

The Burgeoning Ghost Kitchen Industry

An in-depth analysis of the haunting world of a new food industry model

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Key takeaways

- Ghost kitchens represent an emerging tech-enabled business model that could significantly affect the restaurant and food delivery industry.
- Ghost kitchens enable existing restaurants to outsource all aspects of food delivery to centralized locations, where delivery management services can be scaled across numerous restaurant brands.
- VC investment activity in ghost kitchen businesses has steadily escalated over the past five years, with deal values increasing at least 2.4x each year since 2016. Deal activity peaked in 2019 with \$1.9 billion invested across 16 deals.
- While ghost kitchens may be uniquely poised to help restaurants address demand for delivery-only services amid the global coronavirus pandemic, the industry remains nascent and early indications are that ghost kitchens may benefit mid- and large-size restaurant chains over small businesses.

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Defining ghost kitchens

“Ghost kitchens” are commercial kitchens that operate without a brick-and-mortar location and are focused on delivery and takeout.¹ They primarily (if not exclusively) sell through meal delivery platforms. Ghost kitchens should not be confused with “virtual restaurants,” which refer to restaurant brands that operate within ghost kitchens that also sell through meal delivery platforms. Ghost kitchens should also be differentiated from “pop-ups,” which are virtual restaurants that operate out of existing brick-and-mortar restaurant kitchens. For example, when Uber identified the rising trend of poke in 2016, they approached Japanese restaurants (e.g. SushiYaa) about preparing the cuisine and selling it on the Uber Eats platform as a separate brand (e.g. Poke Station).²

While the ghost kitchen concept has been around for several years, the business model began receiving significant public attention in late 2019 when Uber co-founder Travis Kalanick heavily invested in the startup [CloudKitchens](#), which had just raised \$700 million in early-stage VC funding at a \$4.6 billion pre-money valuation. At first glance, ghost kitchens appear to be a simple application of WeWork’s office leasing model applied to restaurants. However, we believe the industry reflects trends that are reshaping the restaurant industry as delivery becomes more mainstream and we note a variety of ghost kitchen models have received VC funding. This note explores the drivers of this burgeoning industry, explains its emerging business models, outlines key providers and investors and provides an outlook on ghost kitchens’ future. We also provide some thoughts on how the coronavirus pandemic, which is causing a spike in demand for restaurant delivery, could affect the ghost kitchen opportunity.

The emergence of ghost kitchens

Versions of ghost kitchens have existed for years, including in the form of commercial kitchen spaces (also known as commissary kitchens) which are subdivided and leased to multiple restaurants. But while these early models were intended more for commercial use, emerging ghost kitchens are providing a more direct consumer model, akin to a virtual food court catering to takeout customers and food delivery app couriers. The online food delivery industry definitely helped jumpstart the growing interest in ghost kitchens.

1: Ghost kitchens may also be referred to elsewhere as dark kitchens, virtual kitchens, commissary kitchens, gray kitchens or cloud kitchens.

2: “Inside the World’s Fastest-Growing Food Delivery Service,” *Eater*, Amanda Kludt and Daniel Geneen, June 29, 2018.

Traditional food delivery

Customer orders from restaurant



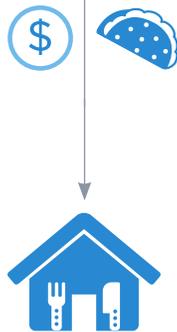
Restaurant prepares order



Restaurant transports order



Food delivered & payment goes directly to restaurant



VC investment in the food delivery space reached \$9.5 billion in 2019, shy of the \$12.7 billion notched in 2018.

Prior to digital food ordering apps, relatively few restaurants offered delivery, and the service was largely limited to pizza and Chinese food. Restaurants that did offer delivery used couriers hired by the restaurant. Customers also relied on mailers, door hangers, the phonebook and other ads to discover new places to eat.

Early food delivery apps, such as Seamless and Grubhub, targeted these inefficiencies by aggregating restaurant menus and contact info into one place. In the early 2010s, food delivery platforms began to take off as VC-backed startups (most notably Uber and Grubhub) began aggressively attacking the market. Massive VC funding subsidized delivery fees and fueled rapid restaurant and consumer growth. Increased mobile adoption, growing consumer preference for delivery and the ease with which drivers could become gig-economy couriers further propelled expansion of food delivery services.

Despite this rapid growth and adoption, delivery providers continue struggling to achieve profitability as price competition compresses margins. While technology has gone a long way in solving the communications and ordering aspects of delivery, lingering problems weighing on the business model include: the cost to hire, train and employ couriers; distances between restaurants and customers; and other frictions with pickups and delivery such as managing various delivery systems.

Both food delivery app providers and VCs are investing in solutions to tackle these issues. One approach is to use autonomous vehicles to reduce delivery costs; however, autonomous vehicles currently only function in limited use cases and full commercialization is potentially at least a decade away. Another approach is to invest in ghost kitchens, which allow providers of food delivery services to aggregate delivery-focused food production at centralized locations, potentially reducing preparation and delivery costs while generating additional revenue streams from restaurant tenants.

Benefits of running a virtual restaurant

Ghost kitchen providers are promoting the many ways their models can potentially help restaurants grow. One of the most compelling value propositions is the ability to simplify the complexity of offering delivery services. The proliferation of food delivery apps has created a chaotic environment, with some restaurants using as many as eight or more order management systems. Ghost kitchens

Food delivery app

Customer orders and pays ahead through delivery app



Restaurant prepares order



Gig worker transports order to customer



Gig worker delivers order



help segregate delivery operations, so brick-and-mortar restaurants can focus on the dining experience while virtual restaurants housed within ghost kitchens can optimize the delivery side.

Another driver of ghost kitchens is the high cost of opening traditional brick-and-mortar restaurant locations, which involves leasing a retail space, buying kitchen equipment and appliances, interior design and hiring and training staff. Ghost kitchen facilities can significantly lower the barriers to entry by providing aspiring restaurateurs with furnished kitchens and restaurant operations services. These include kitchen equipment rental, business consulting, product sourcing, inventory and order management. Ghost kitchens can also facilitate branding and marketing services through digital sales channels that enable restaurants to create a menu and branding that resonates with customers and that allows restaurants to respond in real time to customer feedback.

Ghost kitchens can also enable restaurateurs to reach otherwise inaccessible markets. For example, while it may not make economic sense for a restaurant owner to open an additional dine-in location in a different neighborhood, opening a virtual restaurant could allow access to new markets via delivery only. Ghost kitchens also allow food providers to experiment with new menu items or spin up new restaurant concepts with relatively low investment and brand risk.

Pop-ups—virtual restaurant concepts operated out of an existing brick-and-mortar restaurant—represent another opportunity emerging from the delivery ecosystem. Pop-ups are demand-driven concepts that rely on consumer data collected by food delivery apps to identify what foods customers are searching for and where there may be an opportunity for a new business. For example, if Uber finds that consumers in a particular neighborhood are unsuccessfully searching for Chinese food, the delivery company could partner with a local restaurateur (even if it's not a Chinese restaurant) to produce and deliver that particular food.

Ghost kitchen facilities

Ghost kitchen facilities vary in layout and optimization strategies, giving clients room to cater to their business needs. Some ghost kitchens provide a communal stock room, while others give clients the space to manage their own inventory. Kitchen layout is optimized for delivery, and some facilities provide a variety of business services that allow the client to focus solely on food preparation. We estimate that there are over 1,280 ghost kitchen facilities globally, primarily located in large, densely packed cities such as New York, Los Angeles and Chicago. For example,

Ghost kitchen delivery

Customer orders and pays ahead through delivery app



Virtual restaurant retrieves order through delivery app, prepares order and transfers to ghost kitchen front-of-house



Gig worker transports order from ghost kitchen to customer



Gig worker delivers order



UK-based [Deliveroo](#) currently has 16 ghost kitchens called “editions,” each with six to 10 kitchen spaces, and each kitchen is approximately 18 to 19 square meters.³ Indian food delivery platform [Swiggy](#) claims to have over 1,000 cloud kitchen facilities (called Swiggy Access pods), each with six to seven individual kitchens. The company expects median per-user food delivery occasions to grow from around 12 meals per month to over 40 meals per month in the long term, with ghost kitchens enabling that surge, according to CEO Vishal Bhatia.⁴

While ghost kitchens tend to be located outside core commercial areas where real estate is most expensive, some providers are bucking that trend. Pasadena, CA-based [Kitchen United](#), which recently raised a \$40 million Series B, centralizes back-of-house tasks such as sanitization and inventory management, as well as front-of-house tasks such as delivery management and catering. Rather than using more industrial locations to minimize real estate costs, [Kitchen United](#) facilities are located in commercial cores to encourage customer pickup and minimize delivery time.

Los Angeles-based startup [CloudKitchens](#) has kept a low-profile, revealing few details about their business model. We know the company has been buying real estate properties around the world, including in the US, India and China. These facilities are larger and have the capacity for more virtual restaurants than other cloud kitchen companies. A Conditional Use Permit for an Orlando property cited 41 kitchens across over 25,000 square feet.⁵ The company has also launched several private label concepts with names such as “B*tch Don’t Grill My Cheese” and “Egg the F* Out.”

Some food delivery providers, such as [Reef Technology](#), are taking a more creative approach by building “pods,” which are trailers or shipping containers converted into standalone kitchens. These mobile virtual restaurants can be located close to residential and office areas or moved to wherever demand is greatest. [Reef](#) started out as a parking facilities technology company that now utilizes a portion of its 5,000+ parking lots and garages to support kitchen pod locations. [Reef](#) launched its kitchens business by partnering with local restaurants to provide delivery-only kitchen facilities and seeks to partner with large restaurant chains and develop its own restaurant concepts.⁶

4: “A Sneak Peek Inside Swiggy’s Cloud Kitchen,” Startup Central, November 21, 2019.

5: “LA-based CloudKitchens Building 41 Virtual Restaurant Kitchens Inside a 25,000 SF Building,” The Daily City, Mark Baratelli, February 10, 2020.

6: “Reef Technology is Putting Virtual Restaurants in Parking Garages,” Nation’s Restaurant News, Joanna Fantozzi, November 21, 2019.

SWOT analysis

STRENGTHS

- Restaurants can **address rising demand of delivery** apps without sacrificing brick-and-mortar locations.
- Operation requires **lower initial investment** and overhead. Rent can be over 25x less expensive (\$40,000 per month versus \$1,500 per month), and there is no need for restaurant labor (hostess, server, busser, etc.) outside of kitchen staff.
- **Kitchen is optimized for delivery**, meaning faster orders and better tasting food.
- **Restaurants can quickly adapt** menus, prices and branding with digital menus to meet market demand.

WEAKNESSES

- It is **difficult to establish brand value** without a brick-and-mortar location.
- A virtual restaurant is entirely **reliant on delivery apps** for sales.
- On top of the 30%+ commission fees charged by delivery apps, **ghost kitchens charge commissions for the services provided that may exceed costs of operating standalone restaurants.**
- Ghost kitchens may be located outside of the urban core of a city, **increasing delivery time.**

OPPORTUNITIES

- Ghost kitchens may provide a better opportunity to **integrate robotics** (than cramped restaurant kitchens), potentially reducing labor costs and optimizing repetitive or dangerous tasks.
- Ghost kitchens provide restaurants with an opportunity to **expand geographic reach** with lower initial investment requirements.
- Providers can achieve **cross-selling with virtual restaurants** located in the same ghost kitchen and by utilizing pop-up concepts.
- A strict focus on delivery allows restaurants to optimize operations and **better adapt to future innovations** such as the introduction of autonomous delivery vehicles.

THREATS

- Negative press and a **lack of transparency** around food preparation could damage public perception of ghost kitchens and virtual restaurants.
- Most food delivery platforms are profit negative as they compete for market share. A **food delivery platform going out of business** would eliminate one sales channel and could threaten the viability of the virtual restaurants selling through it.

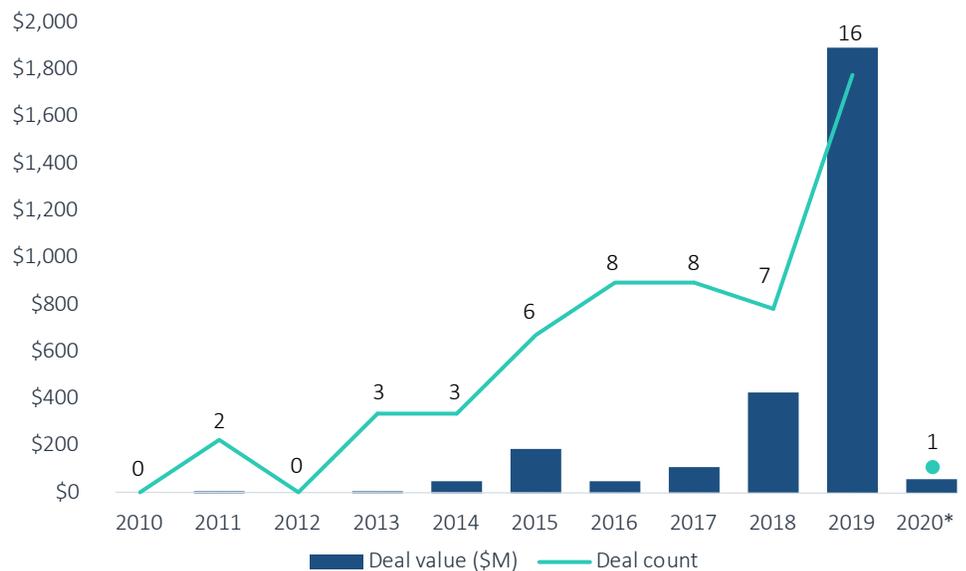
VC investment activity

VC investment activity in ghost kitchen businesses has steadily escalated over the past five years, with deal values increasing at least 2.4x each year since 2016. Deal activity peaked in 2019 with \$1.9 billion invested across 16 deals. The largest ghost kitchen deal on record was a \$900 million late-stage VC investment in [Reef Technology](#) led by SoftBank Investment Advisors.

Aside from SoftBank, other well-known cloud kitchen investors include Google Ventures, Andreessen Horowitz and Kleiner Perkins. The most notable ghost kitchen deal was [CloudKitchens'](#) \$700 million funding round, which closed at just under a \$5 billion pre-money valuation. Saudi Arabia's PIF and LeFrak participated in the round, led by Uber (and Uber Eats) founder Travis Kalanick.

M&A in the space includes [Deliveroo's](#) acquisition of [Maple](#) in 2017 and Uber's acquisition of [Ando Food](#) in 2018. While Uber is reportedly active in the ghost kitchen space, we expect the company is primarily focused on its core ridehailing business.

Ghost kitchen VC deal activity



Source: PitchBook | Geography: Global
*As of February 19, 2020

Top VC investors in ghost kitchens (2009-2020)*

INVESTOR NAME	INVESTOR TYPE	COUNTRY	DEAL COUNT
Battery Ventures	VC	US	4
ACME Capital	VC	US	3
e.ventures	VC	US	3
500 Startups	Accelerator/incubator	US	3
DCM Ventures	VC	US	3
Infinity Ventures	VC	Japan	3
Greylock Partners	VC	US	3
Lightbox	VC	India	3
Menlo Ventures	VC	US	3
LocalGlobe	VC	UK	3
RTP Global	VC	Russia	3
Sequoia Capital India	VC	India	3
SoftBank Investment Advisers	PE/buyout	UK	3

Source: PitchBook | Geography: Global
*As of February 19, 2020

Impact of the coronavirus global pandemic

The current coronavirus crisis could be a longer-term catalyst for food delivery as restaurants either choose to or are forced to temporarily shutter dine-in options. According to NPD Group, take-out, delivery and drive-through made up 48.5% of all restaurant spend (for the 12 months ending in January), suggesting further penetration is possible.⁷ In response to the crisis, Uber Eats recently announced the temporary elimination of delivery fees and Grubhub and Seamless separately announced the temporary elimination of commission fees for independent restaurants with the aim of providing economic relief for smaller businesses and consumers.⁸

7: "Restaurant Delivery Industry to Accelerate Amid COVID-19 Global Health Crisis," Food Navigator, Mary Ellen Shoup, March 16, 2020.

8: "Grubhub and Major Cities Across the US Launch Economic Relief Effort Up to \$100 Million for Independent Restaurants and Delivery Partners Impacted by COVID-19," Grubhub, March 13, 2020.

Emerging ghost kitchen startups could prove to be an attractive model as more dining moves to delivery. In the near term, the relatively small ghost kitchen industry will likely do little to alleviate the catastrophe facing the restaurant industry. However, to the extent consumers' food delivery habits persist after the crisis has ended, ghost kitchens could experience a significant tailwind as restaurants seek more durable delivery models. While VC funding in the space is likely to shrink in the near term, several ghost kitchen startups are flush with recent funding and are likely to continue expansion.

Outlook

Funding for ghost kitchens will likely slow: Ghost kitchen deal activity peaked in Q1 2019 with \$1.7 billion invested across five deals, including two VC mega-deals (\$100 million+) into [Reef](#) and [CloudKitchens](#). Quarterly deal activity has declined in subsequent quarters, with \$28.6 million invested in Q4 2019. Despite raising significant VC rounds in 2018 and 2019, we believe this industry is still in the proof-of-concept phase and do not expect additional large rounds in the near term. Ghost kitchens appear to be highly capital intensive and the path to profitability could be long. We expect investors will stay on the sidelines until the business model becomes more proven.

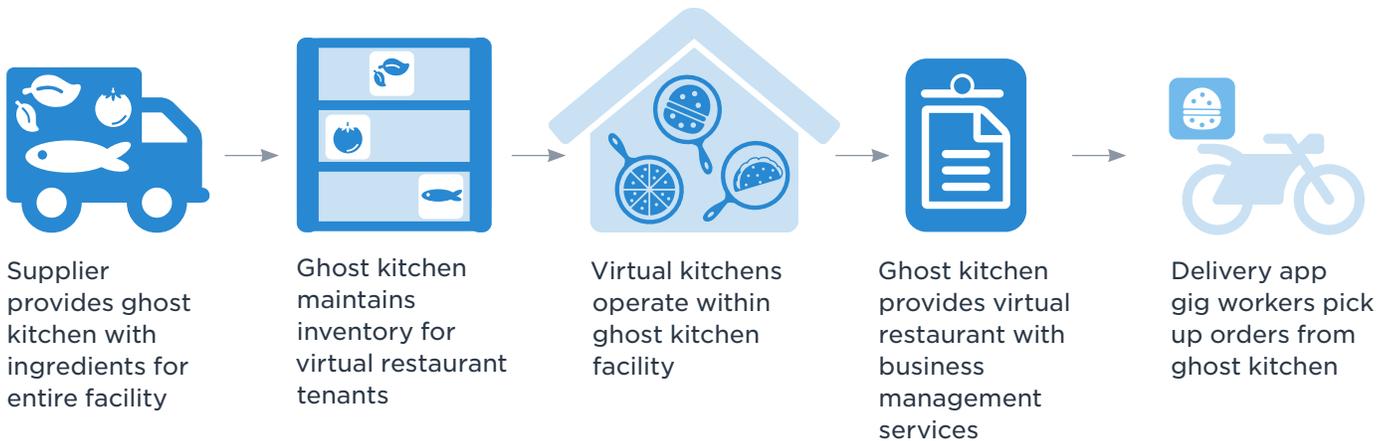
In the long term, the model seems viable: Despite this near-term view, ghost kitchens pose what appears to be a valuable concept for the food industry. Virtual restaurants could be a successful strategy to adapt to the disruption caused by the delivery industry. If food delivery continues to grow as rapidly as has been posited by food delivery and ghost kitchen advocates, we believe restaurants will flock to ghost kitchens to scale operations and meet consumer demand. Gathering restaurants and other retail businesses under one roof may create opportunities to sell additional goods (such as groceries) or facilitate food delivery from multiple restaurants to a single location in one trip.

Small mom-and-pop restaurants will not be the only patrons of ghost kitchen services: Large eat-in chains and small restaurants will likely be the largest users of ghost kitchens. Restaurants that have not been designed for takeout or delivery and that primarily serve dine-in customers face the most disruption risk from online food delivery. We expect these businesses may be early adopters of ghost kitchen facilities as they seek to capitalize on the growing delivery business while insulating the traditional dining

room business model. At the same time, we expect to see future brick-and-mortar restaurants adapt to the changing landscape by planning restaurant layouts that better accommodate delivery orders.

Food delivery platforms have gained power: As more restaurants become “delivery-first,” conducting the majority of business through food delivery apps, we anticipate food delivery apps will begin wielding more power and exert it in a variety of ways. We expect to see food delivery platforms utilize ghost kitchens to vertically integrate, launching more private label brands, where category expansion opportunities arise. We also expect to see ghost kitchens offer more restaurant services such as food inventory management, where economies of scale provide profit potential.

Ghost kitchen supply chain



Top ghost kitchens VC deals by size (2009-2020)*

COMPANY NAME	CLOSE DATE	DEAL SIZE (\$M)	PRE-MONEY VALUATION (\$M)	STAGE	LEAD INVESTOR	COUNTRY
REEF Technology	March 1, 2019	\$900.0	\$900.0	Late-stage VC	SoftBank Investment Advisers	US
CloudKitchens	January 1, 2019	\$700.0	\$4,600.0	Early-stage VC	N/A	US
Zume	November 1, 2018	\$375.0	N/A	Early-stage VC	Grishin Robotics, SoftBank Investment Advisers	US
Rebel Foods	August 1, 2019	\$125.0	\$400.0	Series D	Evolve Capital, Sistema Asia Capital	India
Munchery	May 27, 2015	\$86.6	\$213.4	Series C	ACME Capital, Menlo Ventures	US
Kitopi	February 4, 2020	\$60.0	N/A	Series B	Knollwood Investment Advisory, Lumia Capital	United Arab Emirates
Panda Selected	February 21, 2019	\$50.0	N/A	Series C	Tiger Global Management	China
Zume	September 22, 2017	\$48.0	\$170.0	Series B	SGH Capital	US
Sprig	April 15, 2015	\$45.0	\$123.6	Series B	Greylock Partners, Social Capital	US
Kitchen United	September 19, 2019	\$40.0	\$100.0	Series B	GV, RXR Realty	US

Source: PitchBook | Geography: Global
*As of February 19, 2020

Top VC-backed ghost kitchen companies by pre-money valuation (2009-2020)*

COMPANY NAME	CLOSE DATE	DEAL SIZE (\$M)	PRE-MONEY VALUATION (\$M)	STAGE	LEAD INVESTOR	COUNTRY
REEF Technology	March 1, 2019	\$900.0	\$900.0	Late-stage VC	SoftBank Investment Advisers	US
Rebel Foods	August 1, 2019	\$125.0	\$400.0	Series D	Evolve Capital, Sistema Asia Capital	India
Zume	September 22, 2017	\$48.0	\$170.0	Series B	SGH Capital	US
Kitchen United	September 19, 2019	\$40.0	\$100.0	Series B	GV, RXR Realty	US
Virtual kitchen	June 3, 2019	\$15.3	\$36.0	Series A	Andreessen Horowitz, Base10 Partners	US
Keatz	March 22, 2019	\$21.5	\$24.5	Early-stage VC	Project A	Germany

Source: PitchBook | Geography: Global
*As of February 19, 2020