EMERGING TECH RESEARCH

2025 Consumer Technology Outlook

Our analysts' outlook on consumer technology in 2025

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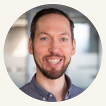

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2025 outlooks

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E-COMMERCE: MARKET ENABLEMENT

Outlook: A VC-backed B2C brand, likely in clothing or apparel, will reach a nine-figure valuation by leveraging a user-generated-content ecosystem like Roblox as a novel distribution channel.

Rationale

Gaming's relevance within the social zeitgeist has meaningfully expanded throughout the preceding decade. Esports now have a credible path to a debut at the Olympics, and gaming competition trophies are now handmade by luxury jewelers.[1] Brand-name musicians, like Travis Scott and Ariana Grande, perform concerts in video game arenas, attracting millions of concurrent viewers. And more hours are now spent watching others play video games than are spent watching Netflix, Hulu, and HBO combined.[2] Within the past year, "The Super Mario Bros. Movie" generated $1.4 billion in box-office sales while the TV adaptations of Fallout and The Last of Us earned Emmy nods.[3, 4] Nontraditional gaming applications, including LinkedIn, The New York Times, and Netflix, are also using games as highly visible retention strategies.

As a result, gaming platforms are increasingly perceived as digital "third places," meaning neutral grounds where people can gather and interact, drawing in tens of millions of users simultaneously.[5] Roblox passed the threshold of 80 million daily active users in 2024 with revenue guidance in excess of $3.5 billion for 2024 and over $900 million in revenue quarterly—figures that account for over two hours of playtime per day from a user base predominately made of children.[6] Epic Games' Unreal Editor for Fortnite (UEFN) added over 80,000 UEFN islands for $320 million in creator payouts since launching at the 2023 Game Developers Conference.[7] In time, this critical mass of consumers will drive a profound shift in how people shop and discover products.

The convergence of commerce and digital entertainment is already well underway, accelerating over the past 12 months. In Q3 2024, Shopify announced a Roblox integration for 2025 that will enable Roblox users to buy physical goods without leaving the Roblox platform. Also in Q3 2024, Hasbro, the owner of "traditional" toy brands like Monopoly, Transformers, and Power Rangers, among many others, earmarked $125 million annually to invest in video game development,[8] and social golfing company Topgolf announced an experience within Epic Games' UEFN. In Q4 2023, Walmart released "Add to Heart," a shoppable television series, and Walmart Discovered, a bespoke Roblox integration supporting the purchase of physical goods within the Roblox platform.

1: "Esports Trophies Designed by Tiffany," Tiffany & Co., n.d., accessed December 5, 2024.
2: "Game Changer: Accelerating the Media Industry's Most Dynamic Sector," BCG, Dr. Alexander Schudey, et al., June 9, 2023.
3: "'The Super Mario Bros. Movie' Hits $1.3 Billion Globally, Surpassing 'Frozen' as Second-Biggest Animated Film of All Time," Variety, Rebecca Rubin, June 4, 2023.
4: "The Last of Us Hits a Major Emmy Milestone for Video Game Adaptations," Entertainment Weekly, Dustin Nelson, July 12, 2023.
5: "Roy Oldenburg," Project for Public Spaces, December 31, 2008.
6: "Roblox Reports Third Quarter 2024 Financial Results," Roblox, October 31, 2024.
7: "State of Unreal Roundup: Unreal Engine 5.4, MetaHumans in UEFN, and LEGO® Elements for Fortnite Creators," Epic Games, March 20, 2024.
8: "Hasbro CEO: 'We're Going All In on Becoming a Digital Play Company,'" GamesIndustry.biz, Marie Dealessandri, July 26, 2024.

To date, gaming-commerce collaborations have been at the behest of established brands with the goal of building awareness with younger consumers and the technical talent to allocate to experimental projects. But technological barriers to entry have been meaningfully lowered as platform integrations like Shopify's are built and forward-thinking brands embrace gaming environments with greater agility.

Within e-commerce, online shopping's share of retail transactions continues to grow year over year, but investor sentiment has materially shifted since the 2010s. The mobile adoption S curve has flattened, customer acquisition costs are elevated following Apple's deprecation of its device identifier for advertisers (IDFA), and the unit economics of breakout direct-to-consumer (DTC) brands are no longer viable. Negative margin profiles and growth-at-all-costs strategies have given way to unflinching expectations for profitable growth and nuanced channel strategies. Consequently, leading investors across asset classes, from Andreessen Horowitz to L Catterton, have begun rotating away from the sector, as covered in our Consumer Retail & Services Launch Report. B2C brands can still secure capital, but the bar is higher and investors are looking for truly differentiated products or distribution advantages. An early-mover edge in user-generated content (UGC) could be one such differentiator.

The "omnimodal" decade will blend physical and digital shopping touchpoints with online entertainment as brands seek to leverage Generation Alpha's perpetually connected state.[9] In this wake, game platforms will emerge as another channel to optimize. While "blended" commerce experiences remain somewhat crude at present, our outlook is rooted in an expectation that forward-looking brands that crack discoverability and organic experiences will attract scores of high-propensity spenders.

Risks

Building sustainable brands includes multichannel complexity, content moderation challenges, unfavorable platform economics, and audience risk. As the DTC wave demonstrated, brands must utilize several channels to build sustainable businesses. Leveraging digital ecosystems will be insufficient as a standalone channel and must fit alongside a broader strategy. Community and brand safety is also elusive. Roblox is battling reports of child exploitation, a key criticism in a recent Hindenburg report,[10] and the platform currently spends approximately 28% of revenue on infrastructure as well as trust and safety.[11] Epic Games announced expanded parental controls for Fortnite and UEFN at the start of Q4. Content moderation is a long-standing challenge in gaming.

The unit economics will also be tricky. Previous commercial integrations with Roblox alluded to fiat currency transactions, but platform transactions generally use "Robux," an in-game currency from which Roblox takes a 30% cut. Epic's Fortnite does not offer the same level of commercial integration, but does offer a more favorable creator payout: 40% of revenue is shared with creators as opposed to

9: "Guide: OMNIMODAL: The New Frontier of Consumer Behavior," Future Commerce, October 21, 2024.
10: "Roblox: Inflated Key Metrics for Wall Street and a Pedophile Hellscape for Kids," Hindenburg Research, October 8, 2024.
11: "Roblox Reports Third Quarter 2024 Financial Results," Roblox, October 31, 2024.

Roblox's mid-20% share.[12] Additionally, digital product strategies will be entirely new muscles for retailers, far removed from traditional product-mix and dollar-per-square-foot retail expertise. Lastly, because these user groups skew toward children, the end user is also rarely in control of their own disposable income.

2024 outlook

AI-powered personal agents will generate record funding to support digital commerce.

Outcome

Vertical applications posted strong fundraising activity in 2024, but foundation model developers led the category by a wide margin. The rapid advancement of agentic use cases was directionally correct but remains some time away (by thousands of days, according to Sam Altman).[13] Several events in 2024 underscored this outlook. Sierra, an AI platform led by Bret Taylor and Clay Bavor, raised $260 million across two rounds in 2024 to bring AI agents and conversational intelligence to enterprises. Anthropic's recent model, Claude 3.5 Sonnet, demonstrated the ability to control computer applications autonomously. Marc Benioff prophesized that Salesforce would deploy 1 billion agents by the end of 2024. Perplexity's "Shop Like a Pro" product pushes further into AI-native product discovery. Commerce applications, like Remark's expert-supported shopping assistant or Klarna's "smart wallet," also debuted. We expect these developments to continue in 2025.

12: "Engagement Payout," Epic Games, n.d., accessed December 5, 2024.
13: "The Intelligence Age," Posthaven, Sam Altman, September 23, 2024.

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GAMING

Outlook: The number of investors active in gaming will fall further as the sector remains underinvested relative to public market capitalization. VC-backed content developers will struggle to siphon market share from incumbents.

Rationale

The number of active investors in game developers has fallen precipitously YoY since the onset of the COVID-19 pandemic. In 2021, 2,359 venture investors wrote checks backing publishers, developers & studios (up from 734 in 2020). By 2023, the number was halved to 1,142 investors, with 2024 pacing lower yet. We expect more of the same in 2025, with a further pullback in the number of investors backing content developers, but the industry's long-term trajectory means the sector is underinvested relative to the $187.7 billion spent on games annually.[14]

The reasons for the abrupt capital inflow and outflow are numerous. During the frenzy of the zero-interest-rate environment, record numbers of VC funds were initiated and record amounts of capital were raised across the venture ecosystem. Gaming itself sat at the intersection of several emergent trends, which drew unprecedented amounts of capital into the industry. Facebook had pivoted to the Metaverse, cryptocurrencies and blockchain-based games exploded in the zeitgeist, and awareness of gaming increased as stay-at-home orders were issued, leaving consumers with few other entertainment choices.

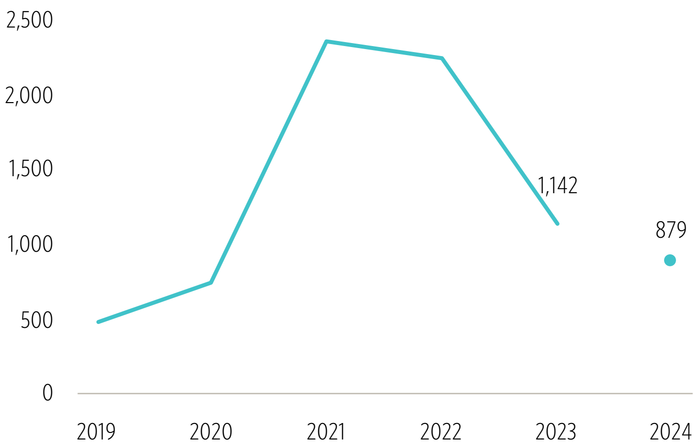
Alas, easy come, easy go. By the end of 2023, the sector proved overinvested. A glut of previously delayed releases were in the hands of the public with a much weaker release slate scheduled for 2024. Interest rates spiked, forcing investors to scrutinize potential deals more closely. Game development cycles, perpetually time-consuming and expensive, are unrecognizable relative to traditional software-as-a-service business models and soon became unpalatable. Apple's IDFA deprecation raised customer acquisition costs, further pressuring margins. Exit pathways became difficult to see as M&A dried up, the IPO window shuttered, and regulatory intervention into deals initiated by Meta (formerly Facebook) and Microsoft discouraged other acquirers. In the face of abundant content, consumers increasingly chose to play established "forever titles," leaving a shrinking pool of time for net-new releases.[15] Lastly, explosive interest in AI & machine learning has siphoned dollars from previously trendy categories.

Nevertheless, we maintain the sector is underinvested. The gaming industry's market cap exceeds $1 trillion globally (excluding Microsoft, but including Tencent),[16, 17] with only $1.5 billion to $4 billion invested annually (excluding outlier COVID-19 years), according to our Q3 2024 Gaming Report. This marks an

14: "The Global Games Market Will Generate $187.7 Billion in 2024," Newzoo, Michiel Buijsman, August 13, 2024.
15: "The PC & Console Gaming Report 2024," Newzoo, April 2, 2024.
16: "Largest Video Game Companies by Market Cap," CompaniesMarketCap, n.d., accessed December 5, 2024.
17: "Game Industry Valuation," Games Ône, Evan Van Zelfden, 2021.

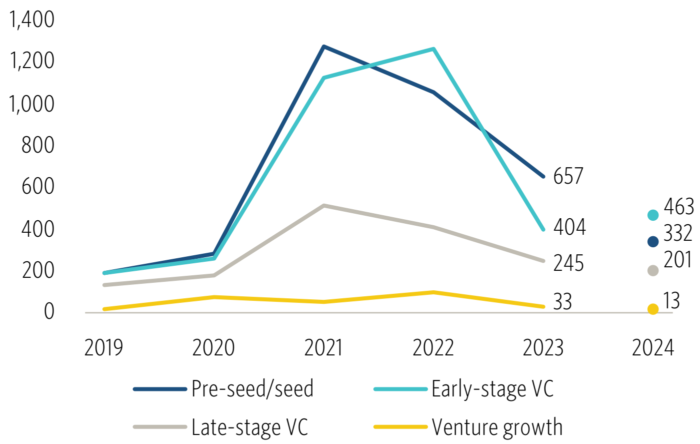
infinitesimally small portion of the industry's market cap being reinvested into high-risk ventures. By comparison, public fintech companies have a market cap of over $1 trillion,[18] and $10 billion to $17 billion is invested into the industry per year, according to our Q2 2024 Retail Fintech Report.[19] Similarly, the combined healthcare IT public market cap exceeds $100 billion with approximately $5 billion invested per year, according to our Q2 2024 Healthcare IT VC Update.[20] As such, new funds and vintages have indeed cropped up since early movers like London Venture Partners started targeting the ecosystem. Andreessen Horowitz earmarked $600 million for gaming as part of a broader $7.2 billion fundraise in April, BITKRAFT announced a $275 million round for its third fund, and Griffin Gaming Partners announced its third flagship fund. Another batch of specialist investors have also come online over the past four to six years to support the sector, including Makers Fund, Konvoy Ventures, 1Up Ventures, F4 Fund, Play Ventures, and many others.

Unique gaming VC investor count



Source: PitchBook • Geography: Global • As of November 18, 2024

Unique gaming VC investor count by stage



Source: PitchBook • Geography: Global • As of November 18, 2024

Risks

Despite depressed quarterly investment figures, several key tailwinds exist. The next generation of consumers spends vast amounts of time in game environments. Over 90% of consumers between 13 and 17 years old play games every week, averaging seven hours of playtime weekly. The value of gaming has been established across technology companies (NVIDIA), movies ("The Super Mario Bros. Movie" and "Detective Pikachu"), television ("The Last of Us"), and more. Across sectors, from e-commerce (Temu and SHEIN), to education tech (Duolingo), to media (The New York times and Netflix), and social networks (Twitch, LinkedIn), games and gamification models have integrated prominently into company's retention strategies. Emerging markets in Latin America, India, and pockets of Africa are also capable of bringing another billion consumers into the category within the decade.

18: "The 2024 State of Fintech Report," F-Prime, David Jegen, et al., 2024.
19: "Fintechs: A New Paradigm of Growth," McKinsey & Company, Lindsay Anan, et al., October 24, 2023.
20: "State of Health Tech 2024," Bessemer Venture Partners, Sofia Guerra and Steve Kraus, October 21, 2024.

These fundamentals will only continue to draw more investors into the segment with additional tailwinds expected from the release of Grand Theft Auto VI and new console generations from Sony and Nintendo.

2024 outlook

VC penetration into emerging markets will progress as the industry looks to onboard the next 1 billion consumers into the gaming ecosystem.

Outcome

Venture investments into emerging markets were flat YoY amid a challenging 2024 for the sector writ large. Several companies did raise notable rounds, including India-based Loco's $65 million late-stage VC raise in Q3, Turkey-based Spyke Games' $50 million Series B in April, and Singapore-based k-ID's $45 million Series A in June. As noted above, the number of active investors in gaming has decelerated precipitously, which is certain to drag down regions with a less-established base of investors. The fundamentals of these emerging market opportunities remain fully intact. Across Latin America, India, the Middle East, North Africa, and other pockets of Africa, hundreds of millions of young, rapidly digitizing consumers and economies are turning to games for entertainment daily. Companies nearly ready to exit via IPO, such as Dream Sports and Mobile Premier League, both based in India, could seed the next generation of entrepreneurs. Meanwhile, startups like Wildlife Studios in Brazil, Fenix Games in the United Arab Emirates, and others could await fundraises in the coming year. Looking ahead, startups in these regions will face enhanced exposure in the event of further slowdowns in the industry overall. Specifically, if 2025 brings more layoffs, closures, and delays for the industry's largest players, then emerging startups will also face fundraising headwinds.

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RETAIL FINTECH

Outlook: Fintech investments will increase in the Asia-Pacific region, Latin America, the Middle East, and North Africa, aided by growing efforts from consumer fintech companies to grow their market share in emerging economies.

Rationale

In recent years, consumer fintech startups have captured a smaller share of fintech venture capital, comprising 41.6% of VC deal activity in the first three quarters of 2024, down from 57.4% in 2019. This decline reflects many things, including investors' preference for cash-flow-positive companies amid a constrained-capital environment. In response, many consumer fintech companies, especially neobanks, shifted from "blitzscaling" to prioritizing profitability. Now, with many companies achieving tighter operating models and positive bottom lines, some are pivoting back to growth, turning to emerging markets as key opportunities for expansion given the saturation in US and European markets. In our view, this may benefit fintech startups in emerging regions, as they are likely to see more partnerships with larger fintech companies expanding into their local markets. Startups in these regions may also see more exit opportunities through acquisitions, bringing greater attention from investors.

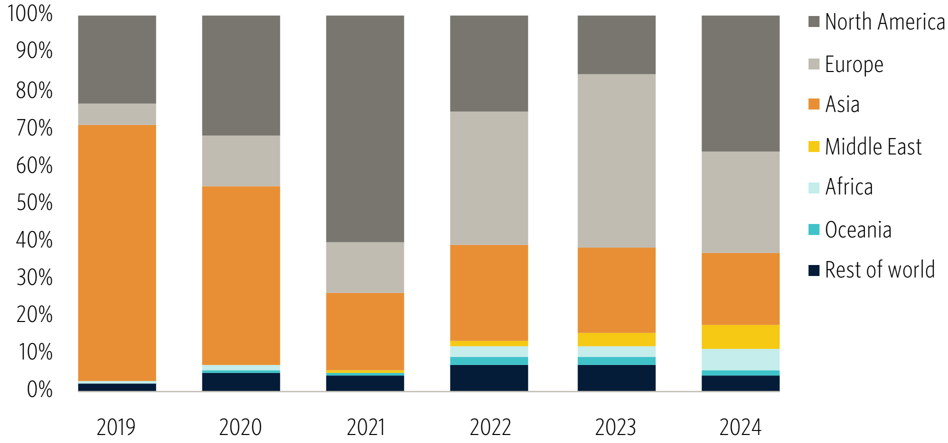
Leading consumer fintech companies have demonstrated their willingness to expand into emerging market regions. Nubank has found success in expanding to Mexico and Colombia, reaching 8.9 million and 2 million customers, respectively, in those countries.[21] The expansion has currently yielded benefits for Nubank's top line and deposit base. Revolut, which also has operations in Brazil, plans to expand into Mexico, India, and the Middle East in 2025. China's Ant Group, which operates the "super app" Alipay, has additionally been increasing its international presence into emerging markets in Latin America and the Middle East.

We believe investors have taken note of this strategy and are beginning to build new theses centered on emerging markets. Investors are additionally recognizing that emerging regions present large addressable markets that remain untapped. For example, only 48% of adults in the Middle East and North Africa have a bank account,[22] representing a significant financial inclusion gap. Similarly, in Southeast Asia, 70% of the population remains underbanked.[23] In our five-part series, Exploring APAC's Fintech Pathways, we highlighted how startups and investors are paying attention to this gap. In Latin America, an estimated 122 million people remain unbanked,[24] and seven out of every 10 individuals in Latin America lack access to loans, insurance, or investment products.[25] Improving infrastructure, exemplified by the success of India Stack in India and Pix in Brazil, alongside the expansion of core banking solutions like Tuum's entry into the Middle East, should also accelerate fintech innovation in these regions.

21: "Nu Holdings Earnings Release Q3'24," Nu Holdings, November 13, 2024.
22: "Financial Inclusion in the Middle East and North Africa (MENA)," Veengu, January 23, 2024.
23: "Grab Earnings: Raising Fair Value by 11% as Revenue Reacceleration Expected in 2025," Morningstar, Kai Wang, November 12, 2024.
24: "Fintech Entrepreneurship to Drive Financial Inclusion in Latin America," BBVA Spark, March 6, 2024.
25: "Overview of Access to Credit for Individuals and Businesses in Latin America," Grupo SURA, Valora Analitik, June 7, 2024.

Consumer fintech VC investments in these emerging countries are beginning to tick upward. The share of consumer fintech venture capital deployed to fintech startups outside of North America, Europe, and Oceania has steadily increased, growing from 24.8% in 2021 to 43.1% for the first three quarters of 2024. While the reduction in the share comprising North America and Europe can partially be attributed to the fewer deals seen for large neobanks following 2020, fintech funds are still showing a willingness to invest in fintech startups in emerging regions. From Q1 to Q3 in 2024, we logged 321 funds that made at least one investment in a consumer fintech startup. 202 of these funds, or 62.9%, made more investments in consumer fintech startups outside of the US, Europe, or Oceania.

Share of retail fintech VC deal value by region



Source: PitchBook • Geography: Global • As of September 30, 2024

We expect this share will gradually increase over the next two years. Our conversations with funds suggest that many are now in the process of evaluating opportunities outside of US and European markets. Some notable deals have also been seen in 2024 despite the slower dealmaking environment in consumer fintech. In early January, Middle Eastern buy now, pay later startup Tabby closed its $950 million Series D (with $250 million in equity) at a $1.5 billion post-money valuation, marking a 1.9x step-up. In November, Argentine neobank Ualá raised a $309.7 million Series E at a $2.8 billion valuation, marking a 1x step-up. In Q3 2024, Mexican credit startup Stori raised a $212 million late-stage round featuring $105 million in equity.

Risks

The fintech dealmaking environment remains soft, especially for consumer fintech companies, and it may not recover in the short term. Uncertainty surrounding currencies, interest rates, inflation, and geopolitical changes could deter investors from allocating capital toward consumer fintech companies. Additionally, it remains an early time to invest in some emerging-market fintech companies, leaving the viability of such strategies to be determined. They may also have an impact on larger companies. For example, Nubank's average revenue per active customer has been impacted by its initial expansion into Mexico and Colombia.

2024 outlook

Undervalued consumer fintech companies will see positive reratings.

Outcome

In 2023, we predicted that some consumer fintech companies were undervalued and would positively rerate in 2024. Looking one year back at enterprise value/trailing 12-month (TTM) sales multiples for our public peer group, this has been true. Digital banks, especially Dave and MoneyLion, have seen their enterprise value/TTM sales multiples expand in the past year, along with other consumer fintech companies such as Wise and Affirm. Some companies such as Remitly saw their multiples contract, however. Some large private companies have also seen positive changes in their valuations, such as Klarna. Based on Caplight data, Klarna is currently valued at $13.8 billion in the secondary market, a 51.6% increase from its last $6.7 billion valuation.[26]

26: "Klarna," Caplight, n.d., accessed December 12, 2024.

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FOODTECH: SUSTAINABLE FOOD PACKAGING

Outlook: The adoption of sustainable food packaging will significantly expand, driven by a convergence of consumer demand, regulatory pressures, technological advancements, and corporate commitments.

Rationale

The rise of sustainable food packaging is supported by several key factors that are shaping the food packaging industry. Consumer awareness and demand for eco-friendly packaging solutions have reached unprecedented levels. A 2023 survey by Trivium Packaging revealed that 82% of global consumers are willing to pay more for sustainable packaging.[27] This shift in consumer preferences is compelling food companies to prioritize sustainability in their packaging choices. As consumers become increasingly educated about environmental issues, they are actively seeking out products that align with their values, putting pressure on brands to adopt more sustainable practices.

Regulatory frameworks are also playing a crucial role in accelerating the adoption of sustainable packaging. Governments worldwide are implementing stricter regulations to reduce plastic waste and promote recycling. For instance, the European Union's Single-Use Plastics Directive as well as its Packaging and Packaging Waste Regulation set ambitious targets for recycled content in plastic packaging and overall recyclability by 2030.[28] At least 12 US states have taken steps to either reduce single-use food packaging or increase the recyclability of packaging materials. These regulatory pressures are directing food companies to innovate and invest in sustainable packaging solutions to remain compliant and competitive.

Technological advancements are making existing sustainable packaging more viable and cost-effective, while innovations in materials science are leading to the development of new biodegradable and compostable packaging options. For example, companies like NatureWorks are producing biodegradable polymers from renewable resources, significantly reducing the emissions associated with producing conventional plastics.[29] Additionally, "smart packaging" technologies are emerging, allowing for better monitoring of food freshness and reducing waste.[30]

Large food incumbents are making significant commitments to sustainability. Major companies like Nestlé, Unilever, and Mondelēz International have pledged to make their packaging fully recyclable, reusable, or compostable by 2025.[31] Nestlé announced in 2018 its ambition to make 100% of its packaging "designed for" recycling by 2025.[32] Unilever had a stated goal to make all of its plastic packaging

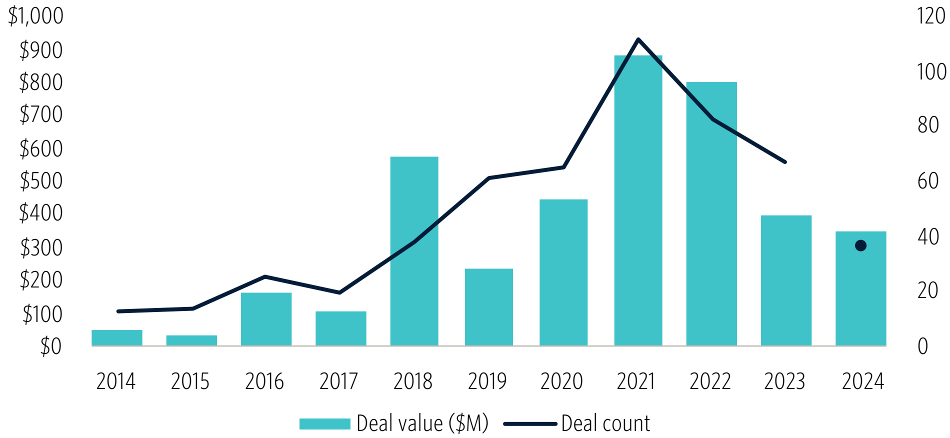
27: "2023 Buying Green Report," Trivium, April 22, 2023.
28: "EU Proposal for a Regulation on Packaging and Packaging Waste Nearing Adoption – The Highlights and Challenges Ahead," Keller & Heckman, October 21, 2024.
29: "How Will the Sustainable Packaging Market Grow to $306.3 Billion by 2025?" Markreo Research, Saurabh Adsule, November 6, 2024.
30: "Smart Packaging: Opportunities and Challenges," ScienceDirect, Procedia CIRP, Dirk Schafer and Wai M. Cheung, 2018.
31: "90% of Sustainable Packaging Commitments Won't Be Met by 2025, Gartner Claims," Packaging Europe, December 8, 2021.
32: "Nestlé's Plastic Strategy Altered Amidst 280,000 Tons of Waste—Recycling Goals Pushed to 2025," Karmactive, Govind Tekale, July 20, 2024.

reusable, recyclable, or compostable by 2025; however, it recently adjusted the verbiage and pushed out the timeline to 2035.[33] Mondelēz plans to make all of its food packaging recyclable by 2025.[34] While Gartner reports that approximately 90% of public sustainability claims may not be met by 2025, these ambitious goals are still driving innovation and investment in sustainable packaging solutions across the industry.[35]

Market projections further support the prediction of expanded sustainable packaging adoption. The global eco-friendly food packaging market is expected to grow at a 7.6% CAGR, from $225.1 billion in 2023 to $505.4 billion by 2034.[36] This growth indicates substantial investment and expansion in the sector. Moreover, the surge in e-commerce and food delivery during the pandemic accelerated this trend, highlighting the need for packaging that is not only sustainable but also functional and safe. This has led to increased innovation in areas such as recyclable and compostable packaging for takeaway food.[37]

While challenges remain, such as the need for improved recycling infrastructure and the higher costs associated with some sustainable materials, the overall trajectory is clear: The food industry is moving toward more sustainable packaging solutions, driven by a combination of consumer demand, regulatory pressure, technological innovation, and corporate commitments.

Sustainable packaging VC deal activity



Source: PitchBook • Geography: Global • As of September 30, 2024

Risks

While there is optimism surrounding sustainable food packaging adoption in 2025, several factors may impede its expansion. Gartner reports that approximately 90% of public sustainability claims will not be met by 2025, as companies remain reliant on fossil-based plastics and single-use packaging.[38] The recycling infrastructure

33: "Unilever Reality-Checked Its 2025 Plastic Packaging Targets. Will More Companies Do the Same?" Industry Dive, Maria Rachal, April 25, 2024.
34: "Mondelez Plans to Make All Packaging Recyclable by 2025," Industry Dive, Cathy Siegner, October 10, 2018.
35: "90% of Sustainable Packaging Commitments Won't Be Met by 2025, Gartner Claims," Packaging Europe, December 8, 2021.
36: "Eco-Friendly Food Packaging Market Size, Share, and Trends 2024 to 2034," Precedence Research, July 2024.
37: "Top 5 Food Packaging Trends 2025 for Businesses to Stay Update," Kimecopak, November 17, 2024.
38: "90% of Sustainable Packaging Commitments Won't Be Met by 2025, Gartner Claims," Packaging Europe, December 8, 2021.

for plastics is currently limited, and many supply chain leaders lack mature sustainability initiatives. Additionally, the high costs associated with sustainable packaging solutions and the challenges of quickly changing established systems pose significant barriers. Production costs for sustainable food packaging are estimated to be about 25% greater than plastic packaging.[39] Without substantial improvements in recycling infrastructure and more realistic goals, the predicted expansion of sustainable food packaging adoption in 2025 may fall short of expectations.

2024 outlook

Advances in health consciousness, diabetes medication, and AI tools will drive record investment in personalized nutrition companies.

Outcome

The 2024 foodtech prediction of record investment in personalized nutrition companies largely materialized. The convergence of health awareness trends, the rise of GLP-1 drugs, and AI-powered nutrition tools sparked significant investor interest. Several personalized nutrition startups secured substantial funding rounds, with Q3 2024 YTD investment reaching $435.3 million, a 92.2% increase from 2023's annual totals. Generative-AI integration, particularly into nutrition platforms, enhanced user engagement and value proposition. However, data privacy concerns and regulatory scrutiny around health data usage may have slightly tempered the sector's growth, preventing it from reaching the most optimistic projections. The convergence of health trends, advanced medications, and AI technologies solidified personalized nutrition as a key focus in the foodtech landscape.

39: "How Sustainable Is the Food Packaging Industry?" Industry Dive, Lillianna Byington, October 15, 2018.

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MOBILITY TECH

Outlook: Extended-range electric vehicles, which feature an onboard gasoline or diesel generator, will emerge as the fastest-growing drivetrain category in Western automobile markets.

Rationale

Sales of battery electric vehicles (BEVs) have slowed in the US and Europe during the past year. Drivers remain wary of higher costs, limited range, inadequate charging facilities, costly repairs, and shaky performance in cold weather. Auto manufacturers, with the exception of market leader Tesla, continue to lose money across the range of BEV models offered. Moreover, investors have cheered efforts to scale back BEV production, sending shares of traditional original equipment manufacturers (OEMs) soaring on management announcements of curtailed production plans. In the US, BEV adoption has been primarily a California phenomenon—electric vehicle (EV) registrations in the state have been 5x that of Florida, which is in second place.[40] US mandates on future EV sales became a political flash point during the 2024 presidential election. President-elect Donald Trump has promised to abandon the $7,500 EV tax credit put in place by the Biden administration. Researchers estimate electric car sales could fall by 27% if the credit goes away.[41] German EV sales fell by exactly that percentage in 2024 after the government canceled a $4,900 incentive in December 2023.[42]

Western efforts to compete with Chinese EV battery producers continue to face challenges. Swedish battery company Northvolt, which raised over $10 billion in equity and debt as of the beginning of 2024, filed for Chapter 11 protection in November after customers such as BMW pulled contracts over quality and production issues. In the US, Our Next Energy, the battery tech company that achieved unicorn status in 2023, was beset by the demotion of its founder and CEO late that year and the departure of its chief science officer in early 2024. In just over a year, the company has reduced its head count by approximately 25% in an attempt to refocus.

While drivers see value in electric drivetrains, trends suggest they are just not ready to jump in with both feet. The market bears this out, with hybrid electric vehicles (HEVs) practically flying off dealers' lots. For the first nine months of 2024, European HEVs and plug-in hybrids (PHEVs) combined accounted for 37% of new car registrations, eclipsing sales of pure petrol vehicles, while BEVs accounted for 13.1%.[43] Drivers enjoy the extra torque electric motors can provide as well as the savings at the gas pump. For decades, the Toyota Prius was the poster child for hybrid electric vehicles. It was practical and provided remarkable gas mileage, but its sensible appeal was limited in the US, where drivers demanded the space and versatility of SUVs. US sales peaked in 2012 and tumbled to one-fifth that level by 2023.[44] Meanwhile, as

40: "Maps and Data - Electric Vehicle Registrations by State," US Department of Energy, September 2024.
41: "How Trump Could Upend Electric Car Sales," The New York Times, Lawrence Ulrich, November 25, 2024.
42: Ibid.
43: "New Car Registrations: -6.1% in September 2024; Year-to-Date Battery-Electric Market Sales -5.8%," European Automobile Manufacturers' Association, October 22, 2024.
44: "Toyota Prius Family US Sales Figures," CarFigures, January 3, 2024.

electric vehicle technology has evolved, OEMs have offered a much broader range of hybrid options. For 2024, Toyota brought the Land Cruiser back to the US market after discontinuing it in 2021. The 2021 version had a 5.7-liter V-8 engine that generated 381 horsepower and 401 pound-feet of torque, but gas mileage was an afterthought at just 13 mpg in the city and 17 mpg on the highway.[45] As of 2024, Toyota offers only a four-cylinder hybrid powertrain for the Land Cruiser. Thanks to a turbocharger and the integrated electric motor, however, the 2.4-liter powerplant nearly matches the horsepower of the earlier V-8 and exceeds its torque by 16%. Meanwhile, the fuel efficiency is significantly higher at 22 mpg in the city and 25 mpg on the highway.

The limitation of the new Land Cruiser and its i-FORCE MAX powertrain is that its 1.9 kilowatt-hour (kWh) nickel-metal hydride battery will not carry it far on electricity alone, so charging at home, even if it were an option, would not supplant going to the gas station. For many drivers, that is the key appeal of PHEVs. With an electric range of 15 to 60 miles, PHEVs can readily accommodate average daily driving on electricity alone. Indeed, PHEV manufacturers often advise occasionally running the vehicle past its electric range so the unused fuel in the gas tank does not go stale.

PHEVs offer two configurations: parallel and series. With the parallel configuration, both the engine and the electric motor mechanically connect to and drive the wheels directly. Under series configuration, only the electric motor drives the wheels. The gas engine merely acts as a generator to top up the battery as needed on the road. This configuration is also referred to as an extended-range electric vehicle (EREV).

The EREV has some unique advantages. The battery can be much smaller than in a BEV. EREV batteries are typically in the range of 10 kWh to 30 kWh, as opposed to BEVs, which average above 60 kWh. The result is less battery material and lower cost, where batteries can make up approximately 30% of the cost of a BEV. Similarly, the internal combustion engine, because it does not need to meet peak loads to drive the wheels, can be undersized as well. EREV engines are typically in the range of 1 liter to 1.5 liters, similar to those that power a medium-to-large motorcycle. Moreover, because the engine on a EREV is run at a constant speed to charge the battery compared to the idle, accelerate, and decelerate modes of a conventional internal combustion engine or parallel hybrid EV, it can operate in the most efficient window of its thermal capacity, maximizing output and limiting emissions. With its function limited to generating power for the battery, the options for the engine expand. Mazda has developed a smaller rotary engine. Highly efficient, lightweight, multifuel turbine engines have been fitted as well, where higher operating temperatures eliminate the need for costly emissions controls. Mechanical operation, where only the electric motor drives the wheels, is simpler and more efficient as well.

In China, EREVs have become the fastest-growing propulsion system for cars.[46] Li Auto, which has been the key proponent of EREVs in China, saw sales jump 182% in 2023.[47] The Li Auto L6 SUV EREV has been one of the hottest-selling cars in China in 2024. Drivers there appreciate the ability to operate on electricity alone, but also enjoy the peace of mind knowing they will not get stuck unable to charge. The typical range for these vehicles exceeds 350 miles, and Chinese automaker BYD boasts a

45: "2024 Toyota Land Cruiser vs. 2021 Land Cruiser: How They Compare," Car and Driver, Eric Stafford, August 1, 2023.
46: "New Breed of EV Promises 700 Miles per Charge (Just Add Gas)," Bloomberg, Keith Naughton, August 13, 2024.
47: "The Extended-Range Electric Car Is Red Hot in China," CleanTechnica, Steve Hanley, October 2024.

model with a combined gas/electric range of 1,300 miles.[48] Cost is another factor, with the typical EREV priced $4,220 less than a BEV in China.[49]

In the US, Stellantis is launching an EREV Ram 1500 pickup truck that is expected to have a nearly 700-mile range. Volkswagen (VW) is reviving the Scout brand, which it gained with its acquisition of Navistar in 2021. Initially, plans were for an EV-only version of the iconic boxy SUV, but in late October, when VW unveiled the vehicle, it also announced a pivot to offer an EREV version. Early reservations suggest more than 80% are overwhelmingly opting for the EREV version over the BEV model.[50] Ford has yet to announce plans for an EREV, but CEO Jim Farley made waves earlier in the year following a trip to China when he enthusiastically announced, "We really like that solution."[51] Subsequent speculation suggested EREVs could be in Ford's lineup after it abandoned plans for a larger BEV SUV.[52] EREV technology might also be a good fit for Ford's Super Duty trucks. General Motors (GM) is in fact responsible for the EREV. The Chevy Volt from 14 years ago was the original EREV. The series powertrain of the Volt had a 1.5-liter gas engine and an 18.4 kWh battery that provided 53 miles of range on electric power alone.[53] Unfortunately, GM reportedly lost money on every vehicle sold and canceled production in 2019. GM has not announced plans to re-enter the EREV market.

Risks

The future regulatory environment for EVs in the US is in flux following the 2024 presidential election. The $7,500 tax credit for EVs is certain to steer manufacturers' marketing and production plans. If it is abandoned, it could spur sales of EREVs, as BEVs would be less appealing from a cost perspective. Consumers appear to want the intermediate step toward electrification that EREVs offer, but OEMs have been so whipsawed by conflicting trends and regulations they may be reluctant to chart another new course that EREVs would represent. With higher tariffs and the potential for trade wars among major powers, it is unlikely Chinese manufacturers of EREVs, which have made the most progress on cost-cutting and ramping up manufacturing, will make much headway exporting vehicles to the US or European markets.

2024 outlook

Software efforts at automakers will get a reboot as automakers seek to enhance their share of the emerging mobility platform market. Meanwhile, consumer electronics contract manufacturer Foxconn will begin producing vehicles, further pressuring traditional auto manufacturing.

Outcome

Software development issues continue to plague traditional OEMs. The biggest evidence for a reboot was VW's $5 billion investment in EV startup Rivian in 2024 (later boosted to $5.8 billion) to bolster VW's software development efforts. Foxconn, alas, is still just making EV tractors in its Lordstown, Ohio, manufacturing plant.

48: "BYD Launches Hybrids With 1,300-Mile Driving Range," The Wall Street Journal, Jiahui Huang, May 29, 2024.
49: "The Extended-Range Electric Car Is Red Hot in China," CleanTechnica, Steve Hanley, October 2024.
50: "Scout Motors Reservations Are Overwhelmingly for the 'Harvester' EREV," MSN, Suvrat Kothari, November 2024.
51: "Ford CEO Says 'Partial Electrification' Is More Than 'Transitional,'" The Detroit News, Breana Noble, May 30, 2024.
52: "Having Abandoned Its Large EVs, Ford Could Be Eyeing China and Ram for Replacements," MotorTrend, August 22, 2024.
53: "2016 Chevrolet Volt Gets Better Range Than We Expected -- Here's the Official EPA Figure," Autoweek, Graham Kozak, August 3, 2015.

Analyst Q&A

Which subsegment of your coverage is the most underappreciated by investors?

Gaming	E-commerce	Retail fintech	Mobility	Foodtech
				
Quality assurance (QA) and test automation—a highly expensive portion of the game development cycle that, to date, has been solved by allocating more bodies to a task. With growing live operations adoption and the trend of games as a service, this is increasingly expensive and complex. Increased automation can materially lower costs and accelerate test cycles.	Gaming integration, such as the collaboration between Shopify and Roblox. Digital ecosystems like Roblox and Fortnite are becoming de facto "third places," especially for younger consumers who can spend hours there daily. Select brands are building bespoke integrations, but lowering the technical barrier to entry will expand access to the next generation of shoppers.	Neobanks continue to be seen as oversaturated but are growing their presence in large addressable markets and reaching new milestones in total customers while improving profitability.	Hybrid vehicle technology. Most investors seem to want to go all in on electrification without considering the challenges facing drivers. Hybrids represent an intermediate step but offer significant emissions benefits while also meeting the demands of drivers at an affordable price.	The food intelligence & development subsegment is undervalued by consumer-facing investors. This oversight is significant, as food intelligence & development technologies, including AI-driven product development, biotechnology applications, and data analytics, have the potential to address challenges in sustainability, efficiency, and innovation. Despite receiving only $82.7 million across seven deals through Q3 2024, startups in this category are driving advancements in production, product development, quality control, and supply chain optimization.

Which incumbent/legacy providers face the most risk of disruption?

Gaming	E-commerce	Retail fintech	Mobility	Foodtech
				
Large, potentially overemployed PC/console developers without a "forever title," such as the Grand Theft Auto franchise, or a strong annual franchise such as EA Sports' FC.	All manner of search providers. I do not think we will type into search bars or always turn to Google in the future.	Incumbent wealthtech players, given that generational wealth transfer is in effect and new AI innovations are creating competitive consumer offerings.	Western and Japanese automakers are under enormous stress from the transition to EVs and, more importantly, the rise of Chinese automakers that can cycle development at 2x to 3x the speed of incumbents.	Alternative dairy products made from plants, precision fermentation, and, potentially, cultivated dairy technologies threaten to disrupt traditional dairy producers. Plant-based milk alternatives have already captured a sizable market share.

In your space, which one or two seed-stage startups should Series A investors pay attention to?

Gaming

First, **Eggscape**, an early-stage VR developer building social alternative & virtual reality games and immersive gameplay integrated with the real world.

Next, **Regression Games**, maker of an automated gaming QA platform for multimodal testing (including scripted code, recorded playback, computer vision, exploratory bots, and more). It is backed by Andreessen Horowitz as well as New Enterprise Associates and was named a "Game Changer" in Lightspeed's annual list of gaming startups to watch.[55]

Finally, **Look North World**, a UGC game studio that has targeted the quickly growing UEFN ecosystem across partnerships with Hasbro, Bandai Namo, Twitch and also through original development.

E-commerce

First, the startup **Two Boxes**. Item returns remain an unsolved albatross for digital commerce. Two Boxes works with third-party logistics companies and uses technology to streamline returns operations. Notable backers include leaders of Passport Shipping, Chubbies, and the Shopify Fulfillment Network, among others.

Next, **Daydream**, a generative-AI-powered search platform led by retail veteran Julie Bornstein. The company is tackling a new era of product discovery that is "context aware" and action oriented.

Finally, **Pietra**, which manages "everything that isn't Shopify,"[54] including sourcing and production, logistics, marketing and sales, and more.

Retail fintech

First, **Yenmo**, which is tapping into the unsecured lending opportunity in India, and second, **Code**, a unique cross-border remittance solution using blockchain and focused on microtransactions.

Mobility

Early-stage startup **Koloma** is developing tools and technology for prospecting and mining natural hydrogen. Natural hydrogen is produced in the earth through chemical and biochemical processes. It has the potential to be a major cost-effective clean energy resource.

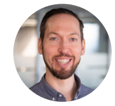
Foodtech

B'ZEOS's innovative approach to sustainable packaging using seaweed extracts positions them as a potential leader in transforming the packaging industry toward more environmentally friendly solutions.

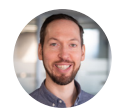
Next, **Restoke AI** is developing an innovative AI-powered platform that has demonstrated significant impact in the restaurant industry, saving businesses over $8,000 per week in operating costs within just four weeks of implementation. With $3.7 million in recent funding, over 2,000 restaurants already using their technology across multiple countries, and plans for US expansion,[56] Restoke AI is well positioned to capitalize on the growing demand for efficiency and profitability in the challenging hospitality sector.

54: "Software & Services to Run Your Brand Profitably," Pietra, n.d., accessed December 5, 2024.
55: "Meet the Game Changers 2025," Lightspeed, n.d., accessed December 12, 2024.
56: "Hospo-Tech Raises $5.1 Million to Save Restaurants Amid Flailing Industry," Forbes, Anastasia Santoreneos, September 24, 2024.

Which one or two Series A companies should Series B and Series C investors pay attention to?

Gaming	E-commerce	Retail fintech	Mobility	Foodtech
				
Ruckus Games is the developer of a four-player co-operative (co-op) game in the ever-evolving co-op third-person shooter genre. The company raised a $19 million Series A in Q4 2024. Also, **k-ID** is a gaming software-as-a-service platform working to support both game developers and families in creating safer, trust-and-safety-compliant digital worlds.	**Canal** is an e-commerce enablement platform helping brands to cross-sell products from complementary merchants. The curated network enables merchants to expand product listings without necessarily increasing inventory.	**NALA Payments** is an African remittance business that provides valuable cross-border payments connections in an underserved region, and **Bright Money** is a consumer lending, debt-reduction, and credit-builder startup that provides a holistic profile of consumer payment behaviors.	Automatous car company **Glydways**. The company offers a revolutionary approach to mobility, providing both low capital costs and low operating costs with the potential for viral growth as the network effects of its mobility systems connect and grow.	**BlueTree** is developing technology that selectively reduces sugar content in beverages while preserving taste and essential nutrients, addressing the growing consumer demand for healthier, low-sugar options. BlueTree's patented solution positions the company to capitalize on this significant industry trend and potentially disrupt the beverage market.

If you were to select only three subsectors from your coverage to invest in, which subsectors would you choose?

Gaming	E-commerce	Retail fintech	Mobility	Foodtech
				
AI-native/vertical game engines, emerging market developers (in Brazil and Turkey), and UGC developers.	Process orchestration, reverse logistics, and fraud prevention (online and offline).	Credit & banking, consumer payments, and wealthtech.	Perception software, commercial BEVs, and passenger safety & experience.	Food intelligence & development, personalized nutrition, and sustainable packaging.