



Business and Financial Benefits of Virtualization

BUSINESS WHITE PAPER

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Executive Summary

When IT executives engage with VMware they often ask, “How do my metrics compare to my peers with respect to virtualizing my IT environment?”. This is often referred to as the VMware Value Journey. IT executives go on to ask, “Am I doing better, worse or equal to other companies who use VMware to virtualize their infrastructure and applications?” “What are the documented financial and business key performance indicators or benchmarks of using VMware on this virtualization journey, and is my organization on target to hit these benchmarks?”

While there are anecdotes and qualitative research on virtualization’s business and financial benefits, this is the first statistically robust quantitative research that measures the business and operational impact of virtualization. To conduct the research, VMware commissioned Management Insight Technology, an independent primary research firm based in Marlborough, Massachusetts, to develop a worldwide, continuous collection, primary research instrument to carefully collect and document the business and financial metrics and key performance indicators that organizations measure on their journey to IT as Service.

Top Level Findings

VMware customers have virtualized on average 36 percent of their x86 servers, and the percentage is expected to grow at a CAGR of 24 percent.

In future years, ROI will come from operational benefits that result in improved operational and business agility.

Business continuity and business agility are becoming key drivers of deployment of virtualization.

Virtualization deployment is sponsored at increasingly higher levels, but doubts still exist among business application owners.

Significant Statistics

OPERATIONAL BENEFITS OF VIRTUALIZATION	OVERALL
Number of new projects increased by	21%
Application time to market improved by	22%
Rework and testing improved by	26%
Server incidents reduced by	27%
System downtime reduced by	26%

Table 1. Significant Operational Findings of Benchmark Study Research

BUSINESS BENEFITS OF VIRTUALIZATION	OVERALL	
	IMPORTANCE	VMWARE DELIVERS*
Operating expenses reduced	57%	4.1
Business continuity improved	54%	4.2
IT can better respond to customer requests	47%	4.0
IT can better deliver on SLAs to the business	31%	3.9
Customer service Improved	22%	3.7

Table 2. Significant Business Findings of Benchmark Study Research

* Scale is 1 to 5 where 1 = "VMWare does not Deliver" and 5 = "VMware Totally Delivers"

FINANCIAL BENEFITS OF VIRTUALIZATION	OVERALL	
	IMPORTANCE TODAY	FUTURE IMPORTANCE
Reduced hardware costs	72%	52%
Server provisioning time reductions	62%	43%
Disaster recovery improvements	39%	49%
Upgrade / maintenance expenses reduced	25%	31%
Applications released faster	14%	22%

Table 3. Significant Financial Findings of Benchmark Study Research

JOURNEY STAGE	STAGE DESCRIPTION	% BY STAGE	ROI BY STAGE
IT Production	Used primarily for server consolidation of IT-owned applications	38%	214%
Business Production	Tier-1 business apps run on virtual servers and advanced features are employed	43%	253%
IT as a Service	All apps are eligible to be run in virtual machines, advanced management techniques are used for virtual servers, and IT organization and processes are updated to fit with virtual infrastructure.	17%	249%

Table 4. Percentage of Companies by Stage of Value Journey, Including ROI

VIRTUALIZATION ADOPTION METRICS	OVERALL
Current percent of x86 servers virtualized	36%
Target percent of production servers that will be virtualized in two years	66%
Percent of newly acquired servers that will be virtualized	76%

Table 5. Study Results for Virtualization Adoption Metrics

Adoption of virtualization is steadily increasing. Currently respondents have, on average, virtualized 36 percent of their x86 workloads. On average, respondents anticipate virtualizing 76 percent of next year's newly installed x86 server workloads. 60 percent of respondents have virtualized one or more Tier-1 production applications.

Organizations are maturing on the VMware Value Journey. The VMware Value Journey is a framework for assessing the maturity of an organization with its use of virtualization. 43 percent of organizations report that they are in the Business Production stage of their journey, virtualizing Tier-1 applications and using advanced features of VMware virtualization such as VMware vMotion® for live virtual machine migration, and VMware High Availability (HA) for hardware-independent failover.

ROI improves as organizations move forward on their journey. As organizations move through the stages of their journey they see incremental increases in ROI. Organizations using virtualization only for IT Production reported an ROI of 214 percent, while organizations who are in the IT as a Service stage see an ROI of 249 percent. Significant operational efficiencies are gained by adopting virtualization, due to platform capabilities (fewer incidents, less downtime, higher utilization), consolidation and green saves, as well as greater efficiency of IT staff (appreciably less rework, testing, and maintenance).

The primary sources of ROI are expected to change. Currently the sources of ROI reported are primarily from hardware savings, reductions in server provisioning time, and disaster recovery costs. Organizations expect the sources to shift to disaster recovery costs, reduced maintenance costs, and faster application release time.

Business benefits of virtualization extend beyond IT. Research participants listed the top business benefits provided by virtualization as follows:

- Reduction in operating expenses
- Improved business continuity
- Better response by IT to requests for new services
- Improved SLAs on IT services
- Improved customer service

The results confirm that virtualization can reduce costs, improve business continuity, and further business agility.

Barriers to further deployment of virtualization in the datacenter are primarily organizational perception issues. As stated earlier, 43% of organizations have successfully virtualized tier 1 business critical applications and are realizing the value of cost savings, better availability, and increased agility that come with virtualization. However, amongst some organizations adoption has been slowed by negative perceptions within the organization. The number one perceived barrier to further deployment was reported to be the cost of SAN storage. Beyond that, other perceptions issues such as application performance, lack of ISV support, and resistance from database administrators were the top barriers to further deployment. These topics are further developed later in this paper.

Strength of virtualization sponsorship varies by organization. The sponsorship of virtualization deployment is strong within IT management, but weakest with Business Application Owners and Line of Business IT. Lack of support from business application owners is most likely a result of lingering perception issues related to poor performance and lack of support statements from leading ISV for business applications running on VMware virtual servers.

Detailed Findings

Adoption of Virtualization is Steadily Increasing

Adoption trends show an average virtualization deployment of 36 percent of respondents' x86 environment. When we look at industry data, we see that the Financial Services sector is about 28 percent higher than average with 45 percent of x86 workloads virtualized. Other industries are closer to the average.

When adoption rates were segmented by company size, the results were in line with expectations. Smaller organizations operating fewer servers can more readily virtualize these server workloads and achieve a higher rate of server virtualization. The average for the smaller customer segment was 45 percent. Larger commercial and enterprise organizations (environments with thousands of servers and multiple IT touch points) averaged virtualization deployment between 32 percent and 34 percent of x86 workloads, except for the Financial Services sector.

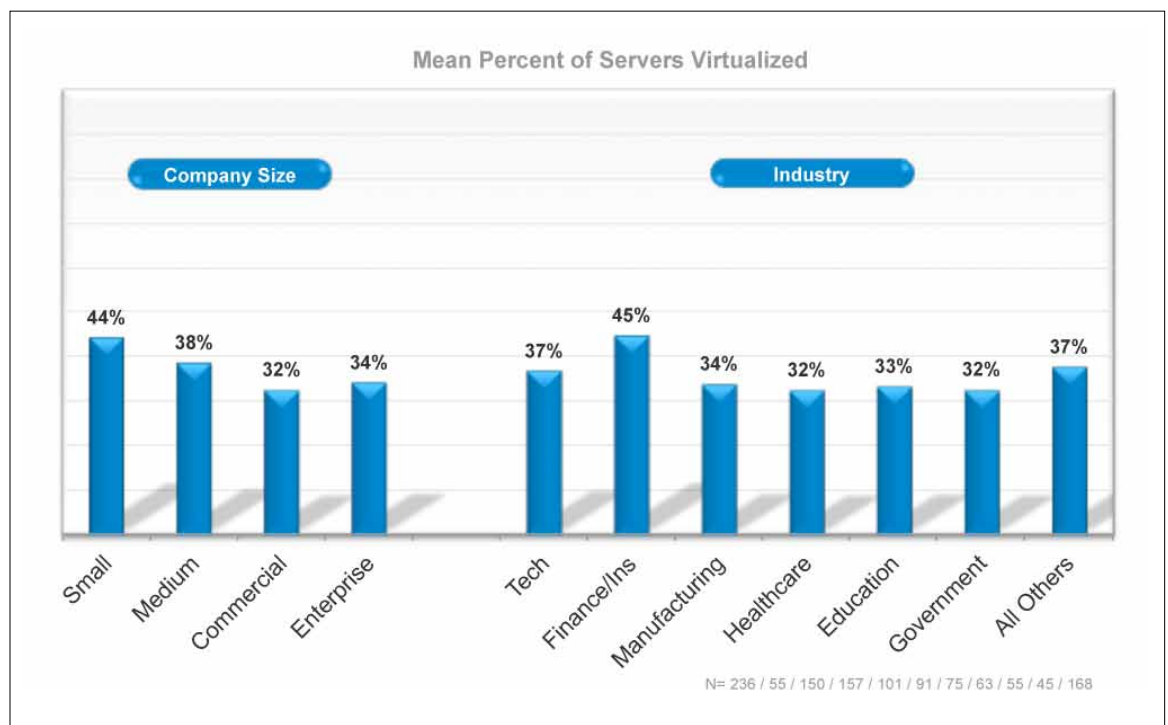


Figure 1. Percent Virtualized by Company, Size and Industry

While the adoption average coalesced around 36 percent, there was a wide range in the reported virtualization values. The average customer virtualization deployment range was between 10 percent and 60 percent of the server population; however, close to 20 percent of organizations reported adoption levels exceeding 60. Given the broad distribution in the level of adoption, the finding suggests that there is significant disparity in understanding and expertise across the general population. The wide distribution suggests a significant amount of operational differences within shops that might affect virtualization deployment.

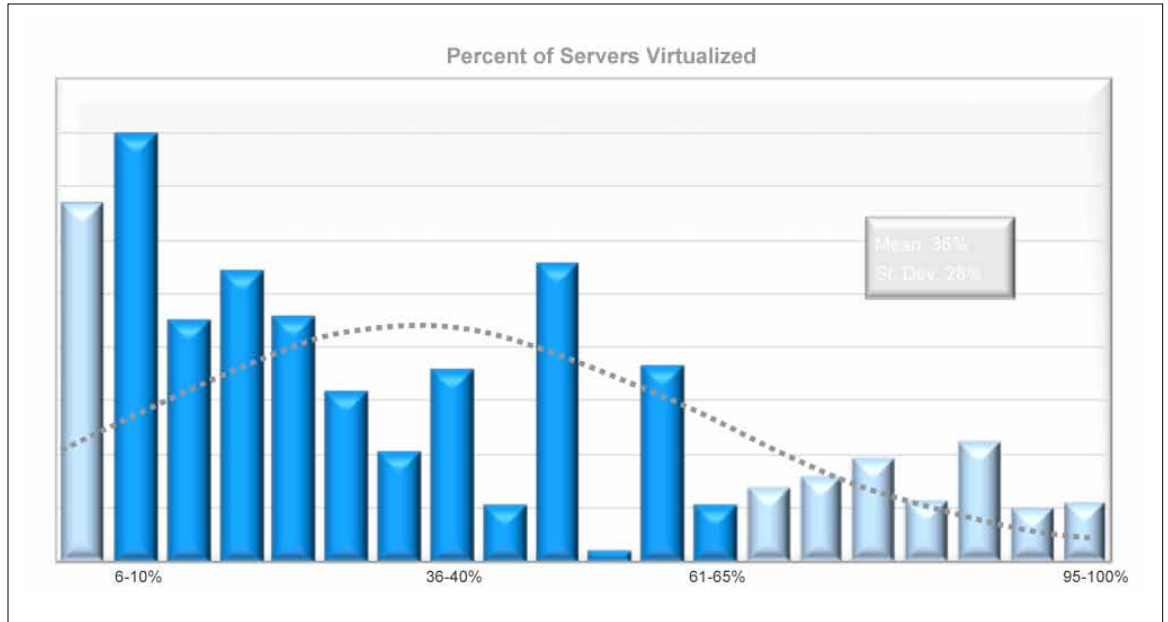


Figure 2. Percent of Servers Virtualized - Distribution

Adoption Trends

In addition to understanding where organizations stand today, we were seeking to understand where they wanted to be in the near future (within two years). Companies expected to end 2010 production with the server virtualization rate of 43 percent and have set the 2012 target at 66 percent. The two-year projected CAGR for virtualization deployments is 24 percent, which is almost twice the rate of historical physical server procurement and deployments. To meet this growth rate, organizations expect to virtualize from 72 percent to 82 percent of their new server implementations, depending on company size and industry.

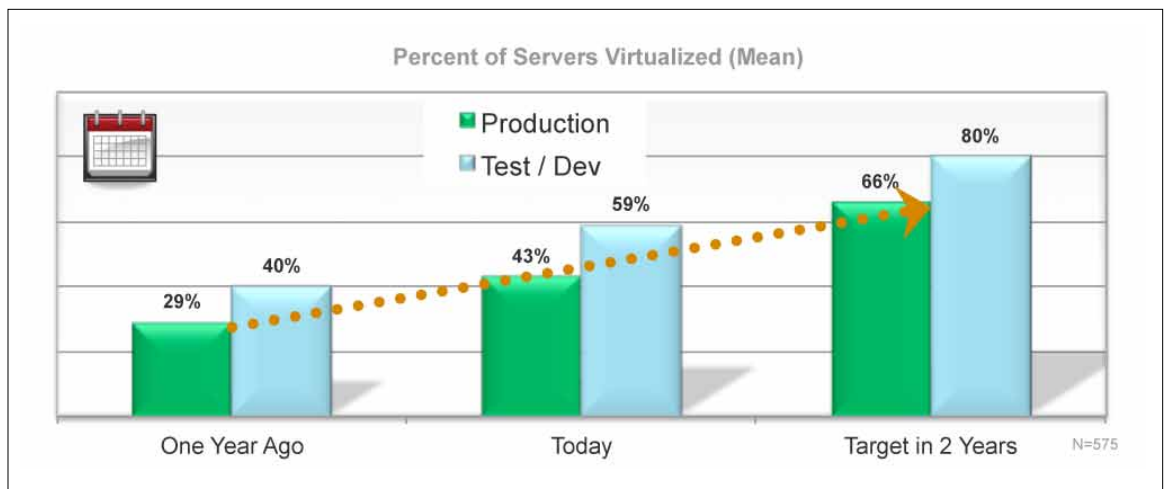


Figure 3. Trending for Percent of Servers Virtualized

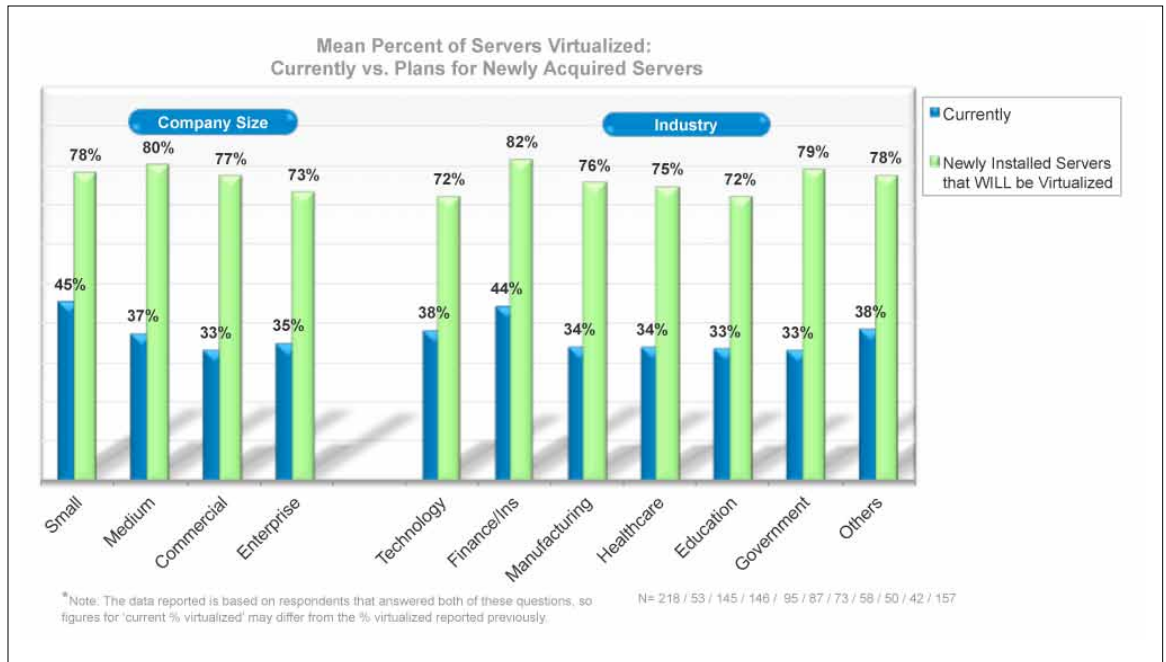


Figure 4. Mean Percent of Servers Virtualized: Current vs. Plans for Newly Acquired Servers

Tier-1 Application Trends: More Than 50 Percent of Tier-1 Workloads Run in Virtual Machines

In order to meet the expected virtualization growth rates, the scope of workloads deployed on virtual servers would have to expand to all applications. As companies report a greater portion of their server workloads are virtualized, we wanted to understand what workloads they were virtualizing. Were Tier-1 applications being considered, under evaluation or being deployed? Were these applications focused on a particular category or a broad set? Respondents stated that a broad array of Business critical applications (databases, collaboration/messaging, and other business applications) are now deployed in a virtual machine.

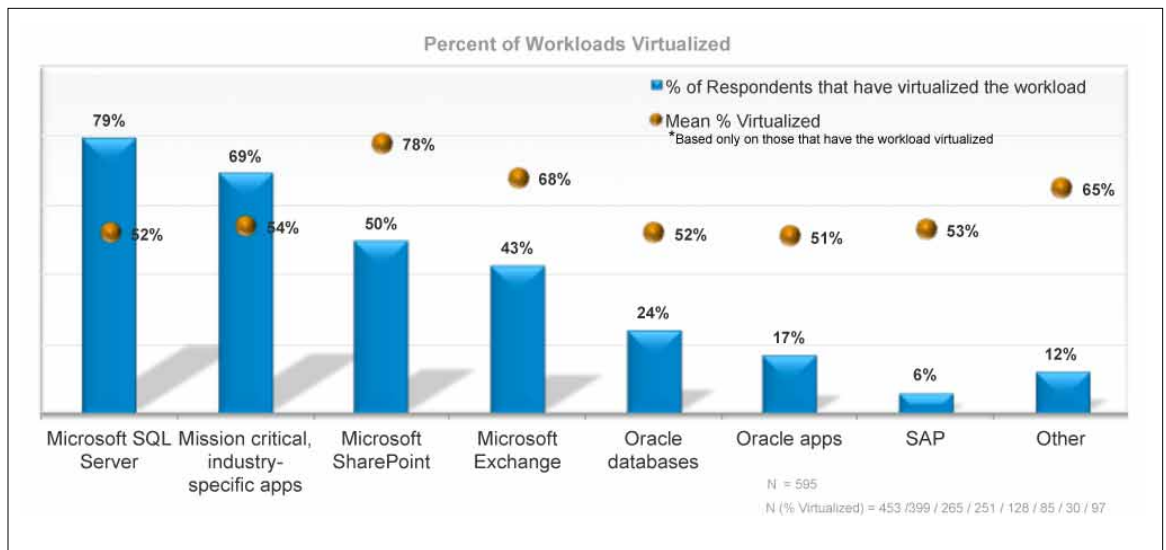


Figure 5. Commonly Virtualized Tier-1 Applications

For applications such as Exchange, Oracle databases, and SAP—where less than half of organizations stated they deployed these workloads in a virtual machines—it was interesting to see that once the decision was made,

they moved aggressively. Once the capability is established, organizations virtualized 68 percent of their Exchange Servers and 52 percent of Oracle database servers! Within the broader categories, 69 percent of respondents stated they were running mission-critical industry-specific applications in a virtual machine. These organizations state they are running more than half of their mission-critical apps inside virtual machines.

Organizations are Maturing on the VMware Value Journey

VMware has developed a framework for assessing a organization's progress toward achieving IT as a Service. There are three stages in this framework, as shown in Table 6. An additional stage, "Test/Dev," was added to this survey for those datacenters that have not virtualized any production applications. These stages measure an organization's maturity in the use of virtualization technology and the impact of virtualization on the operation of the organization.

STAGE	DESCRIPTION
Test & Dev	Virtualization is used primarily in testing and development environments with very few production applications.
IT Production	Virtualization is used primarily for server consolidation of IT-owned applications.
Business Production	Tier-1 business apps run on virtual servers and advanced features are employed.
IT as a Service	All apps are eligible to be run in virtual machines, advanced management techniques are used for virtual servers. The IT organization and processes are updated to fit with virtual infrastructure.

Table 6. VMware Value Journey Stage Descriptions

Responses indicate that 43 percent of organizations consider themselves to be in the Business Production stage of the journey, virtualizing Tier-1 applications and using advanced features such as vMotion, VMware Dynamic Resource Scheduling (DRS), and VMware High Availability (HA). Technology companies tend to be in earlier stages of adoption, while companies in Manufacturing and Financial Services are further along in their journey.

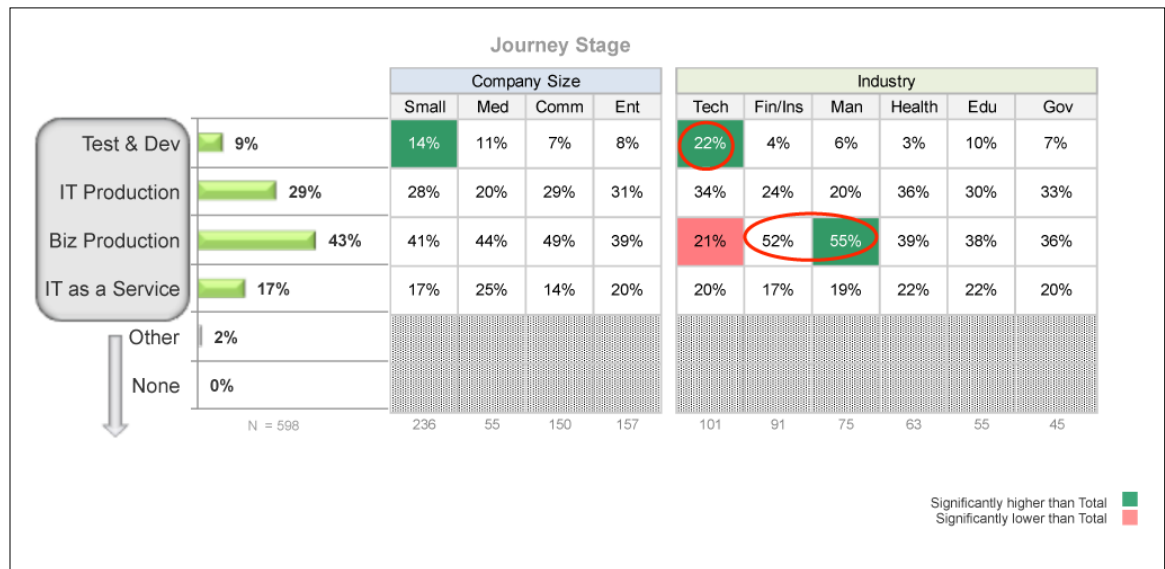


Figure 6. Journey Stage by Company Size and Industry

ROI Improves as Organizations Move Forward on the VMware Value Journey

The data from the study suggests that there is a direct correlation between return on virtualization investment and the maturity of virtualization adoption. ROI as a function of VMware Value Journey stage shows an increase in ROI as organizations move through the Journey. This question measures the ROI realized from virtualization compared to the operational maturity of an organization. The most significant increase in ROI occurs when organizations begin virtualizing production applications and move from Test/Dev to IT Production.

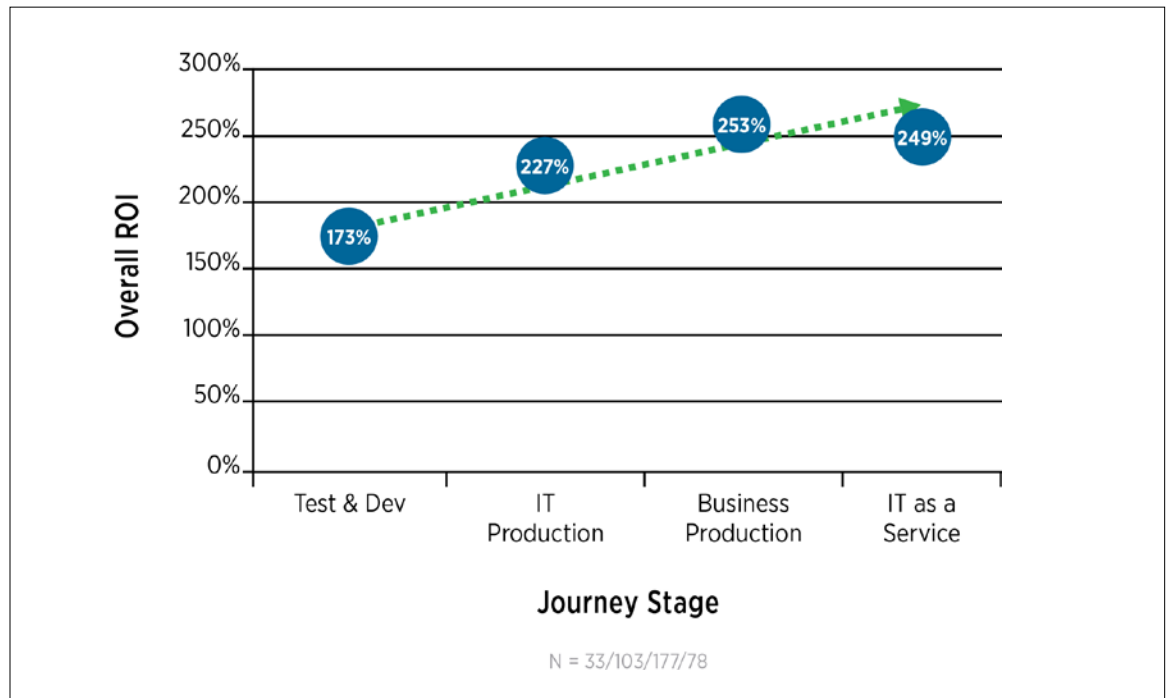


Figure 7. ROI by VMware Value Journey Stage

The correlation between *ROI* and *Years as a VMware Customer* shows an even stronger relationship between ROI and customer maturity. This question measures ROI realized from virtualization compared to the number of years the organization has been virtualizing applications. The most significant increase in ROI occurs in the second and third years of an organizations use of virtualization.

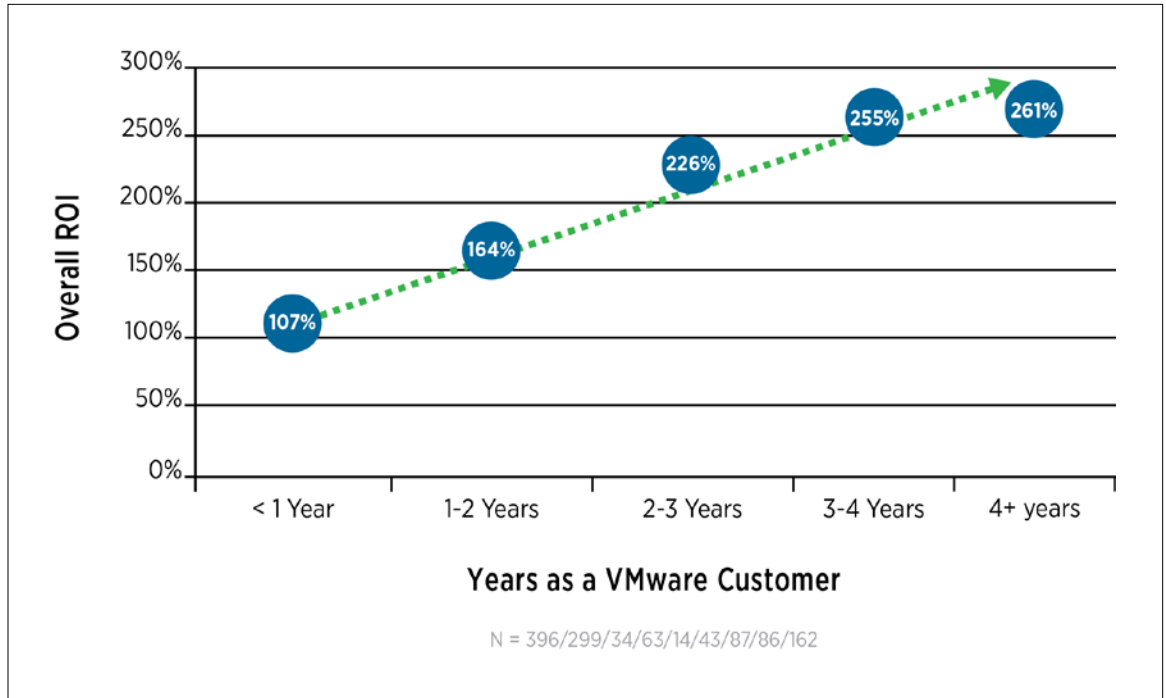


Figure 8. ROI by Years as a VMware Customer

The Primary Sources of ROI Are Expected to Change

Virtualization delivers both business and operational benefits. We wanted to know what capabilities were top of mind and delivering value beyond consolidation. Reduced hardware spend was listed as the top contributor to ROI both now and in the future. However, the contribution of reduced hardware spend is expected to go down in the future with factors such as improved disaster recovery and improved upgrade/maintenance time increasing in importance.

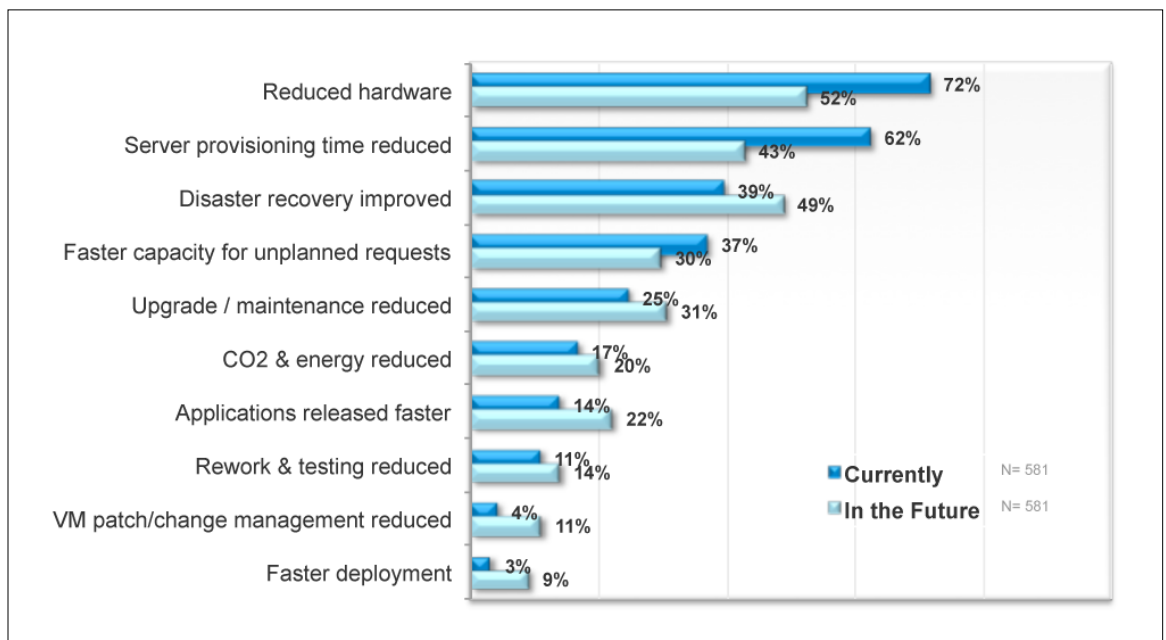


Figure 9. Primary Sources of ROI

The results of the study show a general trend away from capital expense savings as the primary motivator for virtualization, and toward business agility and operational efficiency. If you look closely at the results of the question about future ROI, only one category relates to capital expenses, while all of the other leading categories relate to agility and operational efficiency.

BENEFIT	IMPACT
Reduced hardware	Capital Expenses Reduced
Disaster recovery improvements	Agility & Operational Efficiency Improvements
Server provisioning time reductions	Agility and Operational Efficiency Improvements
Upgrade / maintenance reductions	Agility and Operational Efficiency Improvements
Faster capacity for unplanned requests	Agility and Operational Efficiency Improvements

Table 7. Virtualization Benefits and the Associated Business Impact

Since the vast majority of respondents stated that they obtained operational improvements, it was important to understand the impact. Aggregate staff operational gains were reported to allow 21 percent more projects to be undertaken with existing staff members. This staff efficiency and improved operational leverage results in improvements to business agility and profitability. Respondents reported that applications could now be brought to market 20 percent faster as rework and testing time was reduced by 22 percent. Additionally, several key factors impacting service availability, server incidents, and system downtime improved by more than 25 percent. While not captured in the survey, organizations realize a secondary benefit of lower datacenter server support team call volumes due to a reduction in server incidents.

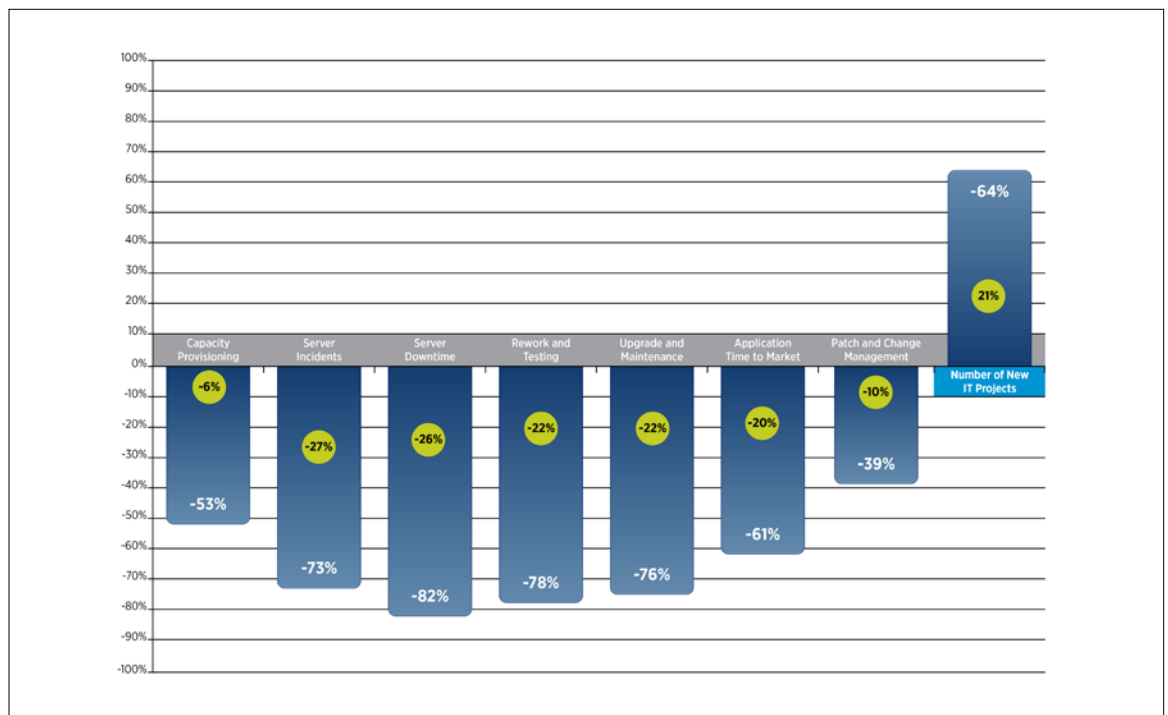


Figure 10. Operating Expense (OpEx) Reduction by Category

Business Benefits of Virtualization Extend Beyond IT

To better understand if and how virtualization impacts business results, we asked organizations to rate the importance of business benefits that can be delivered by VMware virtualization. The most important benefits are reducing expenses, improving business continuity, and increasing business agility. These benefits accrue directly to the business and are in addition to the operational efficiencies available to IT. When asked if VMware virtualization delivered on these benefits the average response was 4.1 out of a best of 5. This suggests that customers are experiencing business benefits based on the deployment of VMware virtualization software.

Measuring this benefit and reporting achievements in meaningful business relevant terms back to the business can help raise sponsorship for increased adoption of virtualization.

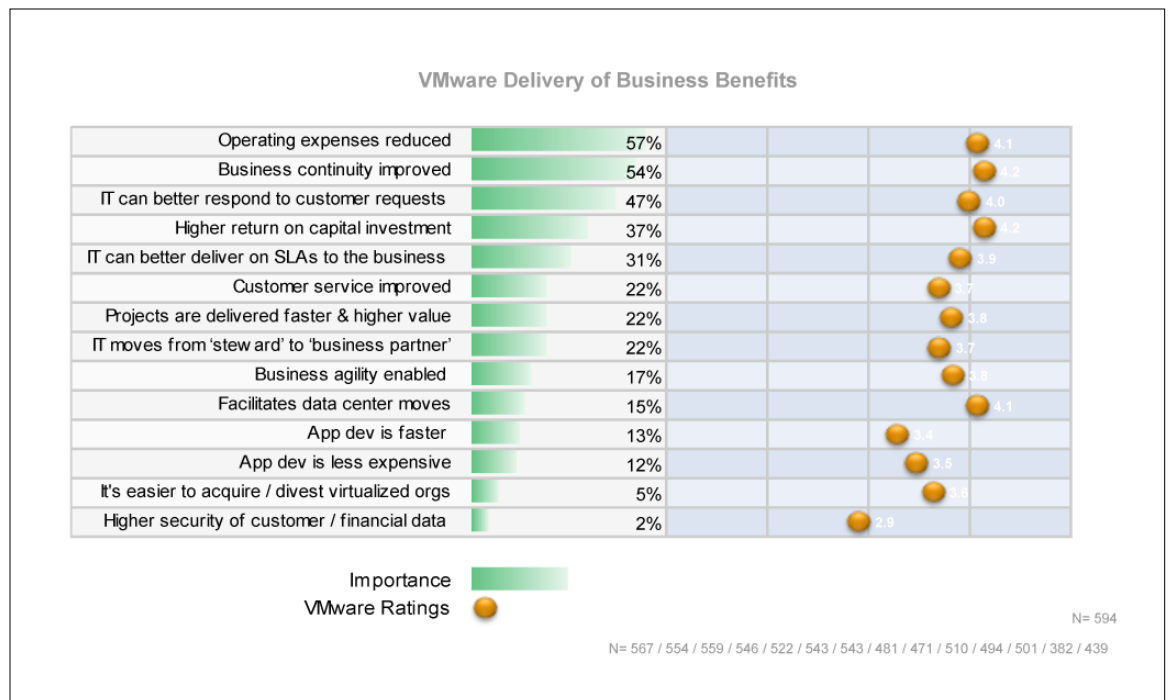


Figure 11. Business Benefits Delivered By VMware Virtualization

Barriers to Further Deployment of Virtualization in the Datacenter are Primarily Organizational Issues

Given the realized savings and use cases, we sought to identify the factors resulting in the 50 percent wide deployment distribution (variance +/- 25 percent). We wanted to understand the most significant barriers to adoption of virtualization technology. Upon reviewing the responses and frequency, the responses fell into four major categories: cost, perception/knowledge, technical and process issues.

In terms of cost issues, SAN storage expense was cited as the primary factor preventing further adoption (39 percent) with staffing costs (7 percent) and high cost of ownership (7 percent) a distant second and third within the category.

Within the perception/knowledge category we included those barriers that represent user hesitation and resistance as these are most likely a result of a lack of knowledge or incorrect perceptions. Included in this category are—perceived decline in performance (31 percent), resistance from database administrators (22 percent), business owner resistance (19 percent).

The most often mentioned technical issue was ISV support (27 percent), technical training/expertise (15 percent), management of physical and virtual environment (12 percent), and limited management capabilities and tools (8 percent).

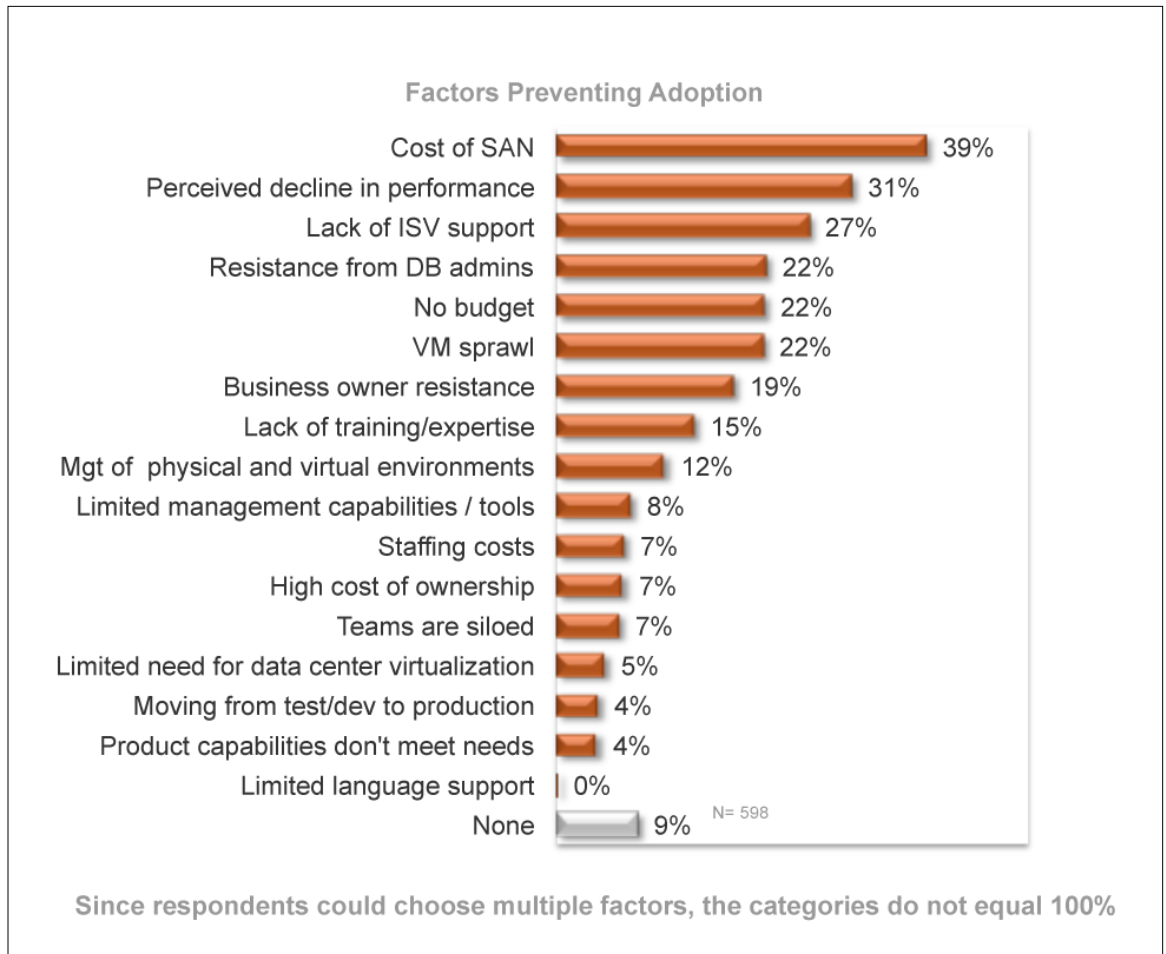


Figure 12. Factors Slowing Virtualization Adoption

Barriers vs. Company Size

An interesting observation can be made if we look at the nine barriers selected by enterprise organizations and compare them to small organizations. The barriers that most impact large businesses are primarily perception issues—perceived decline in performance, lack of ISV support, resistance from DBAs, and resistance from business owners. For small organizations, perception issues weren't as common. The primary barriers for small organizations tend to be cost related—cost of SAN, no budget, and lack of training/expertise. Lack of training/expertise can be a budget issue for small organizations, as they don't want to invest in services or special training. Small organizations don't have the perception barriers because they can more readily communicate across the organization and remove the fear, uncertainty, and doubt.

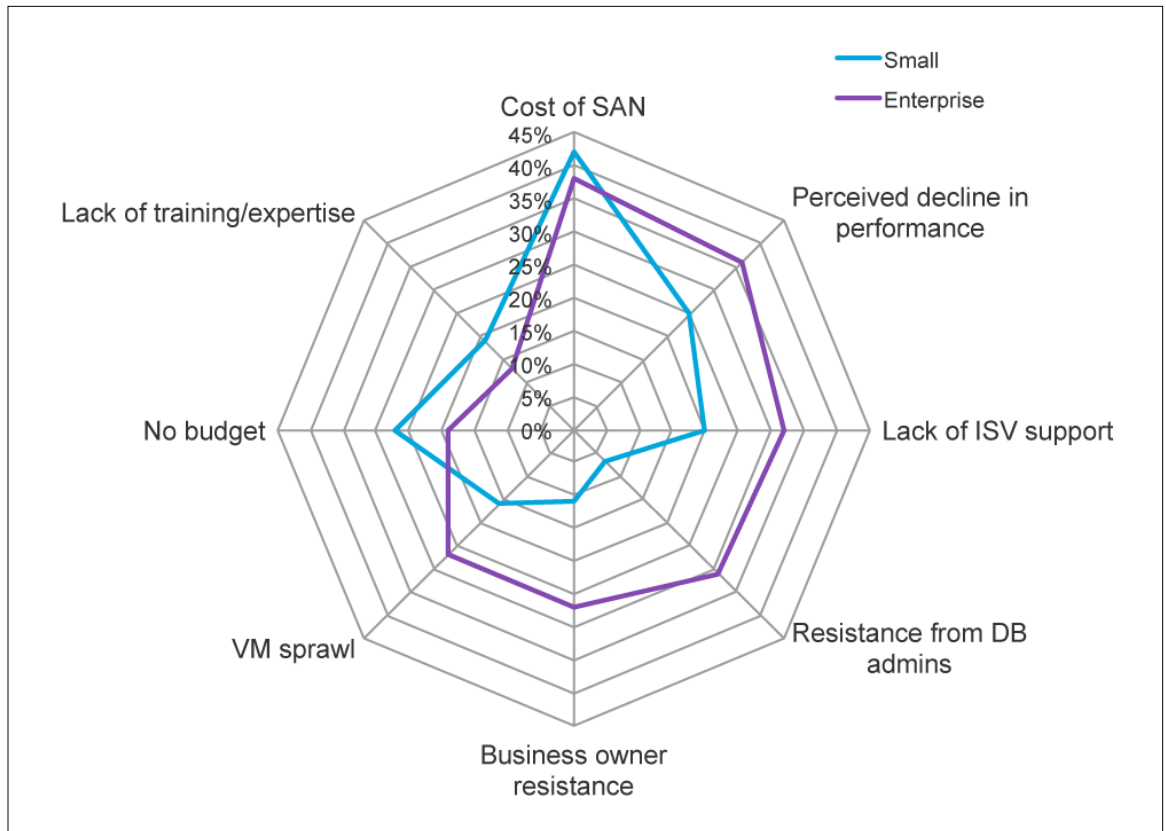


Figure 13. Barriers to Adoption

SAN Cost and TCO

The most often cited barrier to further virtualization is SAN costs. Additional data collected in the study presents an interesting comparison. Three of the top five virtualization capabilities seen as adding value to the organization were:

1. "Efficient utilization of resources"
2. "More feasible DR solutions"
3. "DR investment redundancy reduced"

Features available in today's SAN implementations from major vendors provide solutions that meet these capabilities. Deduplication and storage virtualization allow more "efficient utilization" of storage assets by reducing the physical storage required to store a given quantity of data. "More feasible DR solutions" are provided by the capability of SAN solutions to maintain up to date offsite copies of critical data. Lastly, the deduplication and storage virtualization features reduce the amount of redundancy investment by reducing the total off-site storage required for data backup.

SAN solutions are available based on iSCSI, Fiber Channel over Ethernet (FCoE), and Network File Systems (NFS) that use existing network capability to provide the SAN interconnect at less cost than Fibre Channel solutions. For small and medium businesses, vendors have created virtual SAN appliances that provide SAN functionality across standalone drives. This can be a cost-effective means of getting the benefits of SAN without a large capital outlay for hardware.

As a standalone capital investment, SAN may appear expensive but when considered in context with other capabilities, the TCO may be less in the long term than standalone storage. Less expensive storage alternatives are also available via storage vendors which are gaining acceptance in small and medium businesses. When reviewing the completeness, new capabilities, and lower priced alternatives, SAN costs should not be a barrier to virtualization adoption.

Organizational Barriers

User hesitation and resistance are common barriers to virtualization adoption in large Enterprises. Business application owners and Data Base Administrators don't respond to the same value proposition as the IT team. Reducing capital expenses and operating expenses in IT do not directly affect these groups unless they are being charged directly for IT services. In order to encourage virtualization of business applications IT needs to explain the benefits in business terms that have meaning to the Business App Owners and DBAs. Why this may be difficult is shown by the differences in priorities between IT and the CIO/CTO.

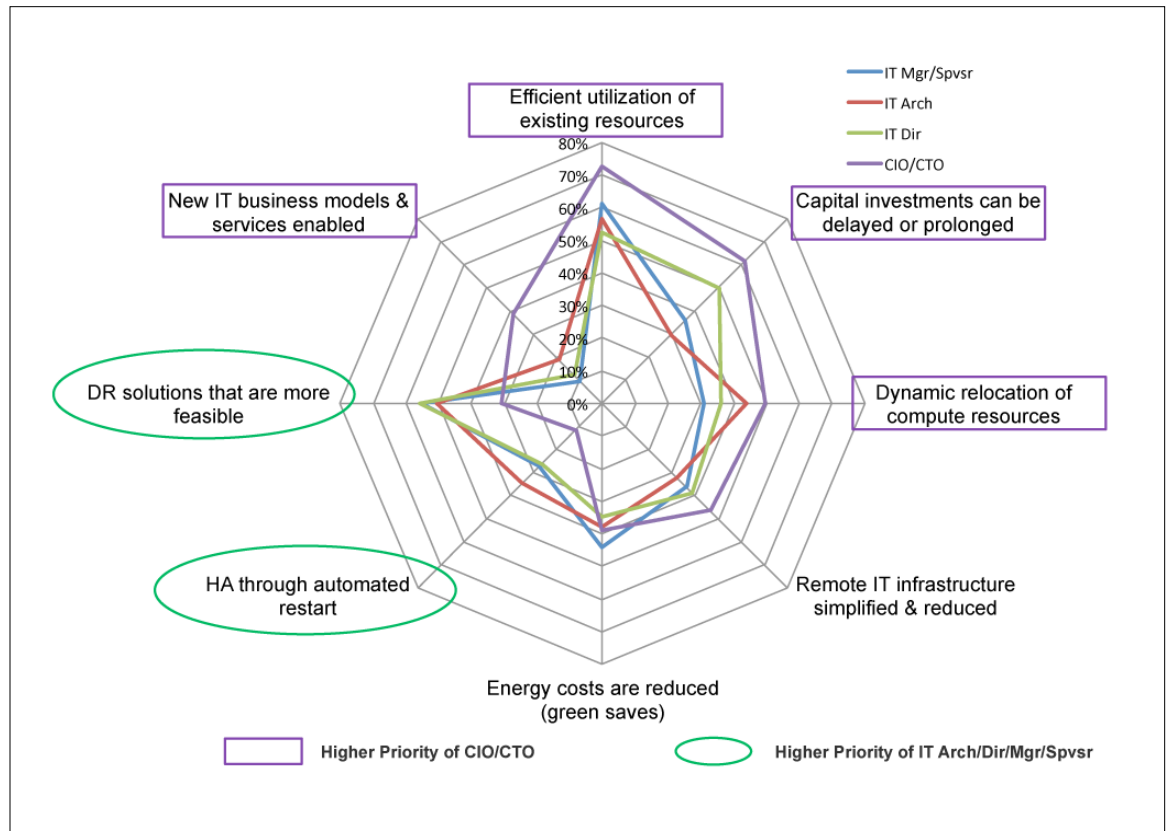


Figure 14. Virtualization Capability Importance by Title

IT puts a higher priority on capabilities that directly affect their performance. The business represented here by the CIO/CTO puts a higher priority on capabilities that more directly affect agility and overall use of business assets. IT needs to express its value metrics in terms that are important to the business to overcome the resistance caused by perception and a desire for the status quo.

Strength of Virtualization Sponsorship Varies by Organization

To better understand the organizational issues underlying the barriers to adoption we asked organizations to tell us the extent of support for virtualization among various constituencies within the IT and Business organization. Consistent with the indications on barriers to adoption, support for virtualization is highest within the IT organization and lowest within the LOB and business application owners.

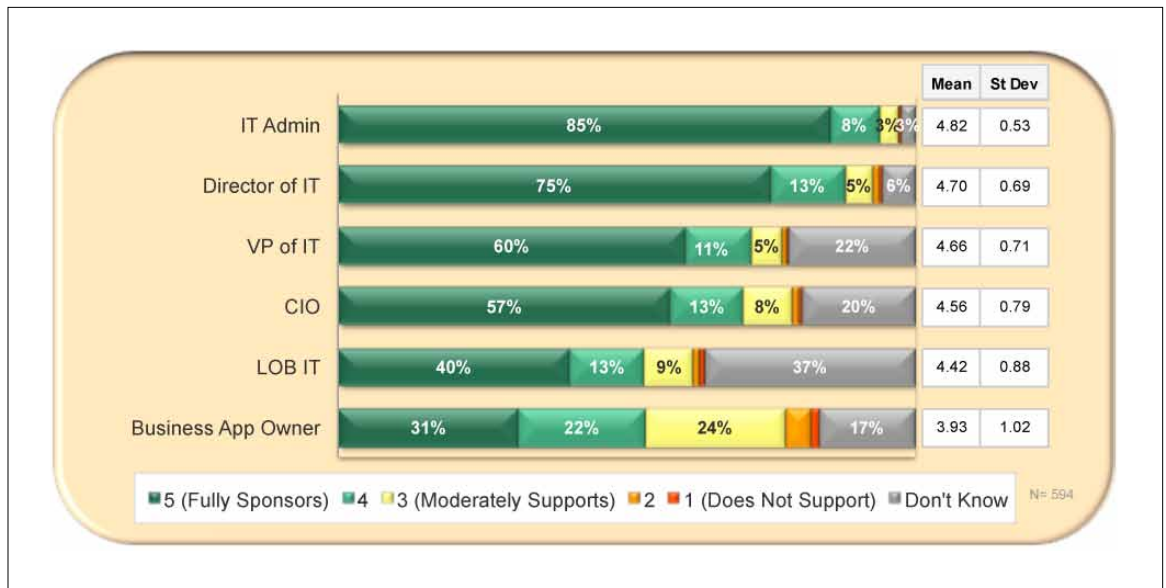


Figure 15. Virtualization Sponsorship Rates by Role

Additional questioning confirmed that the doubts of individual units had a greater impact on adoption than other factors.

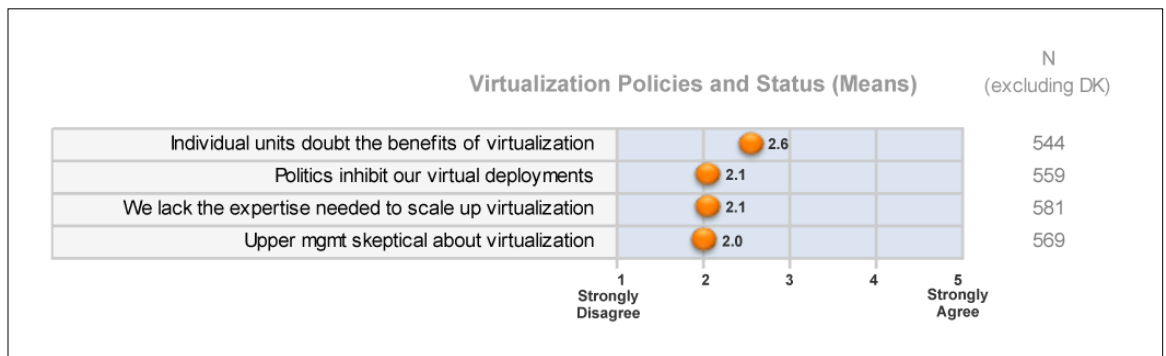


Figure 16. Virtualization Organizational Policies

The rate of virtualization of Tier-1 applications is impacted by the confidence of IT to successfully virtualize the application, coupled with the support of the application owner to virtualize the application. The evidence shows that to increase the rate of virtualization of Tier-1 applications, work must be done to increase the sponsorship of the application owners. This can be accomplished by emphasizing the business benefits that will accrue to the application owner and using “showback” to provide statistics around the advantages of virtualization such as improved uptime and more consistent SLA's.

Recommendations

Using the KPIs from this study will help IT and business leaders understand how they compare against their peers. Measuring the value of virtualization in business terms and communicating that value to business application owners can help overcome reluctance to virtualize Tier-1 applications. Establishing ongoing metrics, developing organization specific KPIs and reporting achievements internally can provide increased transparency. Highlighting the business benefits and improved operational capabilities obtained through virtualization-driven IT transformation can lead to higher levels of sponsorship, paving the way for 47% faster response to customer requests, 31% better SLAs to the business and 57% reduction in operating expenses.

Appendix A: Research Study Methodology

Respondents were invited to participate in a Web-based survey through an email invitation to VMware customers. The primary audience was IT decision makers and IT influencers in companies of all sizes across multiple industries.

Sample	Customer Sample
Geography	North America (US, CN)
Sample Size	598
Data Collection	25-minute Web study
Timing	Fielded August to September, 2010
Audiences	IT Decision-Makers (ITDMs) and IT Influencers (ITIs)
Exclusions	Virtualization ISV responses, non-VMware customer, not in IT
Weighting	1/3 SMB, 1/3 Commercial, 1/3 Enterprise
Reporting Categories	Employee Size: Small, Medium, Commercial, Enterprise Industry

Appendix B: Respondent Demographics

The sample is comprised entirely of VMware customers; most have been customers for two years or more.

INDUSTRY	
Tech	14%
Finance/Insurance	15%
Manufacturing	14%
Healthcare	12%
Education	10%
Government	8%
Retail	4%
Utilities	3%
Media/Marketing	2%
Business Services	2%
All Others	16%
N	598

TITLE	
IT Manager	22%
IT Architect	17%
System Architect	15%
IT Director	10%
Network Administrator	9%
Virtualization Specialist	7%
IT Supervisor	4%
IT Consultant	2%
Individual Contributor	2%
CIO	2%
All Others	9%
N	598

NORTH AMERICA	
U.S.A.	91%
Canada	9%
N	598

DECISION MAKING ROLE	
ITI	67%
ITDM	30%
BDM	3%
N	598

COMPANY SIZE (# EMPLOYEES)	
Small (2-499)	27%
Medium (500-999)	6%
Commercial (1K to 4,999)	33%
Enterprise (5,000 +)	33%
N	598

1ST VIRTUAL SERVER DEPLOYED IN PROD	
Within the Past 12 Months	7%
1 - 2 Years Ago	14%
2 - 5 Years Ago	64%
> 5 Years Ago	15%
N	582

YEARS AS A VMWARE CUSTOMER	
< 1 Year	3%
1 - 2 Years	11%
2 - 3 Years	20%
3 - 4 Years	22%
4 + Years	44%
N	593

VMWARE LICENSING AGREEMENTS	
ELA	53%
VPP	18%
None	29%
N	433

NUMBER OF X86 SERVERS	
1 - 100	45%
101 - 1,000	43%
1,001 +	12%
N	598

DEDICATED VIRTUALIZATION TEAM	
Yes	27%
No	73%
N	597

