

How Can AI Enhance the Sourcing Capabilities of Small and Medium Sized Art Auction Houses

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Abstract. Against the backdrop of profound structural shifts within the global art-auction ecosystem, small- and medium-sized auction houses (SMEs) are confronted with multifaceted sourcing dilemmas. These include the growing scarcity of high-quality uncirculated artworks ("fresh lots"), diminishing returns from traditional sourcing channels, mounting compliance burdens brought by updated cultural relic regulations, and persistent competitive disadvantages against internationally leading auction institutions. Conventional sourcing workflows rely heavily on personal social networks and individual expert experience, leading to fragmented information storage and limited capacity to expand beyond existing client circles. Although existing academic papers have explored AI-driven artwork valuation, research focusing on AI-assisted upstream sourcing procedures for resource-constrained SME auction houses remains underdeveloped. This paper adopts the Gioia-style grounded-theory inductive qualitative methodology, drawing on five semi-structured in-depth interviews with core practitioners from auction institutions located in the Yangtze River Delta region of China. Through three-phase coding procedures, four aggregate theoretical dimensions are extracted: systemic root causes of sourcing difficulties, fundamental transformation of channel operation logic, structural differentiation of collector behaviours and mindsets, as well as the value boundaries and practical obstacles for AI implementation. Based on these empirical findings, this study constructs an embedded five-stage closed-loop human-AI collaborative sourcing scheme. Different from high-cost custom-built technical systems, the proposed solution adopts zero-code off-the-shelf tooling, explicitly positioning artificial intelligence as an information-augmentation instrument rather than a complete substitute for human professional judgment and trust-based interpersonal negotiation. This research enriches existing literature concerning digital transformation within the art market and delivers context-aware, actionable operational suggestions for SME auction practitioners with limited technical and financial budgets.

Keywords: Art auction, Sourcing, Artificial intelligence, Human AI collaboration, Grounded theory

1. Introduction

The contemporary global art-trading system is composed of galleries, art fairs, online art trading platforms and auction houses, forming an interconnected commercial ecosystem [1]. Over recent years, digital transformation, inter-generational shifts in collector demographics, changing consumption expectations and intensified market competition collectively push auction organisations to rethink and adjust their business models and operational strategies [1]. Against such market circumstances, how auction houses can sustain and strengthen their market competitiveness amid continuous industry restructuring constitutes a meaningful research topic for both art-market academia and real-world industry participants.

Distinct from manufacturing enterprises, auction institutions do not produce artworks themselves. Their core operating resources are consigned artworks provided by external collectors, private foundations, and other market participants. Accordingly, the capability to continuously obtain market-attractive consignments largely determines auction houses' operating performance. High-quality lots attract larger buyer groups, boost auction transaction outcomes, and consolidate institutional market reputation.

Nevertheless, resource distribution within the art-auction industry is highly uneven. Established leading auction houses benefit from long-accumulated brand prestige, abundant professional expertise, and global-scale collector networks, granting them prominent advantages when competing for high-value consignments. By comparison, small- and medium-sized auction houses generally suffer weaker brand recognition, narrower collector networks, and insufficient systematic transaction datasets. In an industry heavily shaped by private information and long-term trust relationships, SMEs face substantial barriers when attempting to expand sourcing capacity beyond their existing social connections.

Traditional sourcing activities depend substantially on interpersonal relationships and tacit expert knowledge. While personal networks grant access to valuable private market information, information fragmentation creates practical bottlenecks: collector preference data, consignment willingness signals, and market trend insights are mostly unstructured, hard to systematically archive, aggregate, and reuse. Critical market knowledge is often attached to individual employees, creating risks of knowledge loss and restricting the discovery of new consignment opportunities outside existing circles.

Artificial intelligence brings new possibilities for resolving these information-related pain points. AI technologies can process large-scale heterogeneous information, integrate multi-source scattered data, and support market forecasting and business decision-making [2]. Within the auction sector, AI improves the analytical efficiency of historical transaction records, assists in identifying potential consignors and delivers preliminary valuation references. It should be emphasised that AI is not intended to replace auction experts or trust-driven interpersonal interactions; instead, it supplements human expertise by expanding information-processing capacity.

Against this background, this study puts forward its central research question: RQ: How can AI enhance the sourcing capabilities of SME auction houses? This paper draws on first-hand interview evidence to analyse real-world sourcing pain points and practical constraints for AI deployment. On this empirical foundation, an embedded human-AI collaborative sourcing scheme is constructed rather than presenting a purely theoretical technical prototype. Theoretically, this study expands academic understanding of how AI reshapes information acquisition and resource matching within art-auction intermediary organisations. Practically, it delivers a feasible digital-transformation

pathway that balances algorithmic tools and human professional judgement for resource-limited SME auction institutions.

2. Literature review

2.1. Sourcing and information uncertainty in art auction markets

A defining characteristic distinguishing artwork from standard commodities is fundamental value uncertainty [3]. Each artwork possesses uniqueness; quality and market worth cannot be evaluated through uniform quantitative standards, and future market demand remains difficult to predict. Under such uncertainty, auction houses function not merely as simple buyer-seller intermediaries, but as "information brokers" [4]. They supply professional appraisal judgement, market intelligence and resource matching services to mitigate information asymmetry across the market.

Consequently, the capacity to acquire high-quality consignments represents a core source of competitive advantage. Continuously identifying and obtaining market-competitive artworks attracts high-value client groups, lifts auction performance and strengthens institutional reputation, making sourcing a vital long-term strategic capability for auction operators.

2.2. Limitations of relationship-driven traditional sourcing

Traditional artwork-sourcing practice centres on collector relationships, personal networks and accumulated expert experience. A large proportion of meaningful art-market information is non-public and tacit, built up through repeated transactions and interpersonal communication over long periods [5]. Broader social networks bring superior private-information access for market participants [4].

Even so, relationship-based sourcing carries intrinsic drawbacks. Information concerning collector preferences, potential consignment intentions, and market trends is mostly fragmented and unstructured, which creates obstacles for systematic recording, internal sharing, and data-driven analysis. Reliance on individual specialists and client managers makes it challenging to convert personal tacit knowledge into organisational assets, limiting the exploration of consignment opportunities outside pre-existing networks. Although relationship-based mechanisms facilitate trust-building and private-information acquisition, their scalability for information integration and outward market expansion stays constrained.

2.3. Competitive pressures faced by SME auction houses

Resource distribution across the art-auction field is highly imbalanced, creating clear market hierarchies [6]. Leading auction houses benefit from established brand influence, professional experience, massive transaction archives, and worldwide collector networks, making it easier for them to secure high-value artworks and potential consignors.

Competitive advantages accumulate iteratively: superior consignments improve market performance and institutional reputation, which in turn creates better access to high-quality future consignments [5]. SMEs, by contrast, commonly encounter disadvantages including limited brand awareness, smaller-scale collector networks and insufficient data resources. Their sourcing disadvantages originate not only from tangible brand and capital gaps, but also from information-processing disadvantages in acquiring, aggregating and utilising scattered market intelligence.

2.4. Existing research on AI within art-market practice

AI technology supports corporate operations across three major dimensions: process automation, data-driven analysis and customer-oriented engagement [7]. For auction-sourcing contexts, data-analysis capacity bears particular relevance. When sourcing depends heavily on personal experience, valuable dispersed information may be overlooked; AI can organise and interpret multi-source data to uncover potential consignment opportunities.

Recommendation-system methodologies can identify potential clients by analysing historical transaction behaviour and collector preference profiles [8]. In addition, machine-learning approaches support artwork screening and valuation tasks. Prior research combines artwork visual features and historical transaction records to generate price-prediction outputs [9]. Nevertheless, scholars widely recognise that due to artwork uniqueness, cultural connotations, and the importance of human aesthetic judgement, AI cannot fully supersede domain experts [10]. AI should operate as an augmentation tool, strengthening information discovery and analytical capacity while human experts retain authority for authentication, market interpretation and final decision-making.

2.5. Research gap and research question

Existing literature has analysed auction-house competitive advantages from the perspectives of value uncertainty, professional expertise and social networks. However, few studies systematically investigate how digital technologies transform the upstream sourcing workflow. Current art-market AI research concentrates overwhelmingly on price forecasting and valuation tasks, while upstream-stage sourcing activities, including potential-consignor mining, remain under-examined. Moreover, limited scholarship addresses how resource-constrained SMEs may adopt AI to mitigate constraints imposed by traditional relationship-driven sourcing. This study responds to this research gap with the central research question: RQ: How can AI enhance the sourcing capabilities of SME auction houses?

3. Methodology

3.1. Research approach

Considering that auction-sourcing practice relies heavily on interpersonal trust, exhibits prominent regional features, and involves non-standardised business workflows, this paper applies an inductive qualitative grounded-theory research design [11, 12]. This hypothesis-free bottom-up coding method is well-suited for exploring practitioners' real-world experiences, strategic thinking, and attitudes towards emerging technology within complex market environments. It extracts core conceptual categories and inter-category logical relationships from interview transcripts to build explanatory theoretical frameworks.

3.2. Sampling strategy

A two-week field investigation was conducted covering four core art-trading cities in the Yangtze River Delta: Shanghai, Nanjing, Suzhou and Hangzhou. Purposive sampling [13] was adopted to select five auction-house respondents for in-depth interviews. Sampling criteria included institutional diversity (state-owned time-honoured auction enterprises, mid-sized private houses and small-market-oriented organisations), respondents holding management or front-line decision-making responsibilities for consignment work, and geographic concentration within China's key art-

transaction region. The final sample contained one state-owned institution and four private SMEs. All sampled organisations maintained continuous offline-auction operations over the past three years and faced real-world sourcing-related pressures. High consistency of core viewpoints across different cases indicates theoretical saturation [14].

3.3. Data collection

Triangulated multi-source data collection was implemented [15, 16], combining semi-structured face-to-face interviews, secondary industry documents and public institutional materials. Each interview lasted approximately 45 minutes, audio-recorded and fully transcribed. Interview themes covered shifts in sourcing difficulty over recent years, root causes of sourcing pressure, channel performance changes, collector consignment-resistance drivers, competitive gaps versus leading houses, and current expectations and concerns regarding AI-tool deployment. Supplementary documentary materials included public consignment announcements, auction-catalogue samples, compliance-form templates and industry-association reports, providing contextual cross-validation for interview insights.

3.4. Data analysis

Data analysis followed the constant-comparison method, progressing sequentially through open coding, axial coding and selective coding [11, 12]. During open coding, line-by-line transcript reading extracted native participant expressions describing sourcing hardship, channel shifts, collector attitudes and AI perceptions, yielding 127 initial codes later consolidated to 86 independent first-order concepts. Axial coding grouped conceptually similar first-order codes to generate 18 second-order themes, each supported by evidence from at least three sampled institutions. Selective coding further clarified logical connections among second-order themes and integrated them into four aggregate dimensions: systemic causes of sourcing difficulties, fundamental transformation of channel-operation logic, structural differentiation of collector mindsets, and value boundaries plus practical obstacles for AI adoption. An explanatory framework summarised as "sourcing difficulties → channel reconstruction → boundaries of technological empowerment" was thereby constructed.

Table 1. Partial illustration of coding procedures

Representative Quotation	First-Order Code	Second-Order Theme	Aggregate Dimension
"Old-collector referrals supply over 60 % of total consignments."	Referrals as primary supply source	Private-circle networks as core channels	Fundamental transformation of channel-operation logic
"AI models have inherent defects given insufficient offline-transaction electronic records."	Incomplete industry datasets	Data-related bottlenecks constraining AI	Value boundaries and obstacles for AI adoption
"Sourcing is built upon trust and personal relationships which AI cannot replicate."	Interpersonal trust is irreplaceable	Core human-exclusive work domains	Value boundaries and obstacles for AI adoption

4. Research findings

Interviewees across all five institutions confirmed that sourcing difficulty had risen markedly compared with three-to-four years ago. The industry has shifted from having abundant candidate consignments to facing shortages of high-quality lots. Premium top-tier "cover-piece" masterpieces have grown exceptionally scarce, mid-tier collectable lots show obvious supply gaps, while low-grade repeatedly circulated artworks constitute a large share of incoming submissions. Sourcing hardship represents systemic structural industry conditions rather than isolated operational misfortunes for individual firms.

Multiple mutually reinforcing factors jointly create this systemic predicament: tightened market liquidity makes buyers more prudent and renders collectors reluctant to consign for fear of unsold-lot outcomes; lingering negative perceptions stemming from past unethical market conduct erode industry-wide trust; private transactions and online marketplaces continuously divert consignment supply; newly updated cultural-relic regulatory requirements elevate provenance-verification and archival-filing workloads and associated compliance costs.

Concerning sourcing-channel evolution, formerly popular public mass-outreach channels including national touring appraisal events, large-scale antique markets and public online consignment portals have exhibited deteriorating input-output efficiency and have been largely de-prioritised by most respondents. By contrast, trust-grounded private-collector-circle referrals and invitation-only small-scale appreciation salons have become the highest-conversion sourcing pathways. The overall channel strategy logic has transitioned from blind scale-expansion toward trust-relationship maintenance.

Four major factors inhibit collector willingness to consign: valuation outcomes failing to match collectors' psychological expectations, worries over reputational harm caused by unsold-lot public exposure, excessively long 3-7-month payment-settlement cycles, plus sentimental attachment to inherited artworks among veteran collectors. Notably, slow and cumbersome settlement procedures cause 30 %-60 % of potential consignors to abandon cooperation, as reported by each participating institution. Meanwhile, consignor demographics are undergoing structural change: younger-generation collectors demand higher procedural transparency and digital-service accessibility; overall collector market literacy has improved considerably.

In competitive comparisons versus leading auction houses, SMEs admit gaps regarding brand influence, capital capacity for guaranteed hammer prices or direct buy-outs, and access to high-end consignment resources. Nevertheless, SMEs possess distinct differentiated strengths: refined special-auction curation, short flexible decision chains, deep local-market insight and customised on-site appraisal services. All interviewees reached consensus that "regional deepening plus vertical-category specialisation" constitutes the viable long-term development strategy for SMEs, even though vertical-track cultivation demands sustained long-term resource investment before stable brand advantages materialise.

With respect to current AI deployment status, industry-wide AI applications remain confined to shallow auxiliary tasks: market-data retrieval and document-text generation are widely adopted; image-based preliminary screening and AI valuation are only trialled on limited scales. Three structural barriers constrain deeper implementation: incomplete historical transaction datasets, the non-standardised intrinsic properties of artworks, plus ambiguities surrounding personal-data privacy compliance and liability allocation for AI misjudgement. Interviewees uniformly stressed that hands-on tactile physical appraisal, high-stakes trust-based negotiation with senior collectors,

and humanistic aesthetic judgement fall entirely outside AI's functional scope, because auction-sourcing is inherently a trust-and-relationship-driven business.

Looking three years ahead, practitioners anticipate that the sourcing market will bottom out and stabilise with prominent structural differentiation. High-end masterpieces will remain scarce; mid-tier vertically-specialised collectables will witness early-stage recovery; low-grade repetitive commodities will stay sluggish.

Table 2. Summary of core empirical findings

Analytical Dimension	Key Finding	Consensus (Responses / 5)
Sourcing-difficulty shift	Marked increase; scarcity of premium masterpieces	5/5
Channel transformation	Public mass-outreach channels decline; private-circle referrals dominate	5/5
Collector consignment barriers	Valuation gaps, unsold-lot fear, lengthy settlement cycles	5/5
SME competitive strategy	Regional deepening + vertical specialisation	5/5
AI-implementation bottlenecks	Deficient datasets, artwork non-standardisation, compliance risks	4/5
Three-year-market outlook	Bottom-out stabilisation and structural differentiation	5/5

5. Discussion

5.1. SME sourcing dilemma re-interpreted: information-related disadvantage

Consistent with existing scholarship [3, 4], interview evidence demonstrates that SME sourcing difficulties are not merely brand-or capital-resource shortages. They are substantially information-processing disadvantages: market information remains fragmented; firms are overly dependent on existing interpersonal networks; traditional mass-outreach channels deliver diminishing returns; and compliance workloads keep expanding. Therefore, improving organisational information-processing capacity represents a feasible direction for enhancing SME sourcing performance.

5.2. AI as information-augmentation tool rather than automation substitute

AI's principal value lies in augmenting rather than replacing professional human judgement [7, 17]. Within auction-sourcing contexts, the main bottleneck is rarely pure authentication expertise; instead, it is discovering dispersed potential consignors, integrating fragmented market signals, and expanding beyond closed personal networks. Algorithms excel at multi-source data collation and preliminary screening; human experts retain dominance for physical appraisal, trust-building negotiation, and aesthetic interpretation.

5.2.1. Embedded five-stage zero-code human-AI collaborative sourcing scheme (answering RQ)

Built strictly upon the four aggregate grounded-theory dimensions extracted from interview materials, this embedded workflow respects all empirically observed boundary conditions: AI serves only for shallow information augmentation; hands-on appraisal, high-end trust negotiation, and aesthetic evaluation must remain human-led; industry-wide data weaknesses, artwork non-standardisation, and privacy risks must be accommodated; "regional deepening plus vertical specialisation" is adopted as core competitive orientation. The scheme avoids expensive custom model development, assembling commercially-available zero-code tools accessible for budget-limited SMEs. Each functional module directly responds to real-world pain points documented during field interviews.

1. AI-driven multi-source consignor mining and channel-efficiency diagnosis: Focus data-collection efforts on proven high-value private-domain channels while filtering out low-yield mass-outreach channels such as national touring appraisal events. AI generates dual-dimensional consignor segmentation: tier classification by artwork quality (S/A/B tiers) and behavioural-preference classification distinguishing offline-oriented senior collectors and digital-accustomed younger-generation collectors. The system quantitatively calculates channel conversion ratios and customer-acquisition costs, producing actionable resource-reallocation suggestions. All data-scraping activities must comply with local personal-data-protection regulatory requirements.

2. Multi-modal AI pre-audit: provenance compliance, tiered valuation and collector-concern mitigation. Multi-modal image-retrieval technology supports provenance cross-referencing. AI automatically drafts compliance-archival documents and flags high-risk cultural-relic lots susceptible to ownership-dispute concerns. Drawing on regional vertical-category historical-transaction datasets, the algorithm outputs three-tier hammer-price intervals and unsold-lot-risk probability estimates, and generates ready-to-use consignor-communication scripts addressing typical worries. Mandatory operational constraint: all algorithm-generated provenance markers and valuation outputs are labelled as algorithm-derived references only and require formal manual review plus expert signature before formal consignment acceptance.

3. AI-supported competitive-gap diagnosis and vertical-segmentation strategy formulation: Quantitatively compute resource gaps between the focal SME and leading auction-house competitors, while highlighting SMEs' differentiated strengths, including deep local-market knowledge, flexible decision-making workflows, and customised on-site services. Matching institutional geographic location, the workflow retrieves historical performance indicators for locally characteristic artwork categories and outputs multi-year actionable vertical-track cultivation roadmaps, with explicit reminders regarding lengthy market-cultivation cycles noted by practitioners.

4. AI-function-demand assessment and formalised human-machine-collaboration operating norms: Translate interview-identified AI-deployment obstacles into internal operating rules. Summarise front-line-staff-ranked functional priorities and codify non-delegable human-responsibility items: tactile physical appraisal, high-end-collector trust-based negotiation, and humanistic-aesthetic value judgement. Every document generated by AI must preserve expert-review traceable records for audit purposes.

5. Full-cycle data aggregation and three-year structural-trend forecasting: Aggregate multi-dimensional operational indicators including consignment-supply-structure composition, channel-performance metrics, and year-on-year cost fluctuations. Synthesise bearish and bullish market

drivers derived from interview insights, and deliver differentiated resource-allocation advice for high-end premium lots, mid-tier vertical-category artworks, and low-grade repetitive consignments. All forecasting outputs function purely as decision-support references instead of deterministic market predictions.

Table 3. Zero-code tool-to-pain-point mapping

Workflow Stage	Zero-Code Toolkit	Target Empirical Pain-Point
Consignor mining & channel diagnosis	Free web crawler + cloud-based forms	Limited outreach constrained by existing personal networks
Artwork pre-audit & compliance review	Multi-modal image retrieval + general large-language model	Heavy compliance workload; multi-faceted collector consignment resistance
Competitive-gap & vertical-strategy analysis	LLM-enhanced multidimensional spreadsheets	Ambiguous competitive positioning; need for implementable vertical-track plans
Human-machine-collaboration norm-setting	Multidimensional spreadsheets + general LLM	Unclear liability for AI misjudgment
Full-cycle data aggregation & forecasting	Multidimensional spreadsheets + general LLM	Absence of systematic medium-term decision-support data

The embedded scheme carries inherent limitations originating from industry structural constraints: it cannot access fully confidential top-tier-collector private circulation information; image-analysis technology cannot replace tactile physical appraisal; sentimental and closed-circle-premium values for inherited artworks resist algorithmic quantification; valuation-prediction accuracy depends heavily on the scale of an institution's internal historical-transaction archives. These constraints reinforce the core interview-derived conclusion: AI delivers only auxiliary information-augmentation value and cannot fundamentally resolve the trust-centred systemic sourcing dilemma of the art-auction industry.

5.3. Managerial implications: construct AI-enabled organisational information capability

Consistent with Hillebrand's findings [18], AI value should be evaluated at the organisational-process level rather than merely at the isolated-task level. The five-stage embedded workflow instantiates this viewpoint: it connects potential-consignor discovery, market-information analysis, artwork pre-screening, valuation support and mandatory human expert review into one coherent operating loop. Artificial intelligence evolves from a discrete tool into part of continuous organisational information-handling and decision-making procedures.

For resource-limited SME auction houses, such integration helps convert scattered market intelligence into accumulable organisational knowledge. Therefore, AI implementation is not only about boosting single-task efficiency; it supports SMEs in constructing more systematic and sustainable organisational information-processing capacity.

5.4. Boundary conditions and future-research directions

The proposed human-AI collaborative scheme remains an exploratory conceptual framework induced from qualitative interview data and has not undergone real-world long-term field validation. Furthermore, sample interviewees are concentrated within Yangtze River Delta Chinese auction institutions, creating certain limits for cross-regional generalisability. Future research may expand sample geographic and institutional coverage, and adopt action-research field trials to test real-world workflow performance regarding sourcing efficiency, consignor-mining effectiveness and risk-control outcomes.

6. Conclusion

This paper set out to answer the research question concerning how AI can improve sourcing capacity for small- and medium-sized art auction houses. Drawing upon Gioia-method grounded-theory analysis of five semi-structured interviews with Yangtze-River-Delta auction-industry practitioners, this study unpacked the systemic sourcing difficulties faced by SMEs. The evidence demonstrates that sourcing hardships are not exclusively caused by brand-or-capital disadvantages; to a considerable extent, they stem from information-processing constraints: fragmented market information, over-reliance on interpersonal networks, diminishing effectiveness of traditional mass-outreach channels, and rising compliance burdens.

Empirical evidence rejects the unrealistic expectation that AI can fully replace human trust-building, hands-on physical appraisal, and aesthetic judgement within art-auction operations. Its core practical value resides in information augmentation. Based on this empirical foundation, this paper puts forward an embedded five-stage closed-loop zero-code human-AI collaborative sourcing scheme tailored for budget-constrained SME auction houses. Distinct from expensive custom-built technical systems, it utilises readily available commercial zero-code tooling. Every workflow module responds to real-world industry pain points observed during field interviews, while embedding binding mandatory human-expert-review mechanisms to mitigate risks stemming from AI misjudgment, privacy concerns, and liability ambiguities.

This study delivers two major theoretical contributions. First, it supplements art-market digital-transformation scholarship by shifting research attention away from widely-studied AI artwork-valuation tasks toward the under-researched upstream sourcing workflow. Second, this paper establishes context-specific human-AI division-of-labour boundaries for trust-dependent art-market intermediary organisations, extending augmentation-focused AI theory into cultural-auction-industry research contexts.

For industry practitioners, actionable managerial insights are generated. SME auction houses ought to treat AI not as isolated gadgetry, but as a potential organisational information-processing capability. Technology-investment priorities should align with the empirically validated competitive path of "regional deepening plus vertical specialisation". Practitioners also need to acknowledge inherent workflow limitations: information blind spots regarding top-tier private-collection resources, irreplaceability of tactile physical appraisal, non-quantifiable sentimental and social value of inherited artworks, and performance dependency on internal historical-transaction-data accumulation.

This research carries clear empirical boundaries. Qualitative-study samples are geographically concentrated within Chinese Yangtze-River-Delta auction institutions, and the proposed collaborative-sourcing scheme remains conceptually derived from interview evidence without practical field-testing. Follow-up research may broaden sampling scope and implement field-based

action research to evaluate real-world efficiency, cost changes, and risk outcomes brought by this human-AI sourcing framework.

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