The Total Economic Impact™ Of Microsoft Azure Serverless Platform

Cost Savings And Business Benefits Enabled By Serverless On Azure

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ABOUT FORRESTER CONSULTING

Forrester Consulting provides independent and objective research-based consulting to help leaders succeed in their organizations. Ranging in scope from a short strategy session to custom projects, Forrester's Consulting services connect you directly with research analysts who apply expert insight to your specific business challenges. For more information, visit forrester.com/consulting.

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Benefits And Costs

Impacted efficiency of individual developers and the development process overall:

40% increase

Return on investment:

414%

Payback period:

<6 months

Executive Summary

Microsoft Azure is an ever-expanding set of cloud computing services to help organizations meet their business challenges. The Serverless platform within Azure extends the value proposition of cloud further by offering a set of highly managed services that minimize the time and resources spent on infrastructure-related requirements.

Microsoft commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Azure's Serverless capabilities. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of leveraging the Microsoft Azure Serverless platform on their organizations. To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed nine customers with experience using Azure Serverless platform capabilities.

Prior to using the Azure Serverless platform, the customers used a combination of on-premises infrastructure and sometimes cloud services that typically consisted of virtual machines hosted on a public cloud. Repeatedly, customers told Forrester during interviews that the size, scale, and rate of change for technology were becoming an impediment to their business. To remain competitive, they needed to leverage technology that enabled rapid change that could scale with demand and support the demands of customers.

With a Serverless approach backed by Azure, the companies enjoyed improvements that generated new sources of revenue, accelerated new revenue streams, and improved the efficiency of the entire IT organization. The chief technology officer (CTO) at one company told Forrester: "The thing about Azure Serverless is that it allows you to innovate without worrying about the infrastructure. Today, if a business unit wants a new customer site, we can build it six different ways through Azure and get to market faster. Developers can create a service, container, or other function; it's a logic app, to bring up a cloud service to build, test, and deploy code more rapidly, making each developer more efficient. Operational problems such as disaster recovery, backup, and security are reduced or even eliminated from the IT organization's list of tasks. Staff can focus on adding value to the business and helping accelerate our primary business objectives."

Key Findings

Nonfinancial benefits. The interviewed organizations experienced the following benefits, which are not quantified for this study:

› **Improved the quality of digital assets for customers.** Using Azure Serverless capabilities, some interviewed companies improved the speed of digital releases, resulting in faster improvement in customer facing applications, services, and mobile apps.

› **Sustained innovation from a steady stream of new Serverless features from Azure.** Each interviewee mentioned their company's ability to sustain constant innovation with the regular expansion of Azure Serverless platform capabilities.

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**Benefits PV
$8 million**
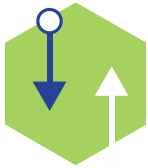
**Costs PV
$6.4 million**

**NPV
$6.4 million**

**Payback
<6 months**

› **Leveraged Azure tagging.** One interviewee was highly enthusiastic about the Azure tagging capabilities and ways that team members could leverage logically organized resources with metadata across its global organization.

› **Financial benefits.** The following risk-adjusted present value (PV) benefits are representative of the companies interviewed:

› **Increased revenue due to scalable API infrastructure.** Several interviewed customers were able to monetize new services, including charging for API hits for information partners. The result was increased revenue that contributed net profit to each company's bottom line.

› **Increased efficiency of developers and velocity of team efficiency by 50%.** Working in the Azure Serverless platform environment improved:

   • Productivity of individual developers with capabilities such as avoiding the time and effort to provision test environments in order to improve testing capabilities.

   • Efficiency of development teams by an average of 50% (one interviewee reported an efficiency increase of 70%) that came from quickly connecting to other Azure services, using new platform capabilities such as internet of things (IoT), big data, and AI as well as redefining some job functions, such as the role of database administrators (DBAs).

› **Reduced cost to manage and maintain on-premises environment by 10%.** Many of the interviewed companies had rapidly growing business. To grow their environments without the scalability of Microsoft Azure would have required hiring dozens of additional employees to manage the expanding servers, storage, and networking.

› **Reduced cost of regulatory and audit compliance by reducing the effort of staff by 30%.** Companies that work in regulated industries must allocate staff to monitor internal behavior and support external audits. Working with the Azure Serverless platform created a better audit trail and simplified compliance by as much as 30% by the end of three years for such companies.

› **Increased speed of launching services in new countries (and compliance with the General Data Protection Regulation, or GDPR).** Additional companies realized revenue streams faster due to more rapid deployments, especially in new geographies. The Azure services allowed companies to rapidly stand up services in new countries while also complying with local laws for customer privacy and data protection.

Costs. The interviewed organizations experienced the following risk-adjusted PV costs:

› **Cost for Azure Serverless resources.** The exact cost for Azure Serverless resources depends on the specific configuration and services consumed, but on average, a company of the size and complexity used in this study would spend about $500,000 per year.

› **Third-party tools and integrators.** A number of interviewed customers used integrators or professional services firms to augment internal staff and design the new architectural requirements and operational processes to use in the Serverless environment.

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> › **Training employees to work in Azure development environment.**
> Each developer attended three days of training to optimize their understanding of the Azure Serverless environment. One CIO indicated that the training focused on processes (e.g., Azure DevOps certification) and that the technology itself required little training or orientation.

Forrester's interviews with nine existing customers and subsequent financial analysis found that an organization based on these interviewed organizations experienced benefits of $8 million over three years versus costs of $1.6 million, adding up to a net present value (NPV) of $6.4 million and an ROI of 414%.

Financial Summary
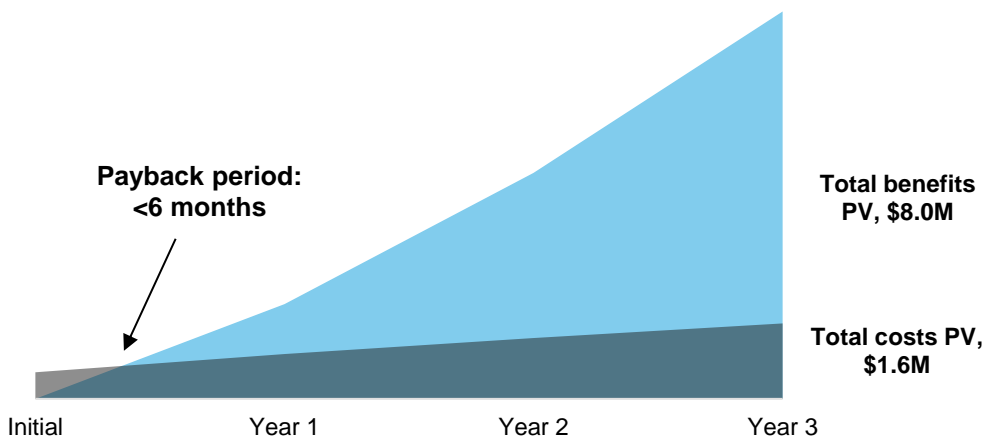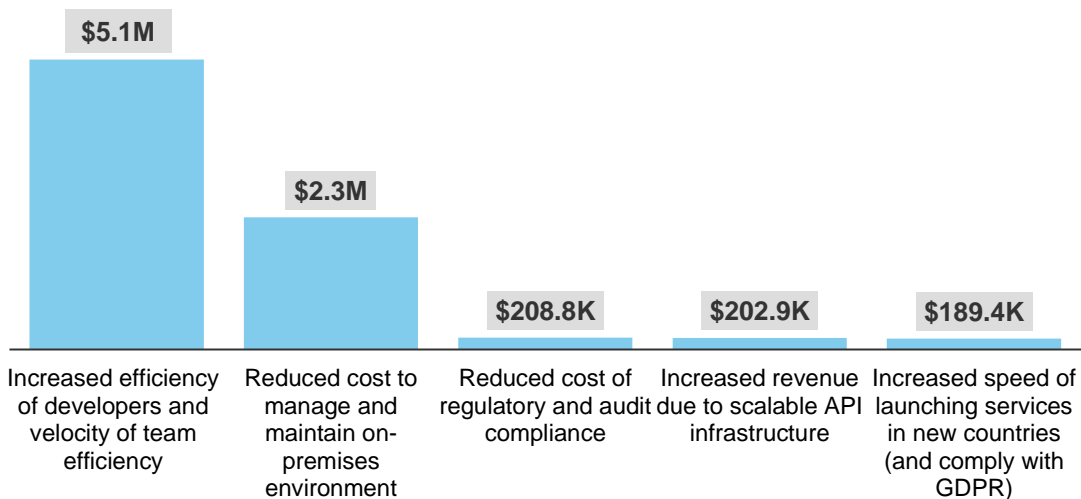
Payback period:
<6 months

Total benefits
PV, $8.0M

Total costs PV,
$1.6M

Initial   Year 1   Year 2   Year 3

Benefits (Three-Year)

$5.1M

$2.3M

$208.8K

$202.9K

$189.4K

Increased efficiency of developers and velocity of team efficiency

Reduced cost to manage and maintain on-premises environment

Reduced cost of regulatory and audit compliance

Increased revenue due to scalable API infrastructure

Increased speed of launching services in new countries (and comply with GDPR)

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TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering using Azure Serverless capabilities.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact of adopting the Azure Serverless platform can have on an organization:

DUE DILIGENCE
Interviewed Azure stakeholders and Forrester analysts to gather data relative to Serverless capabilities.

CUSTOMER INTERVIEWS
Interviewed nine organizations using Serverless capabilities to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION
Designed a composite organization based on characteristics of the interviewed organizations.

FINANCIAL MODEL FRAMEWORK
Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.

CASE STUDY
Employed four fundamental elements of TEI in modeling the impact of using Azure Serverless capabilities: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Microsoft and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in Azure Serverless platform.

Microsoft reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

Microsoft provided the customer names for the interviews but did not participate in the interviews.

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The Microsoft Azure Serverless Platform Customer Journey

BEFORE AND AFTER THE INVESTMENT IN THE AZURE SERVERLESS PLATFORM

Interviewed Organizations

For this study, Forrester conducted nine interviews with Azure Serverless capabilities customers. Interviewed customers include the following:

INDUSTRY	REGION	INTERVIEWEE	DETAILS DRIVING AZURE ADOPTION
Telco	Headquartered in North America	Software development engineer	Provided computing platforms to small and medium businesses. The customer paid Azure fees on a consumption plan, which simplified the business and eliminated the need for capacity planning and improved the response time to meet changing customer needs.
Manufacturing company	Headquartered in Europe	IT solution architect	Launched strategy to develop customer touchpoint applications to automate what customers were previously doing over the phone. Executives recognized that they could only bring the platforms to the market fast enough by adapting to the cloud and enabling development teams to focus on customer use cases.
Energy provider	Headquartered in North America	Enterprise architect	Determined need to stop using large, expensive, internal data centers and move to the cloud. This opened up a range of additional capabilities and functionalities.
Energy management products	Located in North America	Software engineer	Transitioned to Azure early (circa 2008), but the initial strategy was limited to cloud-based virtual machines, which was not broadly adopted across the organization. The second wave of Azure cloud is focused on building applications by taking advantages of Serverless capabilities.
Manufacturing	Headquartered in Europe	Cloud architect	Initiated cloud strategy with Microsoft Azure several years earlier. While the organization is migrating select applications to Azure, the company's primary strategy is building new applications and focusing development on Azure.
Internet information service	Located in North America	Chief technology officer	Leveraged Azure to manage billions of API requests from information partners every day. The move into Azure five years ago was focused on getting off on-premises servers that would allow the company to scale more effectively and expand rapidly in a more managed cloud environment.
Financial services firm	Headquartered in Europe	Global head of cloud architecture	Created by a merger of smaller companies, this larger entity faced questions about the combined technology architecture. The organization chose to clean up a significant amount of its technical debt and focus emerging development and investment into Microsoft Azure generally and the emerging Serverless capabilities specifically.
Energy services company	Headquartered in Europe	Machine learning team lead	Struggled with the flexible scalability of machine learning services. Evaluated Azure, which it deemed as good technology, but executives realized that operationally, it would be a very demanding transition. When Microsoft offered cloud as a platform, the company chose to start leveraging it.
Regional IT services provider	Headquartered in Latin America	Head of marketing and head of information security	Attracted to Azure Serverless platform largely for the financial benefit of scaling services. It sends a lot of communications like IMEO and SMS. When the company doesn't need a lot of the connections, it doesn't pay need to pay.

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Key Challenges

After conducting interviews with nine companies, Forrester identified the following challenges that led to the decision to leverage the Azure Serverless platform. The interviewed organizations needed to:

›   **Launch new platforms more rapidly.** An enterprise architect said: "When I think about our big digital integration platform, if I had to bring up a framework from zero, I would not have been able to deploy this platform or bring the platform into production within two months as I did using Azure Serverless capabilities; I guess, it would have easily taken four to six months until I would have the first case in production."

›   **Define value of cloud as more than virtual machines hosted in an offsite location.** One executive mentioned: "People across the company come to us and say, 'I want to use the cloud and I want to have a virtual machine running some software on it.' I always tell the them that they wouldn't have the most valuable benefit of cloud just by using virtual machines."

›   **Determine ways to leverage container technologies.** One CTO shared: "We were struggling with the flexible scalability of our machine learning services. We started to look at Kubernetes in our private cloud, but it would have been very demanding."

›   **Maintain environment with current patches and updates.** One executive said: "We had built a customer-facing application with Serverless functions and Cosmos DB. The products continuously evolved and added new features and capabilities. If we had the product installed on our own machines, we would never update this quickly or frequently. We would maybe update it once or twice a year because it's always a hassle. Azure's Serverless functions keep on updating all the time. We just follow along and get new features and more capabilities without any problems."

›   **Expose the limitations of on-premises infrastructure.** A director in the energy industry said: "Using Azure [Serverless platform] makes it very visible and transparent where we potentially have issues. Notably, we recently had a lightning strike take out one of our key data centers as well as some critical services."

Solution Requirements

The interviewed organizations:

›   **Defined Serverless as compute without managing the underlying infrastructure or operating system.** A manufacturing cloud architect told Forrester: "Serverless services means that I don't have to manage a virtual machine or manage a container. To me, it means that that I have a hosted service where I put my code [or container], and it gets executed. As a user, I do not have to manage the underlying operating system, and we are not managing physical disks or even virtual machines." Another executive added, "Serverless architecture means that I just put some logic, some data, somewhere, give it to someone without caring how, when, where it is running."

›   **Used API management to monitor the Azure environment.** The telco development engineer indicated: "We have API management, which was a great tool to get started and keep things under control as we matured our environment and our staff."

> "When I think about our big digital integration platform, if I had to bring up a framework from zero, I would not have been able to deploy this platform or bring the platform into production within two months as I did using Azure Serverless capabilities; I guess, it would have easily taken four to six months until I would have the first case in production."
>
> *Enterprise architect, manufacturing company*

> "We were struggling with the flexible scalability of our machine learning services. We started to look at Kubernetes in our private cloud, but it would have been very demanding."
>
> *Chief technology officer, internet information service*

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- › **Leveraged Kubernetes as a service.** One enterprise architect at an energy company added: "When Microsoft offered Kubernetes as a service, it became very appealing to us because Azure Kubernetes Services (AKS) took away much of the staffing burden. It's still a lot of back-end work, but it's a huge relief in the technical setup and enables us to be on the cutting edge of new development. We also ensure that our staff get involved in the Kubernetes community to learn new benefits and put them into use faster."

- › **Depended on existing experts even in a Serverless environment.** A manufacturing executive added: "I tell newcomers to cloud to not underestimate the amount of infrastructure decisions that still need to be deliberately made in order to lay a solid foundation for things like Serverless capabilities. They will need to pass along strong software engineering and to a degree architecture rigor."

- › **Became easier to find Azure-based talent.** An architect said: "At first, it was hard to find people who worked with Azure. Today, the talent pool is getting better and deeper with more experience. It's making it easier for us to find people and count on finding Azure specialists."

Key Results

The interviews revealed that key results from the Serverless capabilities investment include:

- › **Reaching smaller customers with variable pricing of Serverless services.** The service provider told Forrester: "The ability to scale Serverless services has enabled us to sell to customers who are even too small to have an IT department, as such. Traditionally we would sell services that would displace the infrastructure and functionality of an IT department, but we are now selling to customers that don't have a formal IT organization but used to rely on 'a couple of guys' for IT support. Now we can give them world-class operational support at a very aggressive price point."

- › **Ramping up development teams much more rapidly.** One interviewee indicated: "Having DevOps use Serverless technology gave us the capability to scale up teams, external teams especially, very fast. Today, when I have to bring onboard a new team of developers, it's a matter of a few hours to have them ready to begin development. If I needed to do that with our own equipment in our own networks, it would take several days."

- › **Enabling developers to test frequently and inexpensively.** An executive noted: "Developers just deploy an Azure Function on a consumption plan, and it magically spins up instances. We get charged every time we run a function, and the cost of running them is astoundingly low. We measured that in one period; 450 million executions cost us $700. Our developers will run a test 10 times or 100 times in testing, maybe even 1,000 times. And a thousand can cost less than on cent. It's outrageously cheap."

- › **Building products and services that leverage IoT technology.** One director said, "Azure functionality around IoT attracted some of our business units to create IoT connective products as new offerings to expand the solutions available to customers."

> "This is where I see Serverless helps, and the same counts also for Cosmos DB if you do it right. You just start using it. . . . Also, the good thing about serverless technology is that if you're on the wrong path, if you have to refactor and use it in a different way, you just shut down one path and go the other path except for your own time; you have no economical loss there. You do not lose any investment in hardware."
>
> *Global head of cloud architecture, financial services firm*

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- **Reducing the resources required to manage infrastructure.** An IT architect mentioned, "If I think about the infrastructure that underlies all the cloud services we have, for that, we would have needed 15 to 20 more people to bring that up on our own, in the same structure and in the same scope."

- **Improving the speed of testing for increased quality at a lower cost.** One director voiced a sentiment that was pervasive throughout the interviews: "We are much, much faster. We can have a new instance for Azure functions up and running within minutes — and we can scale it up and down based on the needs of the business units."

- **Avoiding the cost to build out physical facilities and infrastructure for business continuity.** The information services CTO shared: "We've probably saved about $5 million to $10 million by not having to do ridiculous amounts of disaster recovery planning for our headquarters. We just moved everything to the cloud. If we get hit by a tornado today, our business is essentially untouched."

- **Enabling nimble and flexible technology strategy.** "This is where I see Serverless capabilities helps, and the same counts also for Cosmos DB of you do it right. You just start using it," indicated one executive. "Also, the good thing about Serverless technology is that if you're on the wrong path, if you have to refactor and use it in a different way, you just shut down one path and go the other path except for your own time; you have no economical loss there. You do not lose any investment in hardware."

- **Leveraging Databricks for data modeling and analysis.** The CTO indicated: "Databricks is really, really cool technology. We use it all the time. Whether it's an ad hoc query or it's more of a deep, deep data science type project, we are using it more and more."

> "If I think about the infrastructure that underlies all the cloud services we have, for that, we would have needed 15 to 20 more people to bring that up on our own, in the same structure and in the same scope."
>
> *IT solution architect, manufacturing company*

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Composite Organization

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization is representative of the nine companies that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization that Forrester synthesized from the customer interviews has the following characteristics:

❯ Operates as a global financial services company with operations in more than 80 countries. The firm expands into additional geographies each year and must comply with data protection laws (e.g., GDPR) in each country or region.

❯ Employs developers that are focused on developing in the Serverless environment. The average burdened salary for these developers is $110,000. In Forrester's financial model, the number of developers grows:

  • From 30 in Year 1.
  • To 50 in Year 2.
  • Reaching 70 by the end of Year 3.

❯ Dedicates the full-time effort of 6 employees, including IT staff, legal professionals, and line-of-business individuals, to support regulatory oversight and audit requirements. These employees have an average burdened salary of $85,000.

❯ Provides data about financial markets to customers and partners. This business receives a high-volume of API requests every day. The company has monetized these requests into a smaller business unit based on information services.

❯ Sends developers to three days of training when they begin working in the Serverless environment.

Key assumptions
- Financial services firm

- 70 developers building Serverless apps

- 6 employees handle regulatory and audit

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Analysis Of Benefits

QUANTIFIED BENEFIT DATA AS APPLIED TO THE COMPOSITE

| Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	Increased efficiency of developers and velocity of team efficiency	$1,254,000	$2,090,000	$2,926,000	$6,270,000	$5,065,620
Btr	Reduced cost to manage and maintain on-premises environment	$731,500	$940,500	$1,149,500	$2,821,500	$2,305,909
Ctr	Reduced cost of regulatory and audit compliance	$43,350	$86,700	$130,050	$260,100	$208,770
Dtr	Increased revenue due to scalable API infrastructure	$81,600	$81,600	$81,600	$244,800	$202,927
Etr	Increased speed of launching services in new countries (and comply with GDPR)	$34,020	$68,040	$136,080	$238,140	$189,398
	Total benefits (risk-adjusted)	$2,144,470	$3,266,840	$4,423,230	$9,834,540	$7,972,624

Increased Efficiency Of Individual Developers And Velocity Of Development Teams

Throughout the nine interviews, customers repeatedly told Forrester about the drastic improvements on their development teams working in a Serverless environment. Specifically, one executive said: "In an apples-to-apples comparison, switching to a Serverless architecture reduced our total time for development by 50% to 70%. Much of that efficiency came from deployment or quality control issues that entirely disappeared such as first-day failures for new releases and updates."

This significant impact came from increases in:

› **Efficiency for individual developers.** Examples of how Azure Serverless capabilities increased the day-to-day work of individual developers include:

  • Avoiding the effort to procure or stand up sandbox and testing environments by the infrastructure team.

  • Testing code and applications at a small and entirely variable cost, often making the cost of testing inconsequential.

› **Velocity of the overall development team.** Working in the Azure Serverless environment improved the velocity of development teams and extended the reach of their capabilities. Examples include:

  • Leveraging Azure Functions and other Serverless capabilities for activities as wide ranging as IoT, big data, and AI.

  • Changing the nature of previous job descriptions (e.g., DBAs) and placing those experts in related positions that benefited from their expertise and tapped it to build business-related functionality rather than maintaining back-end technology (i.e., technical debt).

> The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of nearly $8 million.

$5.1 million

three-year benefit PV

63%
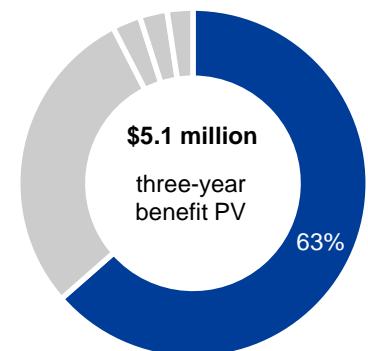
Increased efficiency of development team: 63% of total benefits

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Although the benefits came from a wide range of shifting behaviors, Forrester calculated the benefit by identifying the number of developers working in a Serverless structure and applying a 50% performance efficiency to their work. The productivity increase:

› Was worth $1.7 million in Year 1 with 30 developers.

› Reached nearly $3.9 million in Year 3 with 70 developers.

This benefit was highly consistent across the companies that Forrester interviewed. As such, Forrester adjusted this benefit downward by only 5%, yielding a three-year risk-adjusted total PV of $5.1 million.

> Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

| Increased Efficiency Of Individual Developers And Velocity Of Development Teams: Calculation Table					
Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Number of developers working in Azure Serverless environment	Composite	30	50	70
A2	Improved productivity using Serverless capabilities	From interviews	40%	40%	40%
A3	Average burdened salary	Composite	$110,000	$110,000	$110,000
At	Increased efficiency of individual developers and velocity of development teams	A1*A2*A3	$1,320,000	$2,200,000	$3,080,000
	Risk adjustment	↓5%			
Atr	Increased efficiency of individual developers and velocity of development teams (risk-adjusted)		$1,254,000	$2,090,000	$2,926,000

Reduced Cost To Manage And Maintain On-Premises Environment

Azure customers consistently reduced the cost of their spending for infrastructure. Savings included both the direct cost of infrastructure and the staff required to maintain physical assets. One customer explained that the company no longer needed a data center manager, but he turned out to be an excellent analyst. He is making significant contributions in his new role in business intelligence, where he understands the technical details of the data warehouse but can also dig deep into data and extract salient points to guide business decisions. Specially to cost savings, one interviewee told Forrester, "Our average cost for compute dropped 66% going from on-premises to serverless."

Forrester's financial modeling focuses on the staffing element and avoids including the savings from retiring servers, storage, networking, or related infrastructure. This model calculates the savings for an organization that would have needed to hire additional people to do the same work that it is accomplishing in Azure Serverless with fewer people. Specifically, Forrester's model assumes that the organization avoided hiring 7 people in Year 1, growing to a total of 11 people by the end of Year 3.

The companies that Forrester interviewed generally shared a similar experience and similar benefit to their organizations. As such, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of $2.3 million.

29%

$2.3 million

three-year benefit PV
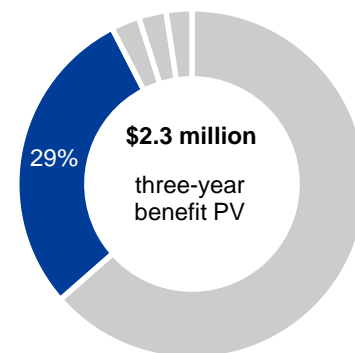
Reduced cost to manage and maintain on-premises environment: 29% of total benefits

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**Reduced Cost To Manage And Maintain On-Premises Environment: Calculation Table**

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Avoided cost of hiring additional IT staff	From interviews	7	9	11
B2	Average burdened salary	Composite	$110,000	$110,000	$110,000
Bt	Reduced cost to manage and maintain on-premises environment	B1*B2	$770,000	$990,000	$1,210,000
	Risk adjustment	↓5%			
Btr	Reduced cost to manage and maintain on-premises environment (risk-adjusted)		$731,500	$940,500	$1,149,500

Reduced Cost Of Regulatory And Audit Compliance

Some of the companies that Forrester interviewed had more than 50 people dedicated to monitoring compliance and support audits. As a financial services organization, the composite organization is subject to extensive regulatory oversight in each country or region of the world and must support audits that confirm compliance.

Forrester built the financial model based on a group of 6 of employees dedicated to regulatory and audit compliance. In the first year, using Serverless provided a nominal amount of benefit — just 10% efficiency — to this effort, but the contribution increased 10% per year, reaching a full 30% impact by the end of three years.

Because some readers will neither be regulated nor have audit compliance requirements, Forrester adjusted this benefit downward by 15%, yielding a three-year risk-adjusted total PV of $208,770.

3%

$208,770

three-year benefit PV
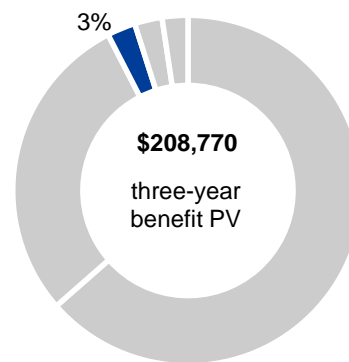
Reduced cost of regulatory and audit compliance: 3% of total benefits

Reduced Cost Of Regulatory And Audit Compliance: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
C1	Number of employees dedicated to regulatory oversight and audit support	From interviews	6	6	6
C2	Reduced effort to support audits	From interviews	10%	20%	30%
C3	Average burdened salary	Composite	$85,000	$85,000	$85,000
Ct	Reduced cost of regulatory and audit compliance	C1*C2*C3	$51,000	$102,000	$153,000
	Risk adjustment	↓15%			
Ctr	Reduced cost of regulatory and audit compliance (risk-adjusted)		$43,350	$86,700	$130,050

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Increased Revenue Due To Scalable API Infrastructure

The customer who shared this example is a prime example of leveraging the scalable capabilities of Azure Serverless. One of the customers provides internet-based information services and literally receives billions of API hits per day. The CIO indicated that building out the on-premises infrastructure to handle that volume of traffic would have been impossible for the internal IT organization. Working with Microsoft Azure, the company can leverage the infrastructure capabilities and consume just the resources required for effective API management.

In Forrester's model, the organization was able to monetize the API hits from partners and generate an additional $800,000 in revenue. At a net profit margin of 12%, the organization generated an additional $96,000 in revenue per year.

While several of the interviewed customers were able to generate incremental revenue using capabilities that they attributed to Azure Serverless, the road to realizing that revenue differed widely and is likely to vary for readers of this study. To account for this variation, Forrester adjusted this benefit downward by 15%, yielding a three-year risk-adjusted total PV of $202,927.

3%

$202,927

three-year
benefit PV
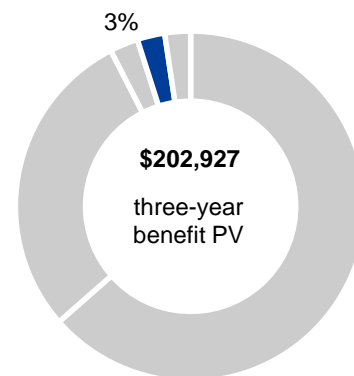
Increased revenue due to scalable API infrastructure: 3% of total benefits

Increased Revenue Due To Scalable API Infrastructure: Calculation Table					
Ref.	Metric	Calculation	Year 1	Year 2	Year 3
D1	Increased revenue	From interviews	$800,000	$800,000	$800,000
D2	Average profit margin	Composite	12%	12%	12%
Dt	Increased revenue due to scalable API infrastructure	D1*D2	$96,000	$96,000	$96,000
	Risk adjustment	↓15%			
Dtr	Increased revenue due to scalable API infrastructure (risk-adjusted)		$81,600	$81,600	$81,600

Increased Speed Of Launching Services In New Countries (And Compliance With GDPR)

Another example of generating additional revenue with the Azure Serverless capabilities comes in the ability to stand up new locations around the globe, including compliance with the critical data and privacy laws around the global (e.g., GDPR).

An executive indicated: "If we'd hosted this ourselves, the idea that we could do sovereignty-based hosting was unrealistic; we sell to customers in Europe and keep the data in Europe, the same in Australia, the same in Japan, the same in China, and the same in the US. The idea that we could have people managing and hosting such that that was possible: That was just a pie-in-the-sky type idea — without Azure."

In the financial model, Forrester shows the organization realizing incremental revenue, but the revenue was only accelerated. The company would have realized the same revenue, but it would have occurred five months later after building the environment without Azure.

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

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Thus, the incremental revenue is shown, reduced to profit by applying the net margin percentage and then reduced 42%, which accounts for the five months earlier that the revenue was realized by the company. Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $189,398.

Increased Speed Of Launching Services In New Countries (And Compliance With GDPR): Calculation Table					
Ref.	Metric	Calculation	Year 1	Year 2	Year 3
E1	Revenue from expanded services in new geographies	From interviews	$750,000	$1,500,000	$3,000,000
E2	Average profit margin	Composite	12%	12%	12%
E3	Percentage of one year that revenue was accelerated	5/12 months	42%	42%	42%
Et	Increased speed of launching services in new countries (and compliance with GDPR)	E1*E2*E3	$37,800	$75,600	$151,200
	Risk adjustment	↓10%			
Etr	Increased speed of launching services in new countries (and compliance with GDPR) (risk-adjusted)		$34,020	$68,040	$136,080

Unquantified Benefits

In addition to the benefits outlined above, the organizations shared other benefits that did not have specific financial implications. Specifically, Microsoft Azure Serverless capabilities:

› **Improved the quality of digital assets for customers.** The CIO at one company said: "The improved functionality and quality of our development has increased to the point that it's actually improved our market perception. In the app store, our digital offerings used to average customer scores about 3.8 to 3.9. In the past two years, our apps have increased to a score of 4.6. Our technology strategy is really moving the needle on the public perception of our products."

› **Sustained regular innovation using stream of new Serverless services from Azure.** The same CIO continued: "We benefit from the continuous learning that seems to never end — and that's the good and the bad of kind of the innovation from Microsoft. Literally, there is something new almost every single week. Microsoft has solved that for us by putting a dedicated team of about five to 10 people that work with us very closely."

› **Leveraged Azure tagging.** "One other thing we love about Azure is the tagging capability," continued the CIO. "There were certain rules we're never breaking with that asset tag: country code, then where in the country, east or west, or one or two, all the way down to what the machine does, what product group it's in, and is it PCI (Payment Card Industry)? We use the heck out of that tagging."

Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement Serverless capabilities and later realize additional uses and business opportunities, including:

› **Increasing the quality of information to combine local information on a global scale.** One executive described: "As an information provider, our next goal is almost philanthropic or like a humanitarian mission. We want to provide better information on a global scale that helps inform people locally and, in some cases, even save lives. To do that, we are building a combination of insights using Serverless AI, IoT sensing, and cognitive services with pattern recognition. We plan to bring all of that together and have better insights for our partners and customers."

› **Redefining roles of long-established experts, such as DBAs.** The financial services executive said: "A real-world, apples-to-apples comparison of the difference in our use of DBAs: I used to have 32 DBAs; now I have three. Our lending system has over 2,000 SQL databases, and yet my DBA needs changed. What do I need? We no longer have backups, reorganization of tables, or other functions that used to be critical activities for a DBA."

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so.

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Analysis Of Costs

QUANTIFIED COST DATA AS APPLIED TO THE COMPOSITE

Total Costs

Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Ftr	Cost for Azure Serverless resources	$0	$274,050	$301,455	$331,601	$907,106	$747,409
Gtr	Third-party tools and integrators	$550,000	$55,000	$33,000	$16,500	$654,500	$639,669
Htr	Training employees to work in Azure development environment	$0	$84,375	$56,250	$56,250	$196,875	$165,454
	Total costs (risk-adjusted)	$550,000	$413,425	$390,705	$404,351	$1,758,481	$1,552,532

Cost For Azure Serverless Resources

Most customers pay for Azure Serverless capabilities as a variable cost and based on consumption. (Various pricing alternatives are available for the Azure Serverless platform.) For simplicity, Forrester shows costs as an annual payment for the representative organization.

The specific pricing for Azure Serverless will vary, but Forrester uses an estimate for a company with the size, scale, and complexity of the composite organization used throughout this study. Readers may estimate the specific pricing for their organization using the Microsoft pricing calculator (azure.microsoft.com/pricing/calculator).

Forrester assumes a price of $225,000 in the first year and a support and maintenance fee of 16%. The organization's consumption of services increased by 10% annually. Forrester did not risk-adjust the cost, resulting in a three-year risk-adjusted total PV of $747,409.

> The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of nearly $1.6 million.

Cost For Azure Serverless Resources: Calculation Table

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
F1	Azure subscription fees			$225,000	$247,500	$272,250
F2	Annual support and maintenance	F1*16%		$36,000	$39,600	$43,560
Ft	Cost for Azure Serverless resources	F1+F2		$261,000	$287,100	$315,810
	Risk adjustment	↑5%				
Ftr	Cost for Azure Serverless resources (risk-adjusted)		$0	$274,050	$301,455	$331,601

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Third-Party Tools And Integrators

In addition to the fees paid directly to Microsoft, some organizations licensed third-party tools for integration or data display that incurred additional fees. Some organizations also paid system integrators to help them set up, configure, or migrate to Microsoft Azure. The financial model assumes $50,000 per year for integration tools and an additional $500,000 paid to integrators at the beginning of the Azure engagement.

The exact needs for integrators and additional tools will vary. To account for this risk, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of $639,669.

Third-Party Tools And Integrators: Calculation Table						
Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
G1	Integration tools	From interviews		50,000	30,000	15,000
G2	Integrator development	From interviews	500,000			
Gt	Third-party tools and integrators	G1+G2	$500,000	$50,000	$30,000	$15,000
	Risk adjustment	↑10%				
Gtr	Third-party tools and integrators (risk-adjusted)		$550,000	$55,000	$33,000	$16,500

Training Employees To Work In Azure Development Environment

The final cost incurred by the interviewed companies was training for developers about working in the Azure environment. Most employees attended three days of training. The CIO mentioned: "We spent a tremendous amount of time getting folks certified. It's really been that versus actually the technology itself, because it is pretty easy to use."

Forrester modeled three days of training at $500 per day and the cost of the developer productivity of roughly $393 per day. Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of $165,454.

Employees attend an average of three days of training about Azure.

Training Employees To Work In Azure Development Environment: Calculation Table						
Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
H1	Number of developers working in Azure Serverless environment			30	50	70
H2	Training days in first year (3 days per developer)	3 days* ($H1_{CY}$-$H1_{PY}$)		90	60	60
H3	Average cost for training	$500/day/person		$500	$500	$500
H4	Cost of developer time per day	$110,000 /280 days		$392.86	$392.86	$392.86
Ht	Training employees to work in Azure development environment	H2*(H3+H4)		$80,357	$53,571	$53,571
	Risk adjustment	↑5%				
Htr	Training employees to work in Azure development environment (risk-adjusted)			$84,375	$56,250	$56,250

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Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)

- Total costs
- Total benefits
- Cumulative net benefits

Cash flows
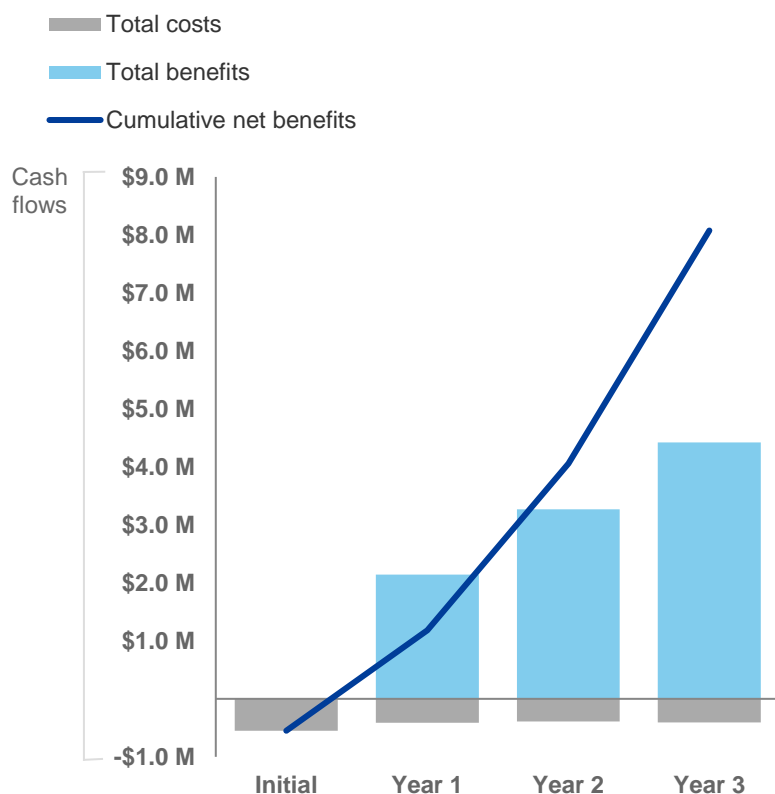
The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Analysis (risk-adjusted estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	($550,000)	($413,425)	($390,705)	($404,351)	($1,758,481)	($1,552,532)
Total benefits	$0	$2,144,470	$3,266,840	$4,423,230	$9,834,540	$7,972,624
Net benefits	($550,000)	$1,731,045	$2,876,135	$4,018,880	$8,076,060	$6,420,092
ROI						414%
Payback period						<6 months

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Microsoft Azure Serverless Platform: Overview

The following information is provided by Microsoft. Forrester has not validated any claims and does not endorse Microsoft or its offerings.

Build, Deploy, And Operate Serverless Apps On An End-To-End Platform

Deliver more value to the core of your business by minimizing the time and resources you spend on infrastructure-related requirements. Use fully managed, end-to-end Azure Serverless solutions to boost developer productivity, optimize resources, and accelerate the pace of innovation.

Increase Developer Velocity

Reduce the time spent on tasks that are noncore to the business by freeing developers from infrastructure provisioning and management. Build and deploy faster using developer-friendly APIs, low-code/no-code services, and ready-to-use machine learning and cognitive models.

Boost Team Performance

Improve team agility and performance by using a fully managed platform to build, deploy, and operate applications. Build for any application pattern and environment — hybrid, cloud, and edge. Proactively manage applications with intelligent monitoring and analysis tools.

Improve Organizational Impact

Accelerate time-to-market with Azure Serverless solutions that help your organization clear the path to innovation and new revenue opportunities. Reduce your infrastructure total cost of ownership and minimize risk with intelligent security management and advanced threat protection.

Learn more about the Azure Serverless platform at https://www.azure.com/serverless.

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Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

Total Economic Impact Approach

Benefits represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.

Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.

Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

Present value (PV)

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.

Net present value (NPV)

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

Return on investment (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

Discount rate

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

Payback period

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

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