urban Pune consumers evaluate quality, certification, price, and packaging. Key questions remain unanswered: Do buyers in Pune prefer certified organic Alphonso mangoes or just seasonal freshness? Are QR codes and traceability tools influencing purchasing decisions? What demographic segments show higher willingness to pay for GI-tagged fruit? The absence of such data leads to marketing strategies based on assumptions, which can misalign product offerings with market demand. Additionally, there is a lack of behavioral segmentation across Pune's diverse urban population—from high-income neighborhoods to emerging peri-urban zones. A comprehensive, data-driven study using surveys, A/B marketing tests, and digital analytics can fill this gap and help producers and marketers tailor their offerings more effectively. Addressing this will not only improve consumer satisfaction but also increase market penetration of certified Alphonso mangoes, supporting sustainable agricultural practices and premium pricing strategies.

2) Inadequate Data on Post-Harvest Losses and Logistics

A consistent limitation in Alphonso mango supply chain literature is the scarcity of quantitative data on post-harvest losses and logistical inefficiencies, especially in routes connecting Ratnagiri/Devgad to urban markets like Pune. While anecdotal evidence suggests that 20–30% of mangoes suffer spoilage during transport and storage, verified field studies are limited. Similarly, there is inadequate mapping of cold storage gaps, ripening facility locations, or last-mile delivery inefficiencies that impact quality. This absence of granular data impairs policy planning and investment prioritization. Researchers emphasize the need for GIS-based infrastructure audits, loss tracking mechanisms using IoT, and real-time data collection on perishability metrics. Such datasets would enable targeted infrastructure development, optimized routing, and improved export planning. Moreover, pilot projects incorporating sensor-based packaging or smart crates with temperature and humidity logging can generate actionable data. Filling this research gap is essential for transforming the Alphonso mango sector from a seasonal trading model to a supply chain-driven agri-business ecosystem that delivers high-quality fruit with minimal waste and maximum farmer returns.

3) Need for Innovation in Branding and Value-Added Products

Another under-researched opportunity lies in the innovation of branding and value addition in the Alphonso mango market. The current literature predominantly focuses on fresh fruit trade, overlooking the growing potential for processed Alphonso-based products such as pulp, jam, ice creams, dried slices, and artisanal beverages. Given Pune's urban demographic and its proximity to food processing clusters, branding Alphonso mango as both a luxury fruit and a base for premium products could diversify farmer incomes and extend shelf life. Branding strategies such as story-based packaging ("from farm to fork"), geographical storytelling, eco-friendly containers, and influencer-led social media campaigns have not been sufficiently explored in research. Consumer acceptance studies, packaging design evaluations, and brand perception analyses could help identify scalable business models. Integrating such value-added approaches can insulate the supply chain from seasonal price crashes and post-harvest glut, while also tapping into retail, gifting, and export niches. Encouraging FPO-led branding ventures and public-private partnerships in mango-based product development could open new revenue streams and improve year-round economic stability for growers.

4) Scope for Integrating AI/IoT in Mango Marketing

The potential of Artificial Intelligence (AI), Internet of Things (IoT), and data analytics in optimizing the Alphonso mango supply chain remains largely unexplored in existing literature. Technologies such as AI-based demand forecasting, price prediction algorithms, image-based grading, and IoT-enabled cold chain monitoring can significantly enhance operational efficiency and market alignment. For instance, using AI to forecast demand in Pune's micro-markets could help farmers plan harvest timing and logistics more effectively. Similarly, mobile apps with AI-powered quality checks could assist small sellers in standardizing grading and pricing. On the supply chain front, IoT sensors in transport crates can monitor temperature and humidity, alerting vendors to potential spoilage risks in real-time. Despite these possibilities, adoption remains low due to high cost, limited awareness, and lack of technical training among rural stakeholders. There is a strong need for pilot research, government-backed innovation hubs, and academic-industry collaborations to build scalable prototypes. Integrating AI/IoT in Alphonso mango marketing can usher in a data-driven revolution that supports real-time decision-making, improves traceability, and enhances profitability across the value chain.

7. CONCLUSION

This literature-based research study provides a comprehensive analysis of the product differentiation and marketing strategies of Alphonso mangoes with a specific focus on the Pune region. The findings highlight that while Alphonso mangoes enjoy a strong brand identity due to their GI-tag status, unique flavor profile, and premium market positioning, challenges such as counterfeit produce, infrastructure bottlenecks, and fragmented supply chains continue to hinder value realization. The Pune market plays a crucial intermediary role in the Alphonso value chain, linking coastal production belts to urban and export-oriented consumer bases. The study reveals that traditional mandi-based marketing remains dominant but is plagued by inefficiencies and price asymmetries. In contrast, emerging models like direct-to-consumer (D2C) sales through FPOs, digital platforms, and online marketplaces are showing promise in improving farmer incomes and consumer satisfaction. Consumer preferences in Pune are shifting towards traceable, certified, and conveniently delivered mangoes, though awareness of certifications like GI and organic labels remains

limited. Infrastructure gaps, especially in cold chain and storage, continue to result in post-harvest losses and reduced export viability. Furthermore, limited empirical research on consumer behavior, logistics data, and branding innovation constrains informed policymaking and investment decisions. The study underscores the need for collective farmer models, enhanced consumer awareness campaigns, and government-industry collaborations to build resilient and transparent supply chains. Future directions include integrating AI/IoT technologies, developing value-added Alphonso products, and conducting region-specific empirical studies to align marketing strategies with consumer demand. A synergistic approach combining technology, policy, and market innovation is essential for sustaining the economic and cultural legacy of Alphonso mangoes in the Pune region and beyond.

CONFLICT OF INTERESTS

None.

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