On-demand manufacturing platforms are taking the sector by storm

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Key factors for a successful platform

On-demand manufacturing platforms take the business model of Amazon in retail, Uber in transportation and AirBnB in lodging and apply it to the manufacturing sector. In recent years, they have evolved into a multi-billion euro market. Their ability to overcome supply chain disruptions, such as the COVID-19 pandemic and the Suez Canal obstruction, and to meet the increasing demand for individualized products has helped to boost recent growth. In this study, we look at how they work and identify their success factors and hurdles to their future development.

"On-demand manufacturing platforms will disrupt traditional manufacturing in the same way Amazon disrupted the retail business."

DR. BERNHARD LANGEFELD
Senior Partner
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A multitude of new on-demand manufacturing platforms have been established in recent years, focusing on different production technologies, regions and customers. Major corporations such as Siemens, Zeiss and BASF have recognized their potential and secured access to manufacturing networks by funding them. As a result, the on-demand manufacturing platform market has boomed, with individual companies seeing revenue from such platforms grow by more than 50 percent a year.

On-demand manufacturing platforms are structured around a network of manufacturers, making them well suited for scaling via mergers and acquisitions (M&A). In the last five years, we have seen more than 30 major M&As, with individual transaction volumes in some cases surpassing EUR 200 million. Often, the money for these acquisitions was raised by initial public offerings (IPOs) supported by a special purpose acquisition company (SPAC). Consolidation in the market has already begun and is expected to continue.

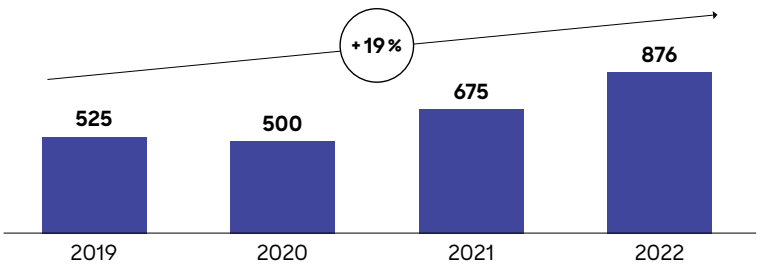
On-demand manufacturing platforms act as a one-stop shop for connecting customers with a network of manufacturing companies. Most platforms include manufacturing services using different, complementary production technologies, such as CNC (computer numerical control) machining, additive manufacturing, sheet metal fabrication or injection molding. Currently, platforms are primarily used by their customers to satisfy short-term ad hoc demand ("spot demand") for components in small lot sizes, such as prototypes. Customers upload a 3D model of a part, define the specifications, such as material, surface finishing and quality requirements, and instantly receive a quote. Orders can be placed within minutes. The corresponding manufacturing order is then forwarded to a manufacturer on the platform's network. Most often, the manufacturer of the part is not disclosed to the customer. With this fundamental transformation of the interaction between

On-demand manufacturing platforms have been expanding rapidly in recent years

Driven by the COVID 19 pandemic and the associated supply chain disruptions

Market growth

Revenue of Top 4 on-demand manufacturing platforms, 2019–22 [EUR m]



Market characteristics, 2019–22

- **Individual companies have seen growth** rates of up to **50 %** (CAGR, 2019–22)
- **Not all** market participants **profitable yet**
- **Several IPOs** in last five years, but many **small to mid-sized** players **still financed by venture capital**
- Highly **dynamic M&A** scene: More than **30 M&As** in the last five years, with individual transaction volumes sometimes **surpassing EUR 200 m**

Source CapitalIQ

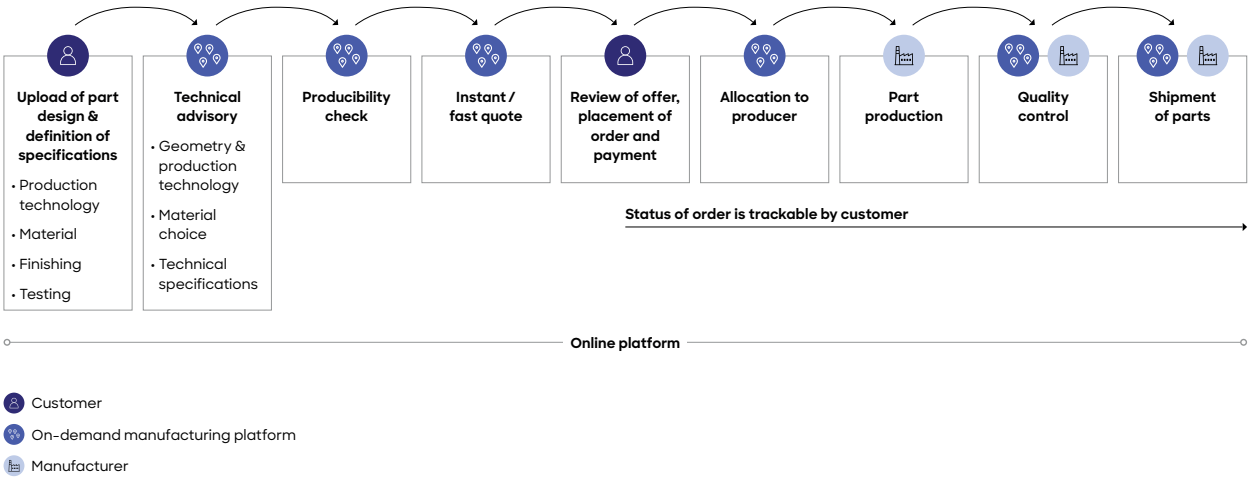
Roland Berger

customers and manufacturers, on-demand manufacturing platforms have the potential to sustainably impact the centuries-old manufacturing sector by paving the way for swift and true demand-driven production.

As mentioned, most on-demand manufacturing platforms focus on meeting spot demand from customers. They operate primarily in unregulated markets. But several platforms have extended their activities to include the production of bigger lot sizes. Some on-demand manufacturing platforms are also using their spot business – producing prototypes, say – as a basis for helping their customers develop a series production strategy, guiding their choice of production technology or manufacturer. Others have made it their mission to develop manufacturers for the production of predefined parts that can then be ordered by customers as and when needed, similar to a digital warehouse.

On-demand manufacturing platforms connect customers with manufacturers

Sample customer journey



Source Roland Berger interviews

Roland Berger

Connecting customers with manufacturers

One of the main things on-demand manufacturing platforms offer is efficiency. That makes the technology used by the platform and its access to a broad network of manufacturers crucial.

A flawless customer journey

The online platform forms the interface between the customer and the manufacturer. Customers value the intuitiveness and simplicity of the user experience across the entire process – from file upload, technical advisory, design for manufacturing (DfM) feedback, producibility check, quotation to delivery date estimation and payment/ order management process. As so often, the magic happens behind the scenes.

"On-demand manufacturing platforms are actually capable of more than just instant quoting. Customers can also get expert advisory on potential design improvements and material & technology selections, as well as, support on designing supply chains for more complex applications."

DR. MARKUS SEIBOLD
Makerverse

On-demand manufacturing platforms leverage artificial intelligence (AI) to recognize geometric features of the requested part, which are then compared with technology-specific and material-specific design rules to validate producibility. Every customer inquiry generates a wide range of datapoints with regard to geometric features, production technology, material and production time. Based on these datapoints, AI algorithms estimate the production time and costs for specific geometries, which then form the basis for the instant quotes. Continuous training of AI algorithms with datapoints from previous parts increases the quoting accuracy. For example, one major on-demand manufacturing platform uses machine-learning data from over 12 million parts to generate geometry-specific instant quotes. If a customer inquiry cannot be quoted fully automatically, an efficient process ensures fast manual quoting by engineers. After receiving the order, the on-demand manufacturing platform either forwards it directly to suitable manufacturers or posts it to a job board for manufacturers in the network to pick from.

For customers, the on-demand manufacturing platform technology offers several advantages. It provides a space where they can connect with a multitude of manufacturers offering services in different manufacturing technologies or geographical regions. Furthermore, customers can get assistance in optimizing part geometry and choosing the best-suited material or production technology for their specific needs. Instant quoting, 24/7, not only simplifies order placement but also streamlines cost comparisons between different manufacturing configurations. After order placement, the on-demand manufacturing platform technology can also provide electronic documentation along the entire production process chain and track-and-trace functionalities, including estimated delivery date – all of which increase transparency for customers.

Access to a network of manufacturers

The core service offered by on-demand manufacturing platforms is access to a network of high-quality manufacturers with a wide range of capabilities. We identify three different types of platforms:

1. ***Consolidator***
   Related manufacturing locations operate under the same umbrella brand, typically resulting in smaller networks with limited global reach

2. ***Broker***
   Manufacturers operate independently as qualified partners of an on-demand manufacturing platform provider, thereby achieving greater scale and global reach

3. ***Consolidator/broker***
   Hybrid networks consisting of related manufacturing locations complemented by a network of independent, qualified partners

Platforms' networks differ in terms of their size, the production technologies covered and the geographical locations of their manufacturers. For example, some on-demand manufacturing platforms focus on connecting customers in high-cost countries with manufacturers in low-cost countries so they can take advantage of production cost advantages. However, a key promise that platforms give to their customers is quality. Platforms of the "consolidator" type can control and manage quality standards

Manufacturing platforms differ with respect to their network type, size and geographical reach

Overview of platform types

	Consolidator	Consolidator / broker	Broker
Description	Components produced by **network of mother company** (in-house production)	Components produced by • **Network of mother company** (in-house production) • **Network of independent, qualified partners**	Components produced by **network of independent, qualified partners**
Network size	Small (approx. 5) – Big (approx. 10,000)	Small (approx. 5) – Big (approx. 10,000)	Small (approx. 5) – Big (approx. 10,000)
Share of in-house manufacturers	●	◔	○
Geographical reach	Local – Global	Local – Global	Local – Global

● All manufacturers belong to the same company as the platform
◔ Some manufacturers belong to the same company as the platform
○ No manufacturers belong to the same company as the platform

Source Interviews with market participants

Roland Berger

within their own operations, but "brokers" require the manufacturers in their networks to undergo extensive qualification processes before becoming qualified partners. The quality promise offered by on-demand manufacturing platforms means that customers can avoid lengthy, cost-intensive traditional sourcing processes: The qualification and auditing of suppliers has already been performed by the platform.

The key advantage for customers is having a one-stop shop for multi-technology manufacturing services

Key advantages for customers and manufacturers

Customer

One-stop shop for manufacturing services in different production technologies

Access to additional manufacturers (e.g. in low-cost countries)

Transparent, efficient ordering process, incl.:
- Instant/fast quoting
- Streamlined order management and payment process
- Instant delivery date guarantee
- Order tracking

Guaranteed quality and less time spent qualifying suppliers

Manufacturer

Bigger potential customer base (geographies/industries)

Increased machine utilization

Streamlined business processes
- No more quoting
- Streamlined credit management
- Standardized customer interface

Source Interviews with market participants

Roland Berger

Most manufacturers in on-demand platforms' networks are small or mid-sized companies with a local or national customer base. In times of local or national demand shortage, such manufacturers can suffer from underutilization. On-demand manufacturing platforms increase their reach and expand their potential customer base without creating additional costs for sales and marketing. This can improve their utilization and thus the return on investment. Furthermore, by eliminating efforts for quoting or credit management, and by standardizing the customer interface, the efficiency of their business processes increases. Customers can also receive basic advisory services, and part designs uploaded to the platform undergo a producibility check. In this way, the manufacturer's workload is reduced and they can focus on what they can do best: manufacturing parts.

Limitations of on-demand manufacturing platforms

While on-demand manufacturing platforms offer many advantages, they also have a number of limitations. Most platforms are designed to serve spot demand in small lot sizes. If the customer has consistently high demand for parts for series production, the customer has less influence over production than in regular series production and usually cannot enjoy the normal economies of scale – although, as mentioned above, some platforms are now addressing this problem by helping customers develop a series production with external manufacturers. Using on-demand manufacturing platforms also means giving away control over the supply chain to a certain extent at the moment of placing an order. Most often, the customer will not know exactly what production techniques and processes are used, or even the name of the manufacturer that produces the part. In the event of quality issues, this can make it difficult to identify the cause. Furthermore, concepts such as just in time (JIT) or even just in sequence (JIS) cannot be combined economically with on-demand manufacturing platforms, as regional proximity cannot be guaranteed and flexible manufacturers are not properly integrated into an OEM's logistics. Therefore, engaging with a traditional manufacturer or building up internal production capacities can be a better solution for customers who need to produce parts in bigger lot sizes.

Another important advantage of traditional manufacturers is that they often complement their manufacturing services with engineering services. Depending on their structure, on-demand manufacturing platforms can provide basic design for manufacturing (DfM) feedback for uploaded part geometries, but few provide extended design or simulation support – which can be critical for the production of highly complex parts. Many on-demand manufacturing platforms offer a wide array of general standards, but if the customer requires special standards such as individual approvals or OEM-specific standards, on-demand platforms often cannot meet these, as the effort to establish them is too high.

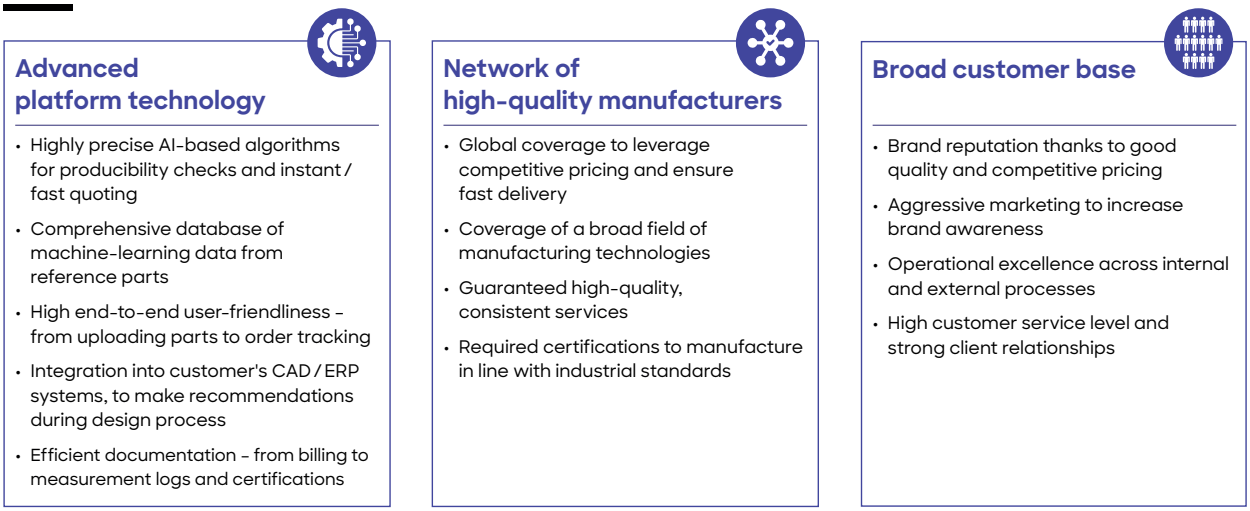
Succeeding in the on-demand manufacturing platform market

From our research, we have identified three pillars of success for on-demand manufacturing platforms:

- Outstanding platform technology with advanced AI features, such as DfM feedback
- A broad network of high-quality manufacturers
- Access to a broad customer base

Key success factors for platforms

Advanced technology, a network of high-quality manufacturers and access to a broad customer base



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Outstanding platform technology

Excellent on-demand platforms stand out by the ease of use of their user interface. Aside from allowing orders to be placed directly on the online platform, some have integrated their platform into established CAD or ERP systems via plug-ins, so designers can place orders and get immediate feedback in a familiar development environment.

The platforms' quoting algorithms need to determine sales prices as accurately as possible in order to avoid overshooting competitors' prices or quoting below production costs. The accuracy of quotes depends on the AI technology utilized and the number of datapoints that the algorithm can access.

A broad network of high-quality manufacturers

Critical size, a broad technology offering and good regional coverage are essential in order to meet diverse customer requirements and ensure high availability of services. Consolidator-type platforms build up their networks organically or identify suitable manufacturers to acquire. Brokers, by contrast, must convince manufacturers to offer their services via their platform. In some cases, they do this by offering additional benefits, such as access to purchasing pools, support in marketing activities or free access to manufacturing execution systems (MES).

The manufacturers in the network should be capable of producing high-quality parts at competitive costs. While most platforms have the quality certification ISO9001,

some offer industry-specific standards, such as AS9100 (Aerospace) or ISO13485 (Medical) so they can serve regulated industries. As regulations increase, so does the need to address security concerns, providing adequate data security to prevent IP theft for specialized parts.

Access to a wide customer base

Increasing demand for on-demand manufacturing services has led to greater competition in the on-demand platform space. Winning customers has become more difficult. The key to gaining access to customers is brand reputation, and many platforms mainly rely on online advertising to create brand awareness. However, as competition increases, the costs of online advertisement have also exploded over the last few years, and some platforms now spend over 15 percent of their revenue on sales and marketing. With this in mind, some on-demand manufacturing platforms have started using different approaches to creating brand awareness, such as directly approaching potential customers in relevant positions (such as engineering, product design, procurement or supply chain managers). Finally, most on-demand platforms generate a large share of their business from repeat customers, so ensuring customer satisfaction with regards to product quality and delivery time, and offering comprehensive customer support, is critical.

Outlook

DR. HENRIKE WONNEBERGER
Replique

"On-demand manufacturing platforms have their origin in serving spot demand of parts in small lot sizes, but some are developing to suppliers of qualified parts for industrial grade 3D printing that can be called off by customers based on their true demand such as in a digital warehouse, therefore enabling OEMs to fully embrace the potential of additive manufacturing and integrate it into their standard processes."

On-demand manufacturing platforms have proven to be a successful business model, attracting a multitude of entrepreneurs and investors. New players are still in the process of building up their brands and reputations, while established platforms are investing in strengthening and defending their market position.

Our research shows that on-demand manufacturing platforms are now facing new challenges and opportunities:

1. Market consolidation: We expect to see consolidation of platforms for common technologies, while niches and new business models will create room for new entrants

2. Increased part complexity and lot sizes: We can observe a trend towards customers requesting parts of greater complexity and in bigger lot sizes. This places new requirements on platform technology and the supply chain management of on-demand platforms

3. Extension of the business model: On-demand manufacturing platforms have the potential to disrupt supply chains in lasting ways. They are expected to act more and more as digital warehouses for true demand-driven and decentralized spare part production, for instance. As a result, platforms will increasingly form long-term production agreements with customers, moving away from their spot demand-driven roots

Roland Berger supports on-demand manufacturing platforms in their scale-up process, the creation of new business models and M&A activities. Contact our experts for more information.

Further reading

- ➔ *NEXT GENERATION MANUFACTURING: HOW COMPANIES CAN EMBRACE THE MANUFACTURING EVOLUTION?Y*
- ➔ *WHATEVER HAPPENED TO "INDUSTRY 4.0"?*
- ➔ *INVESTING IN ADDITIVE MANUFACTURING*

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