

A Forrester Total Economic Impact™
Study Commissioned By VMware
July 2019

The Total Economic Impact™ Of VMware vSAN

Cost Savings And Business Benefits
Enabled By vSAN

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Executive Summary

VMware's Hyperconverged Infrastructure (HCI) solutions, powered by vSAN, accelerate infrastructure modernization initiatives. VMware commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential ROI enterprises may realize by deploying vSAN. The purpose of this study is to provide readers with a framework to evaluate the financial impact of vSAN on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed customers with years of experience using vSAN. Each of them found that vSAN offered a simplified, secure storage solution at a lower cost than traditional storage with the flexibility to scale and address dynamic business needs.

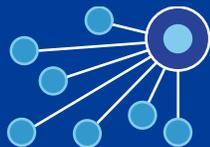
Prior to using vSAN, the interviewed customers were typically facing significant capital costs to replace traditional SAN storage arrays, which were nearing the end of their service. Before making such a major investment decision, the interviewed customers took the time to reassess their needs and evaluate the current storage solutions on the market. What they found was that both the business environment and available solutions had changed over the previous five years. Organizations faced greater competitive pressures to innovate using analytics and to leverage vast volumes of business data. Interviewees shared that their legacy storage solutions were growing increasingly complex, requiring increasing time from the SAN administration team to maintain and monitor the storage assets and related operating system. These limitations led to data latency issues and increased internal customers' frustration levels.

Key Findings

Quantified benefits. The following risk-adjusted present value (PV) quantified benefits are representative of those experienced by the companies interviewed:

- › **Server and storage cost avoidance.** By deploying an enterprise version of vSAN with an all-flash configuration, the organization replaced their traditional SAN and also enhanced storage performance with stretched clusters and data-at-rest encryption. The capital cost to implement a traditional SAN with comparable features would have exceeded \$1.8 million.
- › **Savings from storage efficiency.** HCI solutions powered by vSAN improve the usable storage available from provisioned storage. Organizations reduced their storage capital expenses with vSAN by maximizing their usable storage and then automating space reclamation to dynamically reduce application storage usage overtime. The 12% improvement in storage capacity utilization was worth more than \$173,000 in capital and operating expense savings to the organization over five years.
- › **Savings on data center footprint.** Actions that help to reduce a data center's footprint have a major impact on the cost of storage. Software-based deduplication and compression embedded in vSAN optimizes all-flash storage solutions. Customers found that they could reduce the number of storage racks in their data centers by 50% or more. The resulting savings in power, cooling, and maintenance support costs from colocation data centers totaled more than \$800,000.

Benefits And Costs



Server and storage cost avoidance:
\$1,772,482



Savings on data center footprint:
\$818,810



Capital costs for vSAN environment:
\$1,591,665

“vSAN is a fantastic solution for us. We've really improved the agility, performance, and reliability of our storage environment. To deliver all of those benefits whilst also delivering cost benefits is something we are quite proud of as a company.”

*Global infrastructure manager,
business services*





ROI
103%



Benefits PV
\$3.7 million



NPV
\$1.9 million



Payback
10 months

- › **Simplified provisioning and management.** Organizations operating globally or across multiple data centers require flexibility to keep up with growing demands for computing and data storage. With vSAN customers can add nodes to clusters with no interruption to users and allow the software to rebalance the load. The stream-lined provisioning process saved time and resources, totaling over \$750,000.
- › **IT productivity improvement.** The ability to extend existing virtualization investments in vSphere with policy-based management allowed customers to simplify data storage processes, freeing resources to devote time to strategic IT projects. The enhancement in productivity generated nearly \$150,000 in savings.

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

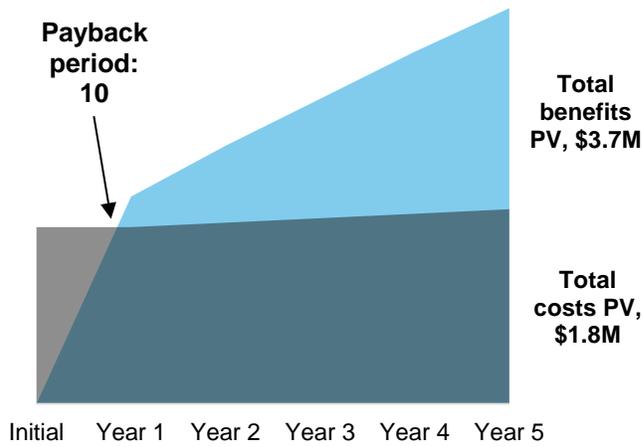
- › **Increased infrastructure resiliency.** For customers operating more than one data center, the stretched cluster feature available in vSAN Enterprise offered a high availability solution, avoiding interruption in event of a local system failure. Workloads could continue to run even if one of the data centers was down.
- › **Improved business performance.** By getting out of a giant shared SAN infrastructure, customers improved overall storage performance. This helped to eliminate complaints from application owners about storage latency when someone was doing a flash copy or backup.
- › **Savings on software licensing upon hardware refresh.** Most storage software licenses are tied to hardware. In subsequent hardware refreshes, organizations must repurchase software licenses for their new infrastructure. However, VMware vSAN is offered as a perpetual license that isn't tied to the hardware. In subsequent server refreshes, organizations only pay service and support costs for the replaced servers.

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

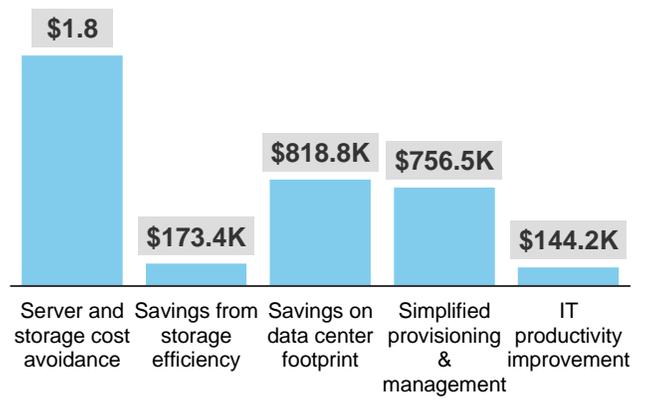
- › **Capital cost for vSAN environment.** The capital cost for a 41 host all-flash vSAN configuration, including support costs was \$1,591,665.
- › **Planning and deployment costs.** The total costs for planning and deployment were \$212,226, including the vendor selection process, internal project management, and professional services.

Forrester's interviews with five existing customers and subsequent financial analysis found that an organization based on these interviewed organizations experienced benefits of \$3,665,391 over five years versus costs of \$1,803,891, adding up to a net present value (NPV) of \$1,861,500 and an ROI of 103%.

Financial Summary



Benefits (Five-Year)



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

TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing VMware vSAN.

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 that VMware vSAN can have on an organization:



DUE DILIGENCE

Interviewed VMware stakeholders and Forrester analysts to gather data relative to vSAN.



CUSTOMER INTERVIEWS

Interviewed five organizations using vSAN 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 VMware vSAN's impact: 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.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by VMware 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 VMware vSAN.

VMware 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.

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

The vSAN Customer Journey

BEFORE AND AFTER THE VSAN INVESTMENT

Interviewed Organizations

For this study, Forrester conducted five interviews with VMware vSAN customers. Interviewed customers include the following:

INDUSTRY	REGION	INTERVIEWEE
Business services	Multinational, headquartered in the UK	Global infrastructure manager
Public utility	Headquartered in the UK	Enterprise infrastructure architect
Higher education	Headquartered in the US	Director of infrastructure services
Software	Multinational, headquartered in the US	Systems engineering manager
Retail	3,000+ remote and branch locations, headquartered in the US	Technology engineer

Key Challenges

Before implementing VMware vSAN, each of the interviewed companies:

- › **Faced significant infrastructure upgrade decisions.** One company had compute and storage reaching the end of life in terms of the hardware and support. The level of required support was becoming quite extensive and only available from a third party. Another company was struggling with compliance issues, due to the fact that its traditional storage drives were not self-encrypting; at the time adding this capability was viewed as being too expensive.
- › **Experienced delays in setting up new storage.** The time to procure additional storage capacity was too long for most organizations. One company waited seven to 13 weeks for orders to be filled, for engineers to install the drive, and to rebalance the storage.
- › **Encountered rising costs to support and manage storage infrastructure.** Interviewees stated that their infrastructure teams often struggled to keep pace with the demand for storage and the complexity to maintain and manage the system, which required specialized skills.

“The ability to quickly move capacity across the globe if we need to, made a huge difference for us.”

*Global infrastructure manager,
business services*



Solution Requirements

The interviewed organizations searched for a solution that could:

- › Seamlessly move storage capacity across the globe.
- › Provide enhanced data storage encryption and resiliency.
- › Reduce the physical footprint of data center infrastructure.
- › Capitalize on the improved price environment of all-flash storage and commodity x86 server components.

“A big selling point for our organization is you can now encrypt almost everything with no issue, just enable the future standard key servers.”

*Director of infrastructure services,
higher education*



Key Results

The interviews revealed that key results from the vSAN investment include:

- › **Simplified storage management.** vSAN, since it is combined with vSphere, allows customers to manage compute and storage from a single control plane. This helped to reduce investment in training and freed specialized storage expertise from tasks such as overseeing lifecycle management, logical unit number (LUN) management, capacity management, vendor management, etc. to pursue more strategic tasks.
- › **Improved compute and storage performance.** For one customer the transition to vSAN and all-flash storage produced a 50% reduction in latencies in their critical applications, improving application responsiveness and customer satisfaction.
- › **Accelerated speed of provisioning.** Using vSAN storage policy-based management, one customer reduced the time required to build a virtual machine for production, that's fully deployed and configured within its system, from a day to about 20 minutes.
- › **Significant reduction in system footprint.** Customers found that vSAN enabled much more efficient use of storage capacity relative to traditional storage. Assigning policies on a virtual machine rather than storage volumes on a SAN, eliminates wasted storage. One interviewee reduced its hosting physical locations by 40%, to 50%, as they moved to vSAN.

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 five 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:

Composite Organization

Description of composite. The multibillion-dollar, business-to-consumer organization is seeking a compute and storage solution that provides more flexibility and agility. In order to accelerate sales growth, the firm is pursuing emerging markets and anticipates an increase in mergers and acquisitions.

Deployment characteristics. The organization operates four regional data centers with 22 racks of servers and hard disk drives (HDD). Due to end-of-service concerns the organization needs to upgrade its servers and replace 1,000 TB of traditional storage capacity. At the same time the organization wishes to upgrade its storage by adding data-at-rest encryption and stretched clusters.

“That single pane of glass — being able to view not only the host environment, but also the storage environments across the globe — was obviously one of the big benefits. There’s no real way to quantify a value around that, but it was something that the team felt was very beneficial.”

*Global infrastructure manager,
business services*



“A nightly billing system batch job that used to take 3 hours on traditional spinning media is now running in 30 minutes.”

*Enterprise infrastructure architect,
public utility*



Key assumptions:

- › 1,000 TB of storage
- › 4 regional data centers
- › 22 racks of servers and traditional storage

Analysis Of Benefits

QUANTIFIED BENEFIT DATA AS APPLIED TO THE COMPOSITE

Total Benefits

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL	PRESENT VALUE
Atr	Server and storage cost avoidance	\$1,598,400	\$86,400	\$86,400	\$140,400	\$140,400	\$2,052,000	\$1,772,482
Btr	Savings from storage efficiency	\$74,966	\$33,955	\$35,064	\$38,387	\$39,604	\$221,976	\$173,367
Ctr	Savings on data center footprint	\$216,000	\$216,000	\$216,000	\$216,000	\$216,000	\$1,080,000	\$818,810
Dtr	Simplified provisioning & management	\$189,000	\$194,670	\$200,510	\$206,525	\$212,721	\$1,003,426	\$756,491
Etr	IT productivity improvement	\$35,815	\$37,050	\$38,285	\$39,520	\$40,755	\$191,425	\$144,241
	Total benefits (risk-adjusted)	\$2,114,181	\$568,075	\$576,259	\$640,832	\$649,480	\$4,548,827	\$3,665,391

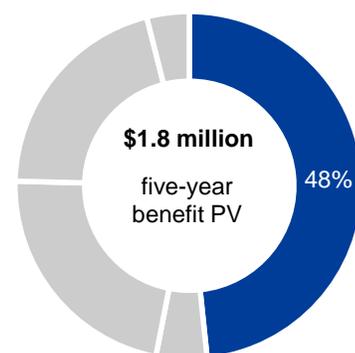
Server And Storage Cost Avoidance

Every five to six years, organizations operating under a traditional storage infrastructure model face a major investment decision when it's time to replace or upgrade their system. Despite the downward trend in storage costs, replacing servers, disk arrays, controllers, and networking hardware still represents a multimillion-dollar investment.

Once the investment decision is made, an organization is then locked-in to the hardware vendor and general architecture until the next replacement cycle begins, diminishing its flexibility to capitalize on the latest technologies.

An HCI environment powered by vSAN changes these dynamics. Because vSAN is native to vSphere, it allows users to manage compute and storage with a single platform. Storage devices can be joined across a vSphere cluster into a shared data pool, allowing organizations to scale up or down as its needs change. In those instances where costs are a key factor in choosing a storage solution, vSAN is designed to run on commodity x86 servers, eliminating the need to deploy or maintain dedicated storage arrays and storage networking hardware.

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over five years, the composite organization expects risk-adjusted total benefits to be a PV of \$3.7 million.



Server and storage cost avoidance:
48% of total benefits

While the exact nature of the cost varied, the composite company:

- › Avoided hardware and networking infrastructure costs for a traditional SAN totaling \$1.2 million.
- › Avoided an upgrade cost of \$480,000 to add self-encrypting drives and a stretched cluster capability to their storage infrastructure.
- › The warranty and maintenance fees equaled 8% to 13% of the initial capital outlay.

The reduction in capital costs for a traditional storage system will vary with:

- › The size and complexity of the existing server, storage, and network infrastructure.
- › The dependency on self-encrypting drives and resiliency provided by stretched clusters.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a five-year, risk-adjusted total PV of \$1.77 million.

“The cost advantage of vSAN was a big benefit for us. We quickly realized it was going to be significantly cheaper, perform better, and serve as our base storage going forward.”

Technology engineer, retail



Server And Storage Cost Avoidance: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
A1	Hardware cost to replace storage & servers	Composite	\$1,200,000				
A2	Upgrade charge for at rest encryption & stretched clusters	A1*40%	\$480,000				
A3	Avoided maintenance fees	Years 1-3: 8% of hardware (A2) Years 4-5: 13% of hardware (A2)	\$96,000	\$96,000	\$96,000	\$156,000	\$156,000
At	Server and storage cost avoidance	A2+A1+A3	\$1,776,000	\$96,000	\$96,000	\$156,000	\$156,000
	Risk adjustment	↓10%					
Atr	Server and storage cost avoidance (risk-adjusted)		\$1,598,400	\$86,400	\$86,400	\$140,400	\$140,400

Savings From Storage Efficiency

Through policy-based management, available in vSAN, storage resources are balanced to optimize HCI efficiency. Organizations can further consolidate their storage footprint by utilizing the deduplication, compression, and TRIM/UNMAP support features of vSAN. The impact of these features is captured by the data center footprint reduction in the next section of this report.

The interviewed customers shared a desire to streamline virtual server operations and optimize server and storage utilization while boosting performance. vSAN-powered HCI solutions are made up of multiple server nodes that form an integrated cluster that vSAN aggregates into a logical storage pool. Efficiencies in storage are achieved because VMs share that storage pool, but a VM is not tied to a specific physical drive

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.

or node.

By maximizing the utilization of storage capacity, organizations can improve usable storage capacity by up to 12%. This storage efficiency has a direct impact on reducing capital expenses and the support and maintenance associated with that capacity.

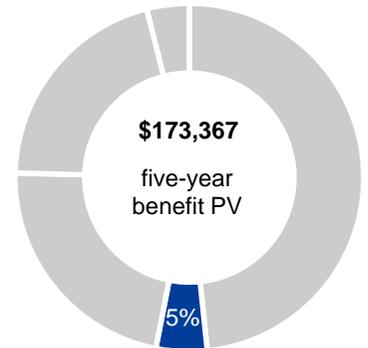
The storage efficiency benefit from vSAN HCI is modeled in the context of additional capital and operating expense savings over a traditional server/storage array architecture. For the composite organization, Forrester assumes that:

- › The storage system capacity is 1,000 TB.
- › The all-flash storage per node is 24.4 TB.
- › The initial investment is \$410,000 (41 nodes @ \$10,000 each) followed by two additional nodes added each year thereafter.
- › vSAN storage clusters improve usable capacity by 12%.
- › The need for support and maintenance is forgone due to the capacity reduction, freeing up 25% of one FTE.

There are several potential factors that can alter the impact from this benefit.

- › The nature of the data, frequency of use, and the ability to split workloads across servers can all have a bearing on utilization improvement.
- › The geographic location and complexity of the storage system may impact average capital and operating expenses per TB of storage.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a five-year, risk-adjusted total PV of \$173,367.



**Savings from storage efficiency:
5% of total benefits**

Savings From Storage Efficiency: Calculation Table

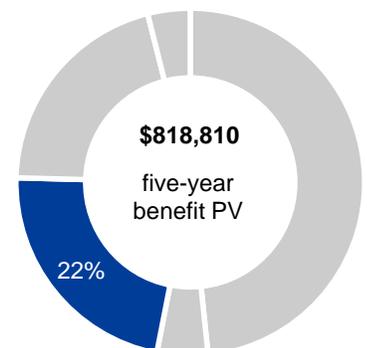
REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
B1	Requested storage capacity (TB)	Composite	1,000	49	49	49	49
B2	All-flash storage per node (TB)	Assumption	24.4	24.4	24.4	24.4	24.4
B3	Number of nodes required	B1/B2	41	2	2	2	2
B4	Capex for HCI solution (@ \$10,000 per node)	\$10,000*B3	\$410,000	\$20,000	\$20,000	\$20,000	\$20,000
B5	Hardware under manufacturer's 3-year warranty	B4 (3-year moving sum)	\$410,000	\$430,000	\$450,000	\$60,000	\$60,000
B6	Hardware under third-party warranty	B4 (cumulative sum of age > 3 years)	\$0	\$0	\$0	\$410,000	\$430,000
B7	Warranty & maintenance fees	(B5*8%)+(B6*13%)	\$32,800	\$34,400	\$36,000	\$58,100	\$60,700
B8	vSAN usable capacity improvement	Assumption	12%	12%	12%	12%	12%
B9	Foregone support & maintenance hours due to capacity improvement	25% of FTE* 2,080 hours	520	520	520	520	520
B10	IT engineer hourly rate	Year 1: assumption Years 2-5: B10py*(1+x3)	\$58	\$60	\$62	\$64	\$66
Bt	Savings from storage efficiency	(B4+B7)*B8+ (B9*B10)	\$83,296	\$37,728	\$38,960	\$42,652	\$44,004
	Risk adjustment	↓10%					
Btr	Savings from storage efficiency (risk-adjusted)		\$74,966	\$33,955	\$35,064	\$38,387	\$39,604

Savings On Data Center Footprint

vSAN's software-based deduplication, compression, and TRIM/UNMAP support optimizes all-flash storage capacity. The space required to operate data storage can drop to as much as seven times and there is minimal CPU and memory overhead.

The interviewed customers shared their experience from storage consolidation. In one case, an organization consolidated four racks down to one rack, and in another case the company reduced its footprint from 23 racks to 11 racks.

The reduction in physical hosting has a direct bearing on storage operational expenses, such as power, cooling, data center services, and maintenance support.



Savings on data center footprint:
22% of total benefits

The savings from this benefit are based up the number of racks that were eliminated during the transition from traditional SAN to vSAN and the fees associated with colocation data center space, power, cooling, network connectivity, and security. For the composite organization, Forrester assumes that:

- › 10 racks were eliminated (a 50% reduction).
- › \$2,000 monthly cost per rack at a colocation data center.

While system consolidation was viewed as a significant benefit of vSAN, the degree of savings varied from 40% to as much as 67% among the interviewed organizations. The design and complexity of the prior storage environment plays a key role in the amount by which physical hosting can be reduced.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a five-year, risk-adjusted total PV of \$818,810.

“I was able to consolidate several hundred physical servers down to two half cabinets with vSAN. So that consolidation has been the biggest bonus that we had.”

Systems engineering manager, software



Savings On Data Center Footprint: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
C1	Number of racks eliminated	Composite	10	10	10	10	10
C2	Monthly cost per rack	Research	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Ct	Savings on data center footprint	C1*C2*12	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000
	Risk adjustment	↓10%					
Ctr	Savings on data center footprint (risk-adjusted)		\$216,000	\$216,000	\$216,000	\$216,000	\$216,000

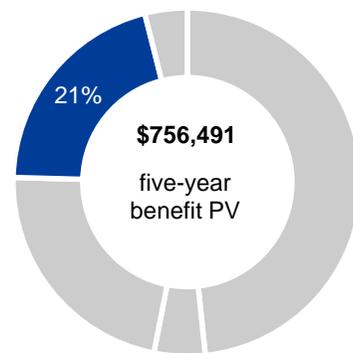
Simplified Provisioning And Management

The policy-based management feature embedded in vSAN removes the burden of provisioning and managing numerous storage volumes.

One interviewee shared that instead of having a VMware team and a SAN team going back and forth managing provisioning, the entire process was managed in vSAN. Under the previous provision process, once the VMware team had the hosts racked and stacked, they would send a ticket in to get them connected to the SAN. It would then take two weeks for the SAN team to run the cable interclass and get them zoned to a certain set of arrays, finally allowing the SAN team to assign LUNs for their VMs. Once the hosts are racked and stacked, within 1 hour or 2 on vSAN, all the storage is preprovisioned and online for the entire rack of capacity.

For the interviewed companies, the simplified provisioning process with vSAN had a significant impact on the productivity of individuals responsible for managing storage, freeing up to 50% of their time to focus on new projects or storage initiatives.

For the composite organization, Forrester assumes that:



Simplified provisioning and management: 21% of total benefits

- › 1.75 FTEs responsible for managing storage are freed up to add value elsewhere in the organization.
- › The annual compensation for individuals managing storage is \$120,000 and rises with inflation over time.

The impact of simplified provisioning will vary with:

- › The number of FTEs dedicated to provisioning storage.
- › The processes in place to provision storage in the SAN.
- › The fully loaded compensation of IT engineers.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a five-year, risk-adjusted total PV of \$756,491.

“We’ve experienced an 80% to 90% reduction in operational tasks to get storage. There are whole processes that just don’t happen for the most part anymore.”

Technology engineer, retail



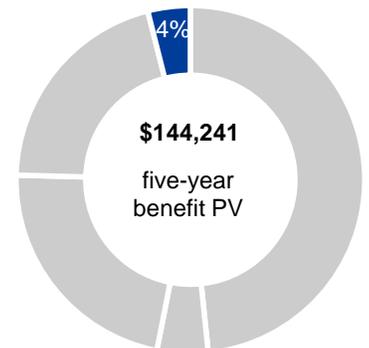
Simplified Provisioning And Management: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
D1	Number of FTEs (freed up)	Composite	1.75	1.75	1.75	1.75	1.75
D2	Yearly rate per person	Year 1: assumption Years 2-5: $C2py^{*(1+x3)}$	\$120,000	\$123,600	\$127,308	\$131,127	\$135,061
Dt	Simplified provisioning & management	D1*D2	\$210,000	\$216,300	\$222,789	\$229,472	\$236,357
	Risk adjustment	↓10%					
Dtr	Simplified provisioning & management (risk-adjusted)		\$189,000	\$194,670	\$200,510	\$206,525	\$212,721

IT Productivity Improvement

By providing vSphere-native storage, vSAN makes it easy for organizations to extend their existing virtualization investments as users can leverage existing tools, vSphere and vCenter, to manage storage. vSAN’s integration reduces the need for training and operating specialized storage interfaces.

Interviewees appreciated the ease of managing the host and storage environments with a single control plane. The familiarity with VMware, in terms of virtualization, eliminated the need for specialized storage management expertise. Customers relied on the policy-based management in vSAN to ensure consistency across the platform. Consistency across infrastructure greatly simplified lifecycle management, making it easier to patch, migrate, and support.



IT productivity improvement: 4% of total benefits

For the composite organization, Forrester assumes that:

- › The virtualization team is composed of five IT engineers.
- › The fully loaded hourly rate for the IT engineers is \$58 per hour.
- › vSAN simplifies storage management tasks, freeing up 5 hours per week for each member of the IT team.
- › IT engineers convert 50% of the freed-up hours in new projects that add value to the organization.

The extent of IT productivity improvement will vary with:

- › The number of engineers on the virtualization team.
- › The number of storage tasks that are automated with vSAN.
- › The fully loaded compensation of IT engineers.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a five-year, risk-adjusted total PV of \$144,241.

“Using vSAN policy-based management, we reduced the time required to build a virtual machine that’s fully deployed and configured within our different processes from a day to about 20 minutes.”

*Enterprise infrastructure architect,
public utility*



IT Productivity Improvement: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
E1	Number of IT engineers	composite	5	5	5	5	5
E2	IT engineer hourly rate	year 1: assumption, years 2-5: $E2py*(1+x^3)$	\$58	\$60	\$62	\$64	\$66
E3	Number of hours saved	$E1 * 5 \text{ hours} * 52$ weeks	1,300	1,300	1,300	1,300	1,300
E4	Percent captured	assumption	50%	50%	50%	50%	50%
Et	IT productivity improvement	$E2 * E3 * E4$	\$37,700	\$39,000	\$40,300	\$41,600	\$42,900
	Risk adjustment	↓5%					
Etr	IT productivity improvement (risk-adjusted)		\$35,815	\$37,050	\$38,285	\$39,520	\$40,755

Unquantified Benefits

In addition to the benefits quantified thus far, Forrester’s interviews with vSAN customers highlighted additional benefits that they were unable to quantify. These unquantified benefits include:

- › **Increased infrastructure resiliency.** In order to protect their business operations from data loss, due to failures of a single drive or an entire site, IT managers need to ensure that their storage solution is resilient. The stretched clusters available with vSAN Enterprise provide local and site protection between two geographically separate sites, synchronously replicating data.

Interviewed customers operating multiple data centers cited the advantages inherent in stretched clusters. This was a big improvement for one organization that previously was operating with side-by-side racks of storage and servers, giving them a single point of failure. With stretched clusters they could achieve the desired redundancy without a separate enterprise level storage solution for their data centers or adding to the complexity of the system and additional licensing costs of another vendor. Customers also utilized distributed RAID5/6 erasure coding to achieve high levels of data protection efficiently.

“We’ve definitely seen a step change in application performance as we moved to a modern vSAN environment. It is across the board, task queries, database queries, etc.”

*Global infrastructure manager,
business services*



- › **Improved business performance.** vSAN's all-flash storage architecture minimizes storage latency. With optimized vSAN all-flash storage, one organization saw IOPS on critical applications improve by 50%. This organization shared that the subsequent improvement in application responsiveness and agility had a direct impact on its customer satisfaction.
- › **Savings on software licensing upon hardware refresh.** Most storage software licenses are tied to hardware. In subsequent hardware refreshes, organizations must repurchase software licenses for their new infrastructure. However, VMware vSAN is offered as a perpetual license that isn't tied to the hardware. In subsequent server refreshes, organizations only pay service and support costs for the replaced servers. For the composite organization, this benefit would likely be realized outside the five-year period utilized in this analysis, hence it was not explicitly quantified.

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 vSAN and later realize additional uses and business opportunities, including:

- › **Lift and shift capacity.** To capitalize on emerging markets and quickly respond to merger and acquisition opportunities, customers appreciated the ability to shift capacity across the globe at a very fast pace, while delivering significant cost avoidance at the same time. With vSAN it is as simple as taking a host, shipping it to a new location, and then configuring it up to the new cluster.
- › **Interoperability across HCI ecosystem.** Several customers appreciated the fact that vSAN provides them with vendor flexibility, including 18 OEM server vendors as well as native services with leading public clouds. Removing dependency on a single hardware vendor gave organizations the ability to capitalize on the latest innovations and keep costs under control.

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.

Analysis Of Costs

QUANTIFIED COST DATA AS APPLIED TO THE COMPOSITE

Total Costs

Ref.	Cost	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Present Value
Ftr	Capital cost for vSAN environment	\$1,424,955	\$0	\$49,875	\$55,650	\$61,425	\$67,200	\$1,659,105	\$1,591,665
Gtr	Planning & deployment costs	\$212,226	\$0	\$0	\$0	\$0	\$0	\$212,226	\$212,226
	Total costs (risk-adjusted)	\$1,637,181	\$0	\$49,875	\$55,650	\$61,425	\$67,200	\$1,871,331	\$1,803,891

Capital Cost For vSAN Environment

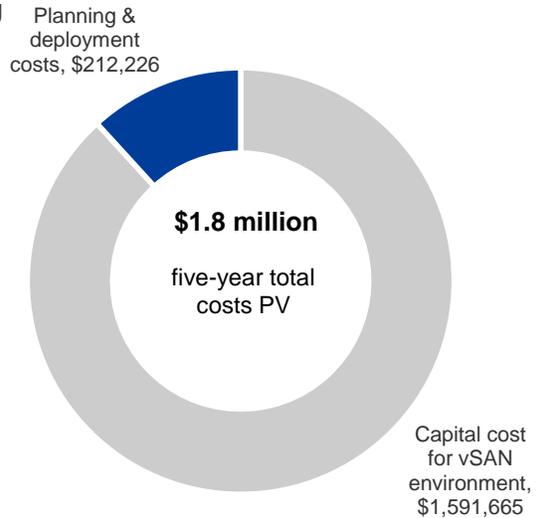
The composite organization is upgrading and replacing its compute and 1,000 TB traditional storage infrastructure across its four data centers. The upgrade to HCI with vSAN includes new servers with all-flash storage configurations, the deployment of stretched clusters, and data-at-rest encryption. Therefore, the analysis includes relevant hardware as well as the vSAN licensing and support costs.

- › The organization purchases 41 nodes to address immediate capacity requirements and then adds two additional nodes each year beginning in Year 2.
- › To optimize its vSAN support costs, the organization pays its five-year cumulative support fee upon the license commencement.
- › The model combines the hardware and vSAN licensing and support costs to derive a total capital cost for the HCI.

There are several risks that may alter these capital costs. OEM vendor discounts for servers and storage could cause initial outlays to be higher or lower. In addition, an organization might opt for a lower priced vSAN offering that does not include stretched clusters or data-at-rest encryption.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a five-year, risk-adjusted total PV of \$1,591,665.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over five years, the composite organization expects risk-adjusted total costs to be a PV of \$1.8 million.



Planning and deployment costs:
12% of total costs

Capital Cost For vSAN Environment: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
F1	Hardware cost to install all flash nodes with vSAN	41 nodes @ \$10,000	\$410,000					
F2	Additional 2 nodes per year to vSAN	2 nodes @ \$10,000		\$0	\$20,000	\$20,000	\$20,000	\$20,000
F3	vSAN Enterprise Edition license	Year 1: 82 CPUs Years 2-5: 2 CPUs	\$451,000	\$0	\$22,000	\$22,000	\$22,000	\$22,000
F4	Prepaid 5 - year support cost for vSAN initial license	Initial license (F3)*22%* 5 years	\$496,100	\$0	\$0	\$0	\$0	\$0
F5	Support cost for additional vSAN licenses	25%* cumulative new licenses (F3)		\$0	\$5,500	\$11,000	\$16,500	\$22,000
Ft	Capital cost for vSAN environment	F1+F2+F3 +F4+F5	\$1,357,100	\$0	\$47,500	\$53,000	\$58,500	\$64,000
	Risk adjustment	↑5%						
Ftr	Capital cost for vSAN environment (risk-adjusted)		\$1,424,955	\$0	\$49,875	\$55,650	\$61,425	\$67,200

Planning And Deployment Costs

The path from server virtualization to HCI was made easier for the interviewed organizations, because vSAN is already native to vSphere. Given their familiarity with the VMware hypervisor, the learning curve was relatively short. As a result, interviewees focused their efforts around the initial RFP process and internal processes such as agreeing on the standards for provisioning storage going forward. In several cases, customers worked with professional services vendors for the initial deployment to a regional data center while managing subsequent installations on their own.

Most interviewees felt that the implementation was relatively straight forward. As one customer stated: "We were actually expecting a longer time-to-deploy the solution and were quite surprised at how quickly it was accomplished. Once we started one small cluster, it was simple to repeat that in the remaining clusters."

The composite organization assumes that four IT engineers were involved in the planning and implementation of vSAN. The initial planning and RFP process required 160 hours and spanned several months. Servers and all-flash nodes were set up over two weeks and the team found that another two weeks were required to transfer the storage. Lastly, the team partnered with a third-party professional services vendor to oversee the project.

The potential risks that can impact the planning and deployment costs include:

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.



Four weeks
Total implementation
and deployment time

- › The complexity of the prior server and storage architecture.
- › The willingness of various stakeholders to transition to an HCI solution.
- › The familiarity with server virtualization based on VMware's vSphere.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a five-year, risk-adjusted total PV of \$212,226.

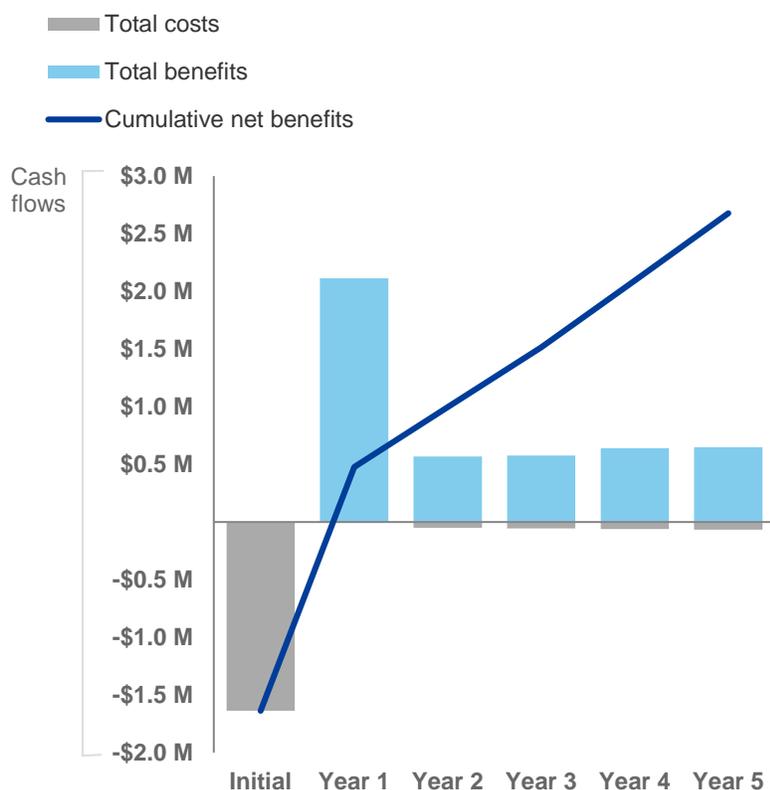
Planning And Deployment Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
G1	Number of people	Composite	4					
G2	Hourly rate per person	\$120,000/ 2,080	\$58					
G3	Hours	Composite	160					
G4	Planning transition & vendor selection process	$G1 * G2 * G3$	\$37,120					
G5	Managing storage transition (i.e., rack setup & data transfer)	Composite	\$140,000					
G6	Professional services	Composite	\$25,000					
Gt	Planning & deployment costs	$G4 + G5 + G6$	\$202,120	\$0	\$0	\$0	\$0	\$0
	Risk adjustment	↑5%						
Gtr	Planning & deployment costs (risk-adjusted)		\$212,226	\$0	\$0	\$0	\$0	\$0

Financial Summary

CONSOLIDATED FIVE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



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 Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL	PRESENT VALUE
Total costs	(\$1,637,181)	\$0	(\$49,875)	(\$55,650)	(\$61,425)	(\$67,200)	(\$1,871,331)	(\$1,803,891)
Total benefits	\$0	\$2,114,181	\$568,075	\$576,259	\$640,832	\$649,480	\$4,548,827	\$3,665,391
Net benefits	(\$1,637,181)	\$2,114,181	\$518,200	\$520,609	\$579,407	\$582,280	\$2,677,496	\$1,861,500
ROI								103%
Payback period								10 months

VMware vSAN: Overview

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

Description of the Vendor's product and features. Table or chart inclusion optional as needed.

About VMware vSAN

VMware vSAN powers the only hyperconverged infrastructure solution that is natively integrated with VMware vSphere, the industry's leading hypervisor. With over 20,000 customers, vSAN powers the most widely adopted HCI software solution as customers race to realize HCI savings in capex, opex, and time-to-market.

VMware vSAN is available as software and hardware ReadyNode configurations that are precertified with all of the industry's top server providers. The software also powers the leading HCI appliance, the Dell EMC VxRail.

For full-stack HCI deployments, VMware vSAN is a core element of the VMware Cloud Foundation (VCF), a fully software-defined HCI offering that adds workload domain setup and lifecycle management for VMware NSX network virtualization and vRealize Suite advanced hybrid cloud management.

With VMware Cloud Foundation, customers access a ubiquitous infrastructure control plane with consistent operations from edge to core to cloud. VMware's leading cloud provider network gives users the option to build a hybrid cloud with hundreds of public cloud providers, allowing users to select a vendor that meets their specific needs.

Finally, intrinsic security across compute, storage, and networking resources allows users to rethink security investments and establish the VM as a control point for establishing security credentials, monitoring, and control across the hybrid cloud.

For more information, please visit [VMware.com](https://www.vmware.com).

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.