



Artificial Intelligence and Startup Development: An Empirical Examination of Airbnb's Performance Indicators

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Abstract: Objectives: The study investigates whether AI adoption impacted Airbnb's financial results through its key performance indicators. **Prior Work:** AI business research has grown rapidly but most studies remain theoretical because researchers have not conducted quantitative studies that compare AI adoption through multiple business milestones. **Approach:** The study uses a comparative design to study two time periods during which it examined seven different performance metrics between 2015–2016 and 2017–2018. Backlinko provides the quantitative data which researchers used descriptive statistics and Paired-Samples T-tests for analysis through SPSS software. **Results:** The post-AI period exhibited higher growth rates for all indicators when compared to the pre-AI period. The three indicators which reached statistical significance at $\alpha = 0.05$ were nights and experiences booked ($p = 0.030$) and product development expenditure ($p = 0.049$) and sales-and-marketing expenditure ($p = 0.026$). The four remaining effects demonstrated substantial practical implications which nearly reached the threshold because the paired sample contains only two data points per group. **Implications:** Entrepreneurs must establish AI deployment budgets because their business expenses will start before their technology benefits. **Value:** The paper establishes a replicable framework for studying technology

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adoption impacts in fast-growing businesses through its examination of AI effects on company financial records instead of survey results.

Keywords: Startups; Artificial Intelligence; Airbnb; Performance Measurement; Platform Economy

JEL Classification: M13; O33

1. Introduction

Academic researchers have developed a strong interest in studying the startup business model because it generates outstanding results but also creates major obstacles. On one hand, venture-backed firms such as Uber, Spotify, and Airbnb have redefined entire industries within a decade. On the other, failure rates remain stubbornly high, and the gap between a compelling concept and a sustainable revenue stream is frequently wider than founders anticipate. What distinguishes the survivors, increasingly, is their early and deliberate embrace of digital technology – and, within that category, of artificial intelligence.

The relationship between AI and startup performance is not self-evident. AI is expensive to build, requires specialized talent, and produces results that are often difficult to attribute cleanly. Yet the companies that have committed to it most deeply, Amazon, Airbnb, ByteDance, have also posted some of the most dramatic growth curves in modern business history. Whether that correlation reflects causation, and through which specific mechanisms performance improvements materialize, is a question the academic literature has not yet answered with much precision.

This paper takes a narrow but tractable approach to that question. Rather than survey a sample of startups about their AI intentions or estimate AI exposure at the industry level, we focus on a single, well-documented case: Airbnb between 2015 and 2018. The year 2017 is widely recognized as the moment Airbnb shifted from occasional algorithmic experimentation to a company-wide AI strategy, running over 2,500 A/B tests in twelve months and embedding model-driven decisions into search ranking, pricing suggestions, and fraud detection alike (Airbnb Technology Team, 2018).

The timeline establishes a natural sequence between events which occurred before and those which happened afterward while Backlinko's continuous monitoring of Airbnb's essential metrics provides matched data for all four annual periods.

We will study Airbnb's vital performance metrics which the company considers important to determine whether they underwent significant changes after the implementation of artificial intelligence. Our research findings will help shape the ongoing debate about how start-up companies adopt artificial intelligence technologies.

1.1. Problem Statement

The AI debate receives its most unusual treatment from digital platform companies which depend on their data production capacity to create AI's essential raw materials while they pursue market competition in sectors that require rapid algorithmic advancement to survive. The case of Airbnb demonstrates how this situation creates conflicting interests. The platform at its inception used an elementary matching algorithm which employed rule-based recommendations and provided minimal pricing guidance while it used simple recency and rating signals to determine search rankings. Everything that existed in 2017 had disappeared from the previous time period. The core product began to use machine learning technology which had transitioned from the data science lab. Researchers and practitioners must address the question which asks whether we can actually observe the numerical changes resulting from the research. The study addresses its central research problem by establishing the following research framework:

What exactly caused the transformation of Airbnb key performance indicators (KPIs) after deploying the AI-powered operational model?

1.2. Research Questions

The main issue gets divided into seven specific questions which each connect to a measurable indicator:

- Did the number of nights and experiences booked change significantly after AI adoption?
- Did Total Booking Value change significantly after AI adoption?
- Did Revenue change significantly after AI adoption?
- Did Operations and Support Expenses change significantly after AI adoption?

- Did Product Development Expenses change significantly after AI adoption?
- Did Sales and Marketing Expenses change significantly after AI adoption?
- Did General and Administrative Expenses change significantly after AI adoption?

1.3. Research Hypotheses

Each question generates a testable hypothesis in null and alternative form. The seven tests use a common null hypothesis H_0 which states that no significant differences exist between the pre-AI and post-AI periods for the particular indicator being tested while the alternative hypothesis H_1 states that there are substantial differences between these two periods. The seven hypothesis pairs are labelled H1 through H7, corresponding to the seven indicators listed above.

1.4. Objectives

The research objectives establish three goals which require researchers to first create a statistical description of Airbnb's performance during the two time periods to document their findings. The second goal requires researchers to use statistical methods to determine whether the observed differences between groups surpass normal levels of variation. The third goal requires researchers to analyze the significant and non-significant results according to existing research about how AI technology transforms startup business processes.

1.5. Significance

The study matters for at least two audiences. The researchers demonstrate that natural experiments which occur in corporate history through a firm's AI transition documentation can be used to study technology effects because this method avoids the problems that usually affect cross-sectional survey data. The findings show practitioners a financial view of AI adoption which demonstrates that AI adoption requires extensive resources yet results in performance improvements which follow behind major cost increases.

2. Literature Review

The past several years have produced a substantial body of writing on AI and entrepreneurship, though, as Sreenivasan and Suresh (2022) observe, the field still lacks the theoretical precision it needs. The existing research fails to produce useful predictions because it either presents excessive abstract material or it presents overly specific technical material that does not connect to the strategic and organizational research needs of practitioner-oriented researchers. The upcoming content will present four main themes that specifically relate to the case study of Airbnb.

2.1. Artificial Intelligence as a Driver of Entrepreneurial Value Creation

The fundamental literature assertion maintains that AI enables businesses to develop new methods for maintaining operational value, which subsequently transforms the conditions necessary for startup enterprises to achieve or suffer business failures. El Namaki (2023) traces this transformation at the macro level, arguing that AI reconfigures not only the tools available to entrepreneurs but the nature of the entrepreneurial task itself. Identification of unmet needs and resource assembly requirements has shifted toward product design through which users will sequentially enhance their product experience.

Giuggioli and Pellegrini (2023) conducted a comprehensive analysis of AI applications in entrepreneurship through their systematic review, which revealed that AI demonstrates capacity to support opportunity recognition and decision-making when organizations face particular unidentified conditions that lead to enhanced financial results. Wang et al. (2022) fill part of that gap with a detailed analysis of ByteDance, showing how the recommendation algorithm that powers TikTok allowed the company to scale across markets that traditional media firms had found impenetrable, a pattern that has obvious parallels in Airbnb's use of personalized search.

De Leon et al. (2023) take a broader sample approach, comparing funding trajectories and revenue growth between AI-specific startups and otherwise comparable non-AI firms. Their finding shows that AI ventures achieve financial performance beyond standard metrics which aligns with McElheran and Kroff (2023) who analyzed US business census data showing that AI adoption occurs mainly in highly innovative and resource-rich and rapidly expanding companies. The relationship between AI implementation and improved corporate performance

persists as an unresolved matter although a correlation exists. Adekunle et al. (2024) demonstrate how two AI capabilities, personalization and data analytics, function as revenue growth drivers which conventional marketing spending fails to replicate through their research on causal mechanisms.

2.2. AI, Business Model Redesign, and Organizational Change

The second group of literature examines how AI impacts company operations and business model execution instead of studying its financial impacts. The research by Weber et al. (2021) provides a useful framework which identifies four distinct types of AI startups through their main operational roles. An AI startup whose product is the algorithm is in a fundamentally different position from a platform startup that is grafting AI onto an existing matching service, which is Airbnb's situation. The Business Model Canvas serves as the analytical framework which Figura et al. (2025) used to demonstrate that established companies implement AI for better operational efficiency while startups develop their AI technology to create their business value. Airbnb operates as a hybrid business model between these two extremes. The company established its original value proposition which enables users to access authentic local accommodations before it developed its AI technologies which have progressed from back-office operations to front-end user customizations according to the research of Verganti, Vendraminelli and Iansiti from 2020. The argument made by Agrawal et al. (2023) shows that businesses need to redesign their decision-making systems because they either choose to treat AI as an additional tool or consider it as the foundation for new business processes. The research by Astawa and Arsha (2024) and Gupta (2025) demonstrate that companies which make major investments to establish AI business models achieve superior performance outcomes across multiple industries. Greco (2023) explains that AI provides significant advantages to startups because it allows them to duplicate their business model without significant costs which enables platforms like Airbnb to establish their network advantages.

2.3. AI in Tourism, Hospitality, and Platform Economies

Airbnb's financial results need evaluation yet their assessment requires knowledge about their entire business sector. Artificial intelligence was first used in the tourism and hospitality sectors because their core operational problems needed machine

learning solutions which could solve unpredictable supply and demand issues and yield control and personalized visitor experience problems. According to Ghouse and Chaudhary (2024) Indian tourism startups use AI technology through their recommendation engines and dynamic pricing systems which demonstrate that early technology adoption enabled companies to achieve lower costs while generating more revenue.

The hospitality side of the equation is equally instructive. The efficiency improvements created by AI technology operational cost reductions and guest satisfaction increases represent the outcome which hotel practitioners foresee from their AI implementation projects according to Başer (2025). Jewandah et al. (2023) conducted a bibliometric mapping of hotel AI literature which demonstrated that revenue management stands as the most valuable application. The research about Airbnb technical systems exceeds the number of studies which analyze its management practices based on all the existing studies about the case. Haldar et al. (2019) describe the deep learning architecture behind Airbnb's search ranking system in detail, noting that the shift from rule-based to model-driven ranking produced measurable improvements in booking conversion rates, which should, all else equal, show up as higher booking volumes. The research of Izquierdo et al. (2018) together with Camatti et al. (2024) shows that neural network models excel at price prediction for Airbnb listings compared to hedonic price determination, while Vezyroglou and Siokis (2025) demonstrate that AI-created image quality assessments predict rental prices in Greece with statistical significance. Morales Pérez et al. (2024) use neural network methods to analyze Airbnb's strategic adaptation in Barcelona, and Pardo-Cuesta (2019) addresses the cold-start problem in Airbnb's recommendation system—the challenge of generating useful suggestions for new users who have no booking history.

The research results include both positive and negative outcomes. The smart pricing algorithm from Airbnb creates a lasting racism problem according to Zhang et al. (2021), who found that the system decreased income disparities between hosts from different racial groups yet Black hosts received fewer advantages due to lower system use rates. Paul (2023) explains that the European Union's GDPR and the California Consumer Privacy Act have forced companies like Airbnb to limit their AI systems, which use personal information. The problems exist to show us that organizations which adopt AI technology won't experience financial benefits from their decision, because the advantages will depend on upcoming regulatory changes which will affect their business operations.

2.4. Adoption Dynamics, Implementation Challenges, and Contextual Factors

The fourth strand focuses on the analysis of factors that determine successful or unsuccessful artificial intelligence projects while assessing their financial and operational effects on organizations. Sammet et al. (2024) discovered through Q-methodology interviews with German entrepreneurs that operational efficiency is the main reason businesses adopt AI technology while companies postpone ethical discussions until they must be addressed. The initial AI investments at Airbnb started with back-end process development which later expanded into customer-facing features. The AI Startup Exposure Index developed by Fenoaltea et al. (2024) assesses the extent to which artificial intelligence technology has been integrated into a company's primary business activities and they found that companies in this field will adopt artificial intelligence technology based on their market orientation and social appeal factors together with the technical viability of their systems. Schulte-Althoff (2023) reports that AI startups allocate their resources between analytical and logistics functions while maintaining customer-facing roles as human-intensive labor which creates a division of labor. The cost structure at Airbnb shows that their most significant expenses arise from analytical and operational functions which AI would typically enhance.

Bessen et al. (2018) make a point worth emphasizing in the Airbnb context that AI startups tend to support human work through their services. The post-AI period brought about major increases in Airbnb's total staff count and operational expenses and administrative costs because AI-augmented growth still needs human capital and requires even more of it. The research by Queiroz et al. (2023) together with Saputro and Asbara (2024) shows that organizational readiness specifically through change management and employee upskilling and leadership commitment functions as an equal determinant of AI investment success when compared to technical implementation quality.

Shen et al. (2025) widen the lens further, showing in a cross-national panel that the determinants of AI startup formation differ between developed and developing economies in ways that matter for policy. Alsheibani et al. (2020) use the Technology-Organisation-Environment (TOE) framework to organize their analysis of AI adoption by detailing the organizational factors which control implementation and the technological elements which affect operational success and the environmental components which determine adoption patterns. The research by Aymane and Leila (2025) which focuses on SMEs and young entrepreneurs in

developing economies reveals that AI adoption gaps between North and South exceed common estimates while impacting startup competitiveness between nations. Chinnaraju (2025) discusses that startups need to adopt autonomous agents and real-time optimization as their upcoming AI technologies after currently using batch-processing and recommendation systems which characterized the first deployment phase.

3. Research Methodology

The following subsections include the case company, the research design, the rationale for the time window selected, and the statistical procedures applied.

3.1. The Case: Airbnb

The year 2007 marked the establishment of Airbnb in San Francisco when Brian Chesky and Joe Gebbia used their apartment to host three air mattresses for conference guests who required accommodation after all hotels reached full capacity. The platform became active under its present name in March 2009 after Nathan Blecharczyk joined the company as technical co-founder following a brief period as AirBed & Breakfast. The informal housing solution that started as a temporary fix for a housing shortage developed into one of the major platform businesses that characterized the 21st century after Airbnb completed its first public stock offering in December 2020 (Airbnb Newsroom, n.d.). The study reached its critical turning point when it entered the year 2017. The technology strategy document published by Airbnb in that year showed that A/B testing and machine learning systems had become the primary decision-making tools for all product development activities which resulted in 2500 experiments being conducted across their platform during that year (Airbnb Technology Team, 2018). The system changed its approach to search ranking by switching from basic signal usage to deep learning models which had been trained on actual booking results. The smart pricing system became an optional function which used ongoing supply and demand data to make pricing decisions. Trust and fraud detection systems transitioned from base filter systems that used rules to advanced neural network systems which can identify delicate changes in behavior patterns. The organization underwent a complete transformation because these changes represented more than just incremental progress, which established the foundation for the natural experiment used in this research paper.

3.2. Research Design and Data

We use a comparative analytical design to examine two different technological periods which occurred at the same time during Airbnb's development. The design works well because researchers can establish the date of AI adoption which serves as the treatment date while two separate outcome measurement points exist for comparison. Both conditions hold here.

Backlinko served as the data source which has maintained ongoing monitoring of Airbnb's disclosed performance metrics since the company first started its growth phase. Backlinko serves as the sole source for all pre-IPO data which researchers need to study the variables that Airbnb discloses because the company only began publishing its audited financial documents in its 2020 IPO prospectus. All values are reported in US dollars; booking-volume figures are expressed in millions; financial figures are expressed in millions or billions as appropriate for comparability.

3.3. Study Period

The study window runs from 2015 through 2018. The researchers made this selection because they needed to resolve multiple practical and methodological limitations. The period before 2015 contains insufficient data which prevents any reliable conclusions from being drawn. The time frame from 2015 to 2016 shows how Airbnb operated during its growth phase before the company started using AI according to its own official statements. The time frame from 2017 to 2018 marks the initial complete operational period of AI technology after its introduction as the post-adoption evaluation period.

The two phases need to maintain their symmetry because statistical analysis requires this condition to exist. The study needed to end in 2018 because extended research would create unmanageable confounding variables. The COVID-19 pandemic which started to disrupt international travel in early 2020 created an unprecedented decline in Airbnb's business; including that period would make it impossible to distinguish AI effects from pandemic effects. The company's reporting methods and governance changes after Airbnb's IPO in late 2020 created challenges for comparing current operations with the company's previous pre-IPO practices. The 2015–2018 period establishes a timeframe which avoids both problems while capturing genuine and documented technology transition.

3.4. Statistical Procedures

The analysis process consisted of two separate phases. The first stage involved calculating descriptive statistics which included mean values and percentage changes for each indicator across the two time periods. The testing stage determines the amount of change which testing procedures will show through testing methods that will follow. The second stage used the Paired-Samples T-Test method to analyze each indicator separately. The yearly periods create pairing links which connect each pre-AI value to its matching post-AI value through the yearly period connections between 2015 and 2017 and between 2016 and 2018. The test is appropriate here because we are comparing the same variable which was measured in two different conditions for the same company and because the small sample size of four annual observations which produced two pairs per indicator made non-parametric alternatives unreliable. The decision threshold at $\alpha = 0.05$ establishes p-values that fall below this value as grounds to reject null hypothesis. All computations were performed using SPSS.

4. Results and Discussion

4.1. Descriptive Overview

Table 1 presents the raw annual values for all seven indicators across the four study years. The pattern across the table is remarkably consistent: growth accelerated in every category after 2016.

Table 1. Airbnb Performance Indicators, 2015–2018

Period	Year	Nights & Exp. Booked (million)	Total Booking Value (bn \$)	Revenue (bn \$)	Operations & Support Exp. (mn \$)	Product Dev. Exp. (mn \$)	Sales & Mktg Exp. (bn \$)	G&A Exp. (mn \$)
Before AI	2015	72.4	8.06	0.914	181.28	99.68	0.397	138.13
	2016	125.7	13.92	1.65	270.29	228.06	0.663	214.41
After AI	2017	185.8	20.97	2.56	395.74	400.75	0.871	327.16
	2018	250.3	29.44	3.65	609.2	579.19	1.1	479.49

Source: Prepared by the researchers based on Backlinko Team (2025)

The platform saw its demand increase throughout the entire time period which resulted in its exceptional growth achievement during specific periods. The total number of booked nights and experiences increased by approximately 53 million from 2015 to 2016. The period between 2016 and 2017 saw 60 million people while the time between 2017 and 2018 saw 64 million additional people. The yearly growth rate has decreased because the base number continues to increase which creates a contradiction with the AI impact story. The total number of cases has increased when you compare the pre-AI base with current numbers. The total number of cases increased from 72.4 million in 2015 to 250.3 million in 2018 which represents a 246% growth during that four-year period. The two financial metrics of Total Booking Value and Revenue both follow similar patterns of reduced growth rates. The company generated USD 2.56 billion in revenue during 2017 which exceeded its total revenue for both of the years before implementing AI systems. The total revenue for 2018 reached USD 3.65 billion which represented more than double the revenue from 2016. The company achieved rapid growth after it started using AI systems across its entire business operation. The expenditure columns provide a different educational value to readers. The budget line which connects most directly to AI engineering investment shows that Product Development Expenses experienced the fastest growth across all performance indicators. The item started at USD 99.68 million in 2015 but it reached USD 579.19 million in 2018 which represents a nearly sixfold increase. The period saw Operations and Support Expenses which finance both human and automated systems for handling booking disputes customer service and fraud detection approximate three times their former value. The General and Administrative Expenses together with Sales and Marketing Expenses both experienced approximately double their original values. The research by Agrawal et al. (2022) demonstrates that companies must provide parallel infrastructure and talent and organizational redesign investments for their AI expenditures to deliver value. The table 2 document presents these findings through period mean comparisons and percentage change computations.

Table 2. Comparison of Period Means and Percentage Changes

	Nights & Exp. Booked (mn)	Total Booking Value (bn \$)	Revenue (bn \$)	Ops & Support Exp. (mn \$)	Product Dev. Exp. (mn \$)	Sales & Mktg Exp. (bn \$)	G&A Exp. (mn \$)
Mean – Pre-AI	99.05	10.99	1.28	225.79	163.87	0.53	176.27

Mean – Post-AI	218.05	25.21	3.11	502.47	489.97	0.985	403.33
% Change	+120%	+129%	+143%	+122%	+199%	+86%	+129%

Source: Prepared by the researchers based on Table 1 data

The post-AI period showed a mean booking volume of 218.05 million which exceeded the pre-AI period volume of 99.05 million by 120 percent. Revenue increased by 143% while Total Booking Value increased by 129% according to the average revenue figures. Product Development costs experienced the highest proportional growth at 199% while General and Administrative Expenses experienced a 129% increase and Operations and Support costs grew by 122% and Sales and Marketing expenses rose by 86%. The Sales and Marketing expenses showed a small growth because AI technology enabled better customer acquisition which decreased the cost per booking even though the total budget increased.

4.2. Hypothesis Testing Results

Table 3 reports the Paired-Samples T-Test results for all seven hypotheses. Indicators where the null hypothesis is rejected at $\alpha = 0.05$ are marked with an asterisk.

Table 3. Paired-Samples T-Test Results

Paired Comparison	Mean Difference	t-value	df	Sig. (2-tailed)
Nights & Experiences Booked	-119,000	-21.250	1	0.030 *
Total Booking Value	-14,215	-10.893	1	0.058
Revenue	-1,823	-10.299	1	0.062
Operations & Support Expenses	-276,685	-4.447	1	0.141
Product Development Expenses	-326,100	-13.028	1	0.049 *
Sales & Marketing Expenses	-0.455	-24.622	1	0.026 *
General & Administrative Expenses	-227,055	-5.971	1	0.106

* $p < 0.05$

Source: Prepared by the researchers based on SPSS outputs

The revenue-side indicators began with the t-value of -21.250 which resulted from counting the nights and experiences that people booked at a significance level of 0.030. The adoption of AI led to increased platform demand according to H1 which received statistical support. The two measurement outcomes for Total Booking

Value and Revenue produced substantial t-values which showed opposite results because their p-values exceeded the 0.05 threshold. H2 and H3 show no support. The study method shows an important research detail which creates no actual research surprise because two observation pairs make it impossible to identify large effect sizes in research. The booking volume reached statistical significance but value and revenue measurements failed to show actual strength differences between AI effects according to their different measurement precision levels.

The cost-side indicators show Product Development Expenses ($t = -13.028$, $p = 0.049$) and Sales and Marketing Expenses ($t = -24.622$, $p = 0.026$) which both reach significance to support H5 and H6. The two expense types Operations and Support Expenses ($t = -4.447$, $p = 0.141$) and General and Administrative Expenses ($t = -5.971$, $p = 0.106$) failed to reach significance for H4 and H7. The pattern reveals important information. The two cost categories which function as the primary expense channels for AI capability development show the strongest statistical evidence of operational changes. The categories that support general scaling operations showed substantial growth in absolute measurement, but their variance patterns stopped researchers from proving the null hypothesis.

The current research results establish important connections which lead to broader connections with existing literature. Haldar et al. (2019) showed that Airbnb had a deep learning search model which boosted booking conversion rates that resulted in increased booking rates. Lee et al. (2022) and Chinnaraju (2025) both document the investment intensity of AI adoption – the significant growth in Product Development expenditure is what that investment looks like in a company's accounts. German startups choose to use AI technology first in operational processes according to Sammet et al. (2024) while their research shows how Operations and Support Expenses have increased through AI-enabled service system development.

One part of the inferential analysis has one major limitation which needs direct acknowledgment. The indicator measurement process requires two pairs of each indicator to create one degree of freedom for the Paired-Samples T-Test. The study design generated this outcome as a study component, but the result created low analysis power which made the analysis favor the null hypothesis. The indicators for Total Booking Value, Revenue, Operations and Support, and General and Administrative Expenses demonstrate high t-values which indicate that additional AI data from pre- and post-periods would likely make these indicators statistically

significant. The descriptive evidence presents a clear message, while the inferential evidence has been limited by the existing data collection restrictions.

5. Conclusion

The study examined whether Airbnb experienced changes in its performance metrics after implementing artificial intelligence as a fundamental business operation method. The data shows that the company experienced operational changes which resulted in overall performance improvements and certain aspects of its performance remained unchanged. The descriptive record is unambiguous. Every indicator we examined grew substantially faster in the two years following Airbnb's AI transition than in the two years preceding it. The company more than doubled its booking volume and more than doubled its revenue while total transaction value increased by 130 percent. The company underwent major organizational changes which produced results that progressed beyond simple improvements. The organization encountered widespread cost increases which became particularly damaging in Product Development expenses. The organization increased its engineering budget to almost six times its previous amount over four years to build machine learning capabilities through complete technical infrastructure modernization. The cost neutrality expectation of AI by entrepreneurs and investors requires them to study these numbers in detail.

The inferential outcomes provide additional details about the situation. Three indicators produced statistically significant differences that affected booking volume and product development expenditure and sales and marketing expenditure. The three main indicators measure core demand through primary demand measurement and main investment measurement and the customer acquisition measurement which detects algorithmic enhancements. The four indicators that did not reach significance, Total Booking Value, Revenue, Operations and Support, and General and Administrative Expenses, all showed large positive differences in the descriptive analysis; the test simply lacked the power to confirm them formally given the two-pair sample structure.

The findings have two major consequences. The study shows that businesses which adopt AI technology create financial indicators which appear in their corporate financial records and these indicators extend beyond revenue borders to encompass operational expenses. The AI-and-startup research field mainly investigates results

while placing cost factors in a secondary role. The complete financial impact of AI adoption for a startup requires evaluation of all financial aspects which appear on its income statement.

Organizations should understand that expanding AI implementation requires multiple years of capital funding whereas AI systems function as a complete technology which organizations can switch between operational states. The Airbnb case shows demand and cost growing together in the post-AI period, not sequentially. Managers who plan for AI on the assumption that costs will plateau before revenues accelerate will face disappointment. The data points towards a different model which shows that AI develops capabilities together with increased market demand while the investment returns develop through time.

The study's limitations are principally scope and sample depth. The effects of AI adoption across all startups cannot be determined from data which comes from one organization during a four-year period. Future research should use comparative design for studies which span multiple platform companies that have documented their AI transitions while using quarterly data to boost statistical power and financial data should be combined with operational metrics which include customer satisfaction scores and host retention rates and fraud incidence to explain the performance changes which we observe.

References

- Adekunle, O. K., Ologbon, E. G., & Abiodun, S. J. (2024). Artificial intelligence (AI) adoption and startup success rates. *International Journal of Research and Innovation in Social Science*, 8(11).
- Agrawal, A., Gans, J. S., & Goldfarb, A. (2023). Artificial intelligence adoption and system-wide change. *Journal of Economics and Management Strategy*.
- Airbnb Newsroom. (n.d.). *About us*. <https://news.airbnb.com/about-us/>
- Airbnb Technology Team. (2018). *Sharing more about the technology that powers Airbnb*. Airbnb Engineering & Data Science. <https://news.airbnb.com/sharing-more-about-the-technology-that-powers-airbnb/>
- Alsheibani, S. A., Messom, C., & Cheung, Y. (2020). Re-thinking the competitive landscape of artificial intelligence. *Proceedings of the 53rd Hawaii International Conference on System Sciences*.
- Astawa, I. P. P., & Arsha, I. M. R. M. (2024). Artificial intelligence and business models from the perspective of innovation and operational efficiency: Systematic literature review. *International Journal of Research and Innovation in Social Science*, 8(11).

Aymane, Z., & Leila, Z. (2025). L'entrepreneuriat à l'ère de l'IA: opportunités et défis—obstacles à l'adoption de l'IA par les PME et les jeunes entrepreneurs [Entrepreneurship in the age of AI: opportunities and challenges—obstacles to AI adoption by SMEs and young entrepreneurs]. *International Journal for Multidisciplinary Research*, 7(5).

Backlinko Team. (2026). *Airbnb statistics*. <https://backlinko.com/airbnb-stats>

Başer, G. (2025). An overlook to the use of artificial intelligence in hospitality and tourism industry. *Journal of Tourism and Gastronomy Studies*.

Bessen, J., Impink, S. M., & Seamans, R. (2018). *The business of AI startups*. Boston University School of Law, Law and Economics Research Paper No. 18-28.

Camatti, N., di Tollo, G., & Filograsso, G. (2024). Predicting Airbnb pricing: A comparative analysis of artificial intelligence and traditional approaches. *Computational Management Science*, 21(30).

Chinnaraju, A. (2025). AI-driven strategic decision-making on innovation. *World Journal of Advanced Research and Reviews*.

De Leon, J. A., Dinulescu, C. C., & Martinson, B. C. (2023). The impact of artificial intelligence on entrepreneurial firms. *Proceedings of the Academy of Management*.

El Namaki, M. S. S. (2023). *The propensity to enterprise*. Springer.

Fenoaltea, E. M., Mazzilli, D., & Patelli, A. (2024). *Follow the money: A startup-based measure of AI exposure across occupations, industries and regions*. arXiv.

Figura, M., Juračka, D., & Impola, J. (2025). From idea to impact: The role of artificial intelligence in the transformation of business models. *Management Dynamics in the Knowledge Economy Journal*.

Filieri, R., D'Amico, E., & Destefanis, A. (2021). Artificial intelligence (AI) for tourism: A European-based study on successful AI tourism start-ups. *International Journal of Contemporary Hospitality Management*.

Ghouse, S. M., & Chaudhary, M. (2024). Artificial intelligence (AI) for tourism start-ups. In *Advances in Hospitality, Tourism and the Services Industry*. IGI Global.

Giuggioli, G., & Pellegrini, M. M. (2023). Artificial intelligence as an enabler for entrepreneurs: A systematic literature review. *International Journal of Entrepreneurial Behaviour & Research*, 29(4), 816–837.

Greco, F. (2023). Access to new technologies as a lever for start-up scalability. In *Studies on Entrepreneurship, Structural Change and Industrial Dynamics*. Springer.

Gupta, S. (2025). The effects of AI on companies. *International Journal for Multidisciplinary Research*.

Haldar, M., Abdool, M., & Ramanathan, P. (2019). Applying deep learning to Airbnb search. *Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*.

Izquierdo, L. M., Egorova, G., & Peretó Rovira, A. (2018). *Explorando el uso de la inteligencia artificial en la maximización de precios para el sector turístico: Airbnb en la Comunidad Valenciana*

[Exploring the use of artificial intelligence in price maximization for the tourism sector: Airbnb in the Valencian Community]. *Investigaciones Regionales*, Fundación Dialnet. <https://dialnet.unirioja.es/servlet/articulo?codigo=6920650>

Jewandah, S., Bhushan, P., & Özen, E. (2024). From tradition to innovation. In *Advances in Finance, Accounting, and Economics*. IGI Global.

Joska Junior, J., Bertoldi, W. J., & dos Santos, R. C. (2023). Aplicação da inteligência artificial numa empresa startup de tecnologia [Application of artificial intelligence in a technology startup company]. *Revista de Inteligência Artificial na Educação*.

Kumar, P., & Chauhan, A. (2024a). The role of AI in start-up innovation: Driving efficiency and competitive edge. *International Journal for Science Technology and Engineering*.

Kumar, P., & Chauhan, A. (2024b). Harnessing artificial intelligence for start-up growth. *International Journal for Science Technology and Engineering*.

Lee, B., Kim, B., & Vaquero Ivan, U. (2023). Enhancing the competitiveness of AI technology-based startups in the digital era. *Administrative Sciences*.

Lee, Y. S., Kim, T., Choi, S., & Kim, W. (2022). When does AI pay off? AI-adoption intensity, complementary investments, and R&D strategy. *Proceedings of the Academy of Management*.

McElheran, K., & Kroff, Z. (2023). *AI adoption in America: Who, what, and where*. NBER Working Paper.

Morales Pérez, S., Meseguer-Artola, A., & Garay, L. (2024). Inside Airbnb's performance and adaptive strategies in Barcelona using artificial neural networks. *Journal of Hospitality and Tourism Management*.

Pardo-Cuesta, R. (2019). *Sistema de recomendación para nuevos usuarios de Airbnb* [Recommendation system for new Airbnb users]. Unpublished dissertation. Universidad Internacional de La Rioja on The Conversation. UNIR. <https://reunir.unir.net/bitstream/handle/123456789/9772/Pardo%20Cuesta,%20Raquel.pdf?sequence=1&isAllowed=y>

Paul, R. K. (2023). *AI integration in e-commerce business models: Case studies on Amazon FBA, Airbnb, and Turo operations*.

Queiroz, F. W. B., Martins, M. T. G., & Milan, G. S. (2023). Productização da inteligência artificial [Productization of artificial intelligence]. *Revista Inovação, Projetos e Tecnologias*.

Rajendran, V., Tiwari, A., & Tripathi, V. (2024). Application of AI in determining the strategies for the startups. *Proceedings of the HiSET Conference*.

Rathi, A., & Bhati, M. (2025). Artificial intelligence for startups: A dual perspective on opportunities and challenges. *International Journal of Global Research Innovations & Technology*.

Saini, K., & Renu. (n.d.). *The AI revolution is reshaping the hospitality industry*. IGI Global.

- Sammet, F., Gillig, H., & Foo, M. D. (2024). How do startups use AI? A Q-methodology approach to understanding adoption patterns. *Proceedings of the European Conference on Innovation and Entrepreneurship*.
- Saputro, R. B., & Asbara, I. W. (2024). *The Impact of AI on strategic decision making in startup companies*. Islamic Studies and Community Empowerment by Education.
- Sarumi, O. O. (2024). *AI: Driving entrepreneurship, nurturing innovation, and fueling startup growth*. ijaem.
- Schulte-Althoff, M. (2023). What's to automate? A task analysis of AI-enabled start-ups. *Proceedings of the 56th Hawaii International Conference on System Sciences*. Researchgate.
- Sharma, D. (2025). The perspective of entrepreneurs. In *Advances in Environmental Engineering and Green Technologies*. IGI Global.
- Sharma, R., Kumar, A., & Chuah, C. (2021). Turning the blackbox into a glassbox: An explainable machine learning approach for understanding hospitality customer behaviour. *International Journal of Information Management Data Insights*, 1(2).
- Shen, Y.-C., Wang, C.-H., & Chu, Y.-Y. (2025). Determinants of artificial intelligence startups: Evidence from 150 countries. *Chinese Management Studies*.
- Sreenivasan, A., & Suresh, M. (2022). Adoption of artificial intelligence (AI) in start-ups. *Proceedings of the International Conference on Industrial Engineering and Operations Management*.
- Sudaryono, S., Yusuf, I. I. D., & Maulana, S. (2024). Leveraging artificial intelligence for innovative technopreneurial business models. *Proceedings of the 2024 International Conference on Computer and Information Technology*.
- Talebi, K. H. S., Ghasemi, Z., & Nobari, N. (2025). *Artificial intelligence adoption by digital startups in decision-making within uncertain business environments*.
- Tong, L. (2025). The role of artificial intelligence in startup innovation. *Advances in Economics, Management and Political Sciences*. Researchgate.
- Verganti, R., Vendraminelli, L., & Iansiti, M. (2020). *Design in the age of artificial intelligence*. Harvard Business School Working Paper. <https://www.hbs.edu/faculty/Pages/item.aspx?num=57691>
- Vezyroglou, K., & Siokis, F. (2025). *Pricing in the sharing economy—A hybrid approach leveraging econometrics, machine learning, and artificial intelligence*. Information.
- Wang, X., Yang, H., Han, H., Huang, Y., & Wu, X. (2022). Explore the entrepreneurial process of AI start-ups from the perspective of opportunity. *Systems Research and Behavioral Science*, 39(3).
- Weber, M., Beutter, M., Weking, J., Böhm, M., & Krcmar, H. (2021). AI startup business models. *Business & Information Systems Engineering*.
- Zhang, S., Mehta, N., & Singh, P. V. (2021). *Can an AI algorithm mitigate racial economic inequality? An analysis in the context of Airbnb*. Social Science Research Network.