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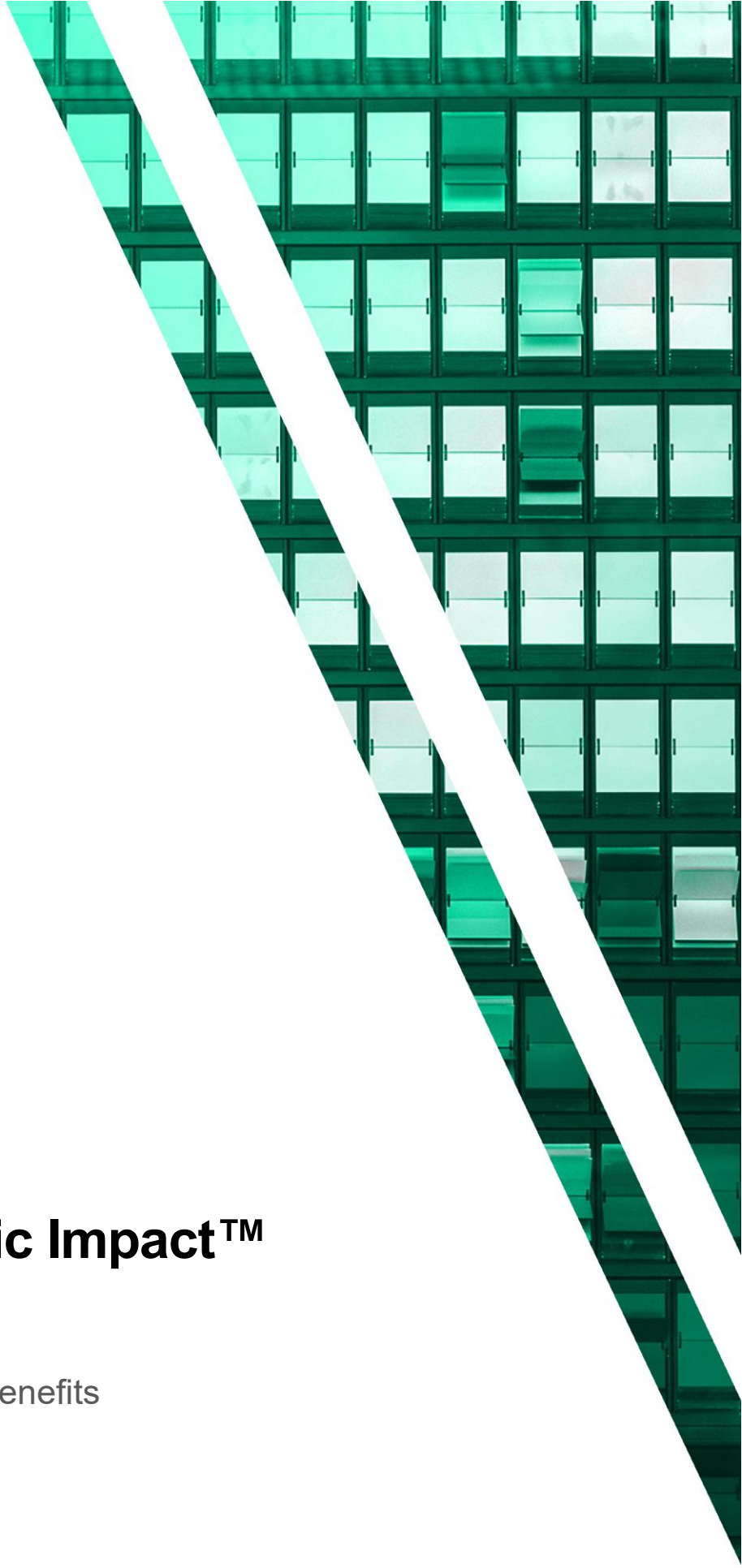

The Total Economic Impact™ Of IBM i

Cost Savings And Business Benefits Enabled By IBM i

APRIL 2021

Table Of Contents

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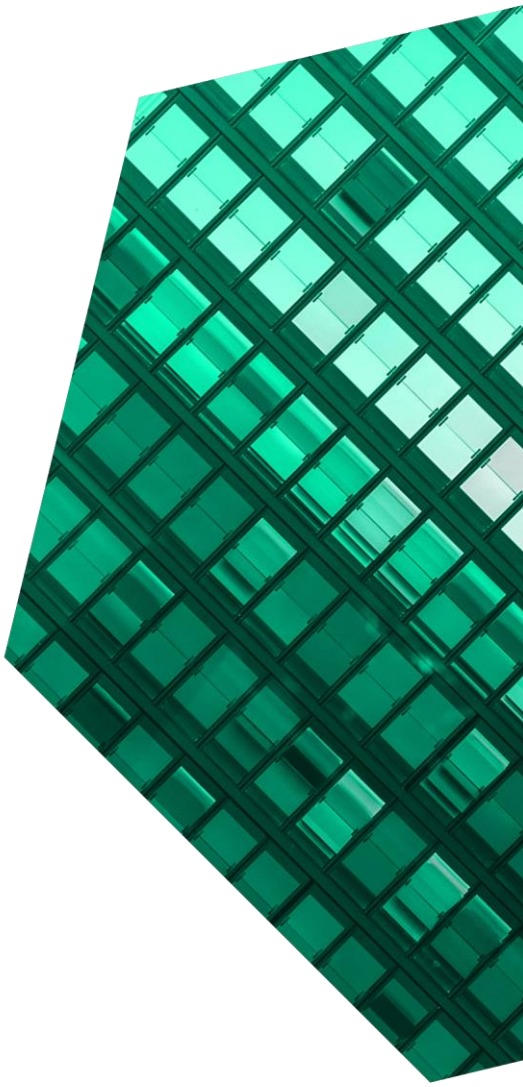


Executive Summary

In today's fast-paced and rapidly evolving business ecosystem, managing an operating system or the applications running on it should be a business leader's last concern. IBM i is an environment that integrates an operating system with the database, virtualization layer, application server, and transactional system. The reliability and security of this environment makes it possible for businesses to reduce system downtime and admin support costs, as well as improve frontline task workers' productivity.

IBM commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying the IBM i operating system on IBM Power Systems hardware or in the cloud. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of IBM i on their organizations.

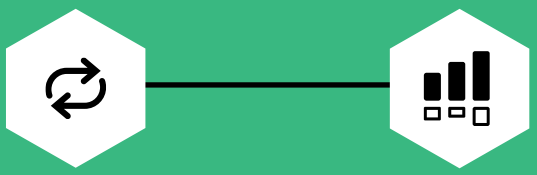
To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four customers with experience using IBM i. For the purposes of this study, Forrester aggregated the experiences of the interviewed customers and combined the results into a single composite organization.

Prior to using IBM i, the customers used a diverse number of platforms. These solutions left customers with multiple siloed systems and applications to manage, leading to disruptive and expensive downtime, exorbitant administration costs, and inefficient operations.

With an investment in IBM i, the customers were able to integrate their operating systems with the database, virtualization layer, transactional system, and other operational applications.

Key results from the investment included reduced system downtime cost, reduced system admin cost, and the elimination of manual tasks through IBM i's automation, which improved the productivity of business unit employees.

KEY STATISTICS



Return on investment (ROI)
171%

Net present value (NPV)
$595K

KEY FINDINGS

Quantified benefits. Risk-adjusted present value (PV) quantified benefits include:

- **Reduced system downtime savings of about $530K.** Interviewees reported a reduction in the number of times they experienced downtime compared to other systems used in the past. IBM i eliminated about four instances of downtime annually. These usually lasted about 30 minutes on average at a cost of about $125K per event.
- **Reduced technical support cost by over $255K.** Because IBM i is an integrated platform, it allows technical support teams to focus on other systems and be more proactive. It combined functions, such as systems and database administration, and reduced technical support hours by 33%. The composite organization goes from 6,240 hours of system

technical support per year before IBM i to 4,160 hours after this environment is implemented.

- **Improved productivity of business unit employees, saving around $158K.** With IBM i, the composite organization customer automates many tasks. Autonomic functionalities in some applications also allows for the repurposing of 6,240 business unit employee hours annually.

Unquantified benefits. Benefits that are not quantified for this study include:

- **Management's trust and peace of mind about uptime.**
- **Management's trust in security against malware.**
- **Integration of extensive IBM software and other tools.**
- **Ability to easily integrate in-house developed applications.**

Costs. Risk-adjusted PV costs include:

- **The cost of an IBM Power Systems model S924 8-core server, which is around $74K.** The list price of an IBM Power Systems server with the performance and storage capacity to handle the composite organization's needed applications.
- **Monthly maintenance fee of $168.** A service fee for upkeep and support of the environment.
- **Cost of IBM i with five licenses at $295K.** The licenses to manage and operate an ERP system and other applications needed to run the business of the composite organization.

The customer interviews and financial analysis found that a composite organization experiences benefits of around $943K over three years versus costs of over $348K, adding up to a net present value (NPV) of about $595K and an ROI of 171%.

> **With the database being integrated into the operating system, it allows the admin to manage the database with reorgs and table size. The admin really works with the developers to develop a strategy on how things are maintained with data. On the other systems' side, it seems like you are buying licenses individually. It starts to get out of hand and hard to manage in those environments where licensing is all over the place and you are charged in this and that. In our company, we do not have DBAs so, the admin manages the database.**
> — IT engineering supervisor, manufacturing, and retail.

ROI
171%

BENEFITS PV
$943K

NPV
$595K

PAYBACK
8 months

Benefits (Three-Year)

TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in IBM i.

The objective of the framework is to identify the cost, benefits, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that IBM i can have on an organization.

DUE DILIGENCE
Interviewed IBM stakeholders and Forrester analysts to gather data relative to IBM i.

CUSTOMER INTERVIEWS
Interviewed four decision-makers at organizations using IBM i to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION
Designed a composite organization based on characteristics of the interviewees' 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 investment impact: benefits, costs, flexibility, and risks. Given the increasing sophistication of ROI analyses related to IT investments, Forrester's TEI methodology provides a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

The IBM i Customer Journey

Drivers leading to the IBM i investment.

Interviewed Organizations

Industry	Region	Interviewee	Company Size
Manufacturing and retail	HQ in the US with operations in North America and Europe	IT engineering supervisor	5,000 FTEs with $2B in annual revenue
Manufacturing	HQ in the UK with operation in Europe	President; IT director	100 FTEs with $20M in annual revenue
County government	HQ in the US	IT director	1,400 FTEs with $500M in annual revenue
Transportation and logistics management	HQ in Europe with global operations	Principal systems specialist	150,000 FTEs with $24B in annual revenue

KEY CHALLENGES

Before choosing IBM i, the interviewees' organizations struggled with common challenges, including:

- **Operations disruptions due to system downtime.** As often as every week, systems would experience unplanned downtime when demand surged. This caused a loss in revenue and, in some cases, loss of data that hindered operations. Interviewees wanted an environment that could scale rapidly to meet demand at a short notice, cutting down on these operation disruptions.
- **Siloed systems that did not communicate well with each other.** The interviewed customers had to employ additional staff to manage these independent systems. Rather than focusing on the business, decision-makers had to spend excessive time managing technology to ensure that FTEs working on siloed systems and applications could collaborate efficiently.
- **Manual processes.** Many repetitive business processes like invoicing, data backups, and imaging were being done manually and cost thousands of employee hours. Business leaders wanted technology that could help automate repetitive tasks, making them easier to replicate and scale quickly as their businesses grew.

> **"On our primary IBM i environment, there is a full ERP Suite. We do the financials, we do the stock control, forecasting, and the manufacturing, along with the MRP type environments. Then, integrated into that is the larger environment, the firewall, the email systems, the Windows file sharing systems, then the graphical frontend that can sit on the top. And of course, the reporting, and the BI reporting that goes along with that."**
>
> — *IT director, manufacturing*

SOLUTION REQUIREMENTS/INVESTMENT OBJECTIVES

The interviewees' organizations searched for a solution that could:

- Be reliable and scalable to meet growth needs.
- Integrate across the technology stack and still provide room for customization to meet their unique needs.
- Save the organization money by freeing up employees' hours through automation and autonomic computing.

After a request for proposal (RFP) and business case process evaluating multiple vendors, the interviewees' organizations chose IBM i and began transitioning:

- Most of the interviewees already had experience with prior IBM platforms alongside other competitors and their transition consisted of migrating applications to IBM i.
- Two interviewees' organizations had over 80% of their applications running on IBM i but are still figuring ways to migrate the rest if possible. One of the interviewees said: "If we can do it on this box, we need to do it on this box and not look to other systems, period. My goal would be to get rid of all of them if it were up to me. If I can figure out how to do it."

COMPOSITE ORGANIZATION

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

Description of composite. The international, multimillion-dollar manufacturing and retail business-to-consumer organization manufactures and provides sales, customer support, and service/warranty support for its consumer products in both retail outlets and on its own website. The organization has a strong brand, international operations, a customer base of about 5 million customers, and a strong online and offline presence. The average selling price of its products is $10.

Key assumptions

- **$100M annual sales**
- **5M customers**
- **Two factories, two distribution centers, and 15 retail stores**
- **Online retail sales**

Deployment characteristics. The organization has manufacturing operations in two countries, 10 retail outlets in North America, and five retail outlets in Europe, as well as online retail activities in these regions. Finished goods are brought into two distribution centers, one of which is in Europe and the other in North America. Online sales are serviced out of the retail location closest to the consumer. The composite organization uses a centralized IBM i environment to run its enterprise resource planning (ERP) software and other departmental applications.

> **"If we can do it on this system, we need to do it on this system and not look to others, period. And there is not much, I mean we do imaging on this system. We do print serving on this system."**
>
> — *VP of operations, retail*

Analysis Of Benefits

Quantified benefit data as applied to the composite

Total Benefits						
Ref.	**Benefit**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Atr	Reduced system downtime cost	$212,925	$212,925	$212,925	$638,775	$529,513
Btr	Reduced technical support cost	$102,544	$102,544	$102,544	$307,632	$255,012
Ctr	Improved productivity of frontline workers	$63,648	$63,648	$63,648	$190,944	$158,283
	Total benefits (risk-adjusted)	$379,117	$379,117	$379,117	$1,137,351	$942,808

REDUCED SYSTEM DOWNTIME COST

Evidence and data. Interviewees explained that downtime on previous systems was a major driver for their organization's transition to IBM i. One company president said: "If we take that last system that we brought in, that was corrupting at least once a week if not twice a week. During the corruption, we lost all activity on it. We had to get everybody off for at least an hour, rebuild it, get it back online. Certainly at least once a week and often two or three times towards the end when we would have unexpected downtime on that system that would stop the business from operating correctly." On average, interviewees reported losing about $125K each hour a system was down.

Modeling and assumptions. Forrester assumes downtime of 30 minutes each quarter. Interviewed customers reported downtime that ranged from a few minutes to outages lasting over two hours. They explained that the types of applications, business demands on those applications, and the skills of the admins influenced this range.

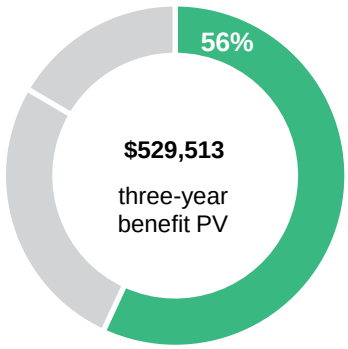
The interviewed customers also reported costs ranging from $13K per hour for smaller organizations to $1 million per hour for larger companies. With these numbers in mind, Forrester assumes an hourly cost of $125K for downtime per unplanned incident.

> **"I would say the biggest advantage of IBM i is basically that it does not crash. That is the biggest real ability that business colleagues on other platforms appreciate the most. What we've seen is that these systems are very stable. For critical operations which need very high availability, we go with IBM i."**
>
> — *Principal systems specialist, logistics*

Risks. Forrester observed variations between organizations on both variables in this benefit. Regardless of size, scale, and complexity, all interviewed customers experienced downtime. Potential risk include:

- The age of the technology.
- The applications running on the technology and the demand on them.
- The skill set of the admins operating the system, including how the system was configured and how fast they can bring it back online.
- The size of the organization and how it affects the cost of downtime.

To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of about $530K.



56% of total benefits
$530K three-year benefit PV

Reduced System Downtime Cost

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Number of system reboots per year	Interviews	4	4	4
A2	Average hours of downtime	Interviews	0.5	0.5	0.5
A3	Average cost per downtime hour	Interviews	$125,250	$125,250	$125,250
At	Reduced system downtime cost	A1*A2*A3	$250,500	$250,500	$250,500
	Risk adjustment	↓15%			
Atr	Reduced system downtime cost (risk-adjusted)		$212,925	$212,925	$212,925
	Three-year total: $638,775		**Three-year present value: $529,513**		

REDUCED TECHNICAL SUPPORT COST

Evidence and data. Interviewed customers employed various admins to run their previous environments, including systems admins and database admins. With the integrated architecture of IBM i, interviewees said they were able to realign admin support hours as individual admins were able to be trained to maintain the entire environment. This helped reduce admin hours needed to run an integrated system by about 33% and freed up resources to handle other issues.

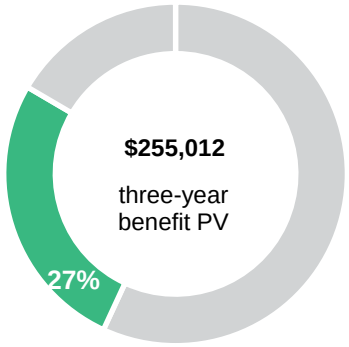
Modeling and assumptions. Forrester assumes an hourly burdened rate of $58 for an experienced system admin who can support an integrated operating environment. The average reduction in technical support hours is 33%. These two variables determine the savings witnessed by the composite organization.

Risks. All customers saved technical support hours, but the results varied widely. One customer reduced technical support hours by half while another doubled the admin workload without increasing technical support hours.

Forrester acknowledges some risk with the assumptions taken to arrive at this benefit, including:

- The technical skill set of the admins being used within each organization.
- The complexity and demands on the applications being used in each organization.
- The number of applications that admins must manage, among other variables that can influence workload within an organization.

To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of about $255K.



27% of total benefits
$255K three-year benefit PV

Reduced Technical Support Cost

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Technical support hours before IBM i (per year)	3 FTEs*2,080 hours	6,240	6,240	6,240
B2	Technical support hours after IBM i (per year)	2 FTEs*2080 hours	4,160	4,160	4,160
B3	Technical support hours saved (per year)	B1 - B2	2,080	2,080	2,080
B4	Systems administrator hourly rate	From payscale.com	$58	$58	$58
Bt	Reduced technical support cost	B3*B4	$120,640	$120,640	$120,640
	Risk adjustment	↓15%			
Btr	Reduced technical support cost (risk-adjusted)		$102,544	$102,544	$102,544
	Three-year total: $307,632			**Three-year present value: $255,012**	

IMPROVED PRODUCTIVITY OF FRONTLINE WORKERS

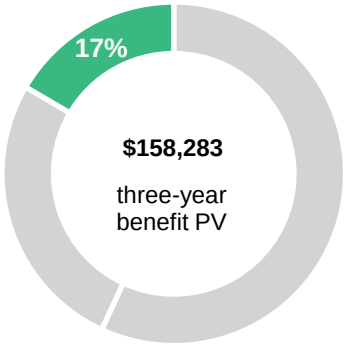
Evidence and data. Because of automation of various processes in each organization, interviewees reported productivity improvements and savings in employee hours. Previously manual and repetitive tasks and processes like invoicing, data capture, content management, process workflows, etc. were eliminated. Interviewed organizations saved over 6K hours annually on average.

Modeling and assumptions. Forrester assumes an hourly burdened rate of $24 for a frontline worker and average annual savings of 6,240 hours for frontline workers. The latter number comes from an aggregation of the savings reported by the interviewees, adjusted for size and industry.

Risks. Forrester recognizes that multiple factors can affect the realization of this benefit for individual organizations including:

- The current level of automation within the organization.
- The complexity and number of processes within the organization's industry.
- The distribution of tasks to workers, new tasks assigned to replace those eliminated by automation, amongst other unidentified factors.

To account for these risks, Forrester introduced a productivity adjustment factor of 50% and adjusted this benefit downward by a risk factor of 15%, yielding a three-year, risk-adjusted total PV of $158K.



17% of total benefits
$158K three-year benefit PV

Improved Productivity of Frontline Workers

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
C1	Frontline worker hours before IBM i (per year)	80 FTEs*2,080 hours	166,400	166,400	166,400
C2	Frontline worker hours after IBM i (per year)	77 FTEs*2,080 hours	160,160	160,160	160,160
C3	Frontline worker hours saved (per year)	C1 - C2	6,240	6,240	6,240
C4	Productivity adjustment factor	50% of C3	3,120	3,120	3,120
C5	Average frontline worker hourly rate	From payscale.com	$24	$24	$24
Ct	Improved productivity of frontline workers	C4*C5	$74,880	$74,880	$74,880
	Risk adjustment	↓15%			
Ctr	Improved productivity of frontline workers (risk-adjusted)		$63,648	$63,648	$63,648
	Three-year total: $190,944		**Three-year present value: $158,283**		

UNQUANTIFIED BENEFITS

Additional benefits that customers experienced but were not able to quantify include:

- **Management's trust and peace of mind about uptime.** Interviewees trusted in the consistency and reliability of IBM i and could focus on running their businesses, rather than their operating system. An IT Director stated: "IBM i is never down. It is never down. It just runs and runs." Interviewees didn't worry about mitigation activities if the system crashed, since most had not faced such situations for over a year.
- **Management's trust in security against malware.** Interviewees called out system security as one of their main reasons for using IBM i. A systems specialist expressed: "The architecture is different. So, it is simply very hard to write a virus for this platform." What Forrester deduced from these interviews was that the architecture of IBM i protected against most malware.
- **Integration of extensive IBM software and other tools.** The system allows room for the integration of open-source applications and technologies, making it easier to scale and add applications to serve an organization's unique needs. Interviewees lauded the fact that the operating environment came already ported for dozens of open-source applications and languages.
- **Ability to easily integrate in-house developed applications.** Interviewees applauded the fact that they could design and easily integrate in-house applications to the operating environment. This enables them to customize applications to their organization's individual needs without having to buy and run other independent operating systems.

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement IBM i and later realize additional uses and business opportunities, including:

- **Integration for various open-source and inhouse applications.** IBM i is already ported for dozens of open-source applications, giving organizations flexibility to customize their environments. Interviewees were from very diverse industries and all expressed the attractiveness of this functionality. Though not quantified in this study, it was well established as a determining factor in adopting IBM i.
- **Scalability of the operating environment.** Organizations can easily scale as demand surges. One interviewee talked about the ability to integrate their local IBM i system with cloud-based systems. IBM i allows you to run a hybrid cloud scenario where core business applications are running internally while being able to extend into the cloud using a service offering available in the operating system.

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

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**
Dtr	System cost	$174,076	$100,233	$100,233	$0	$374,541	$348,033
	Total costs (risk-adjusted)	$174,076	$100,233	$100,233	$0	$374,541	$348,033

SYSTEM COST

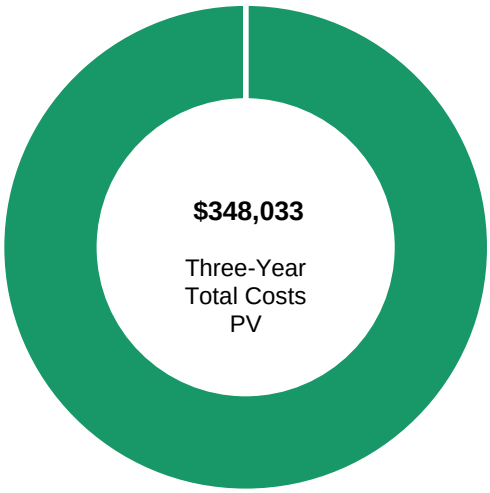
Evidence and data. Interviewees were diverse and the systems' costs of their organization were unique to their size, industry, and the configurations being used. A composite organization was developed and given to IBM for pricing.

Modeling and assumptions. For the composite organization, we make the following assumptions:

- The composite organization is an international company with manufacturing and retail operations.
- It uses two manufacturing sites, two warehouses, and 15 physical store fronts.
- The composite organization needs a system that has at least eight cores to carry its ERP software, departmental, and other applications.
- The system needs enough storage to support online sales and other data storage needs for an organization with $100M in annual sales, about 5 million active customers, and products averaging about $10 each.

Risks. This cost was provided as market value by IBM. Forrester spread it out over three years without adding any financing cost.

Forrester adjusted this cost by 0%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of about $348K.



100% of total costs
$348K three-year cost PV

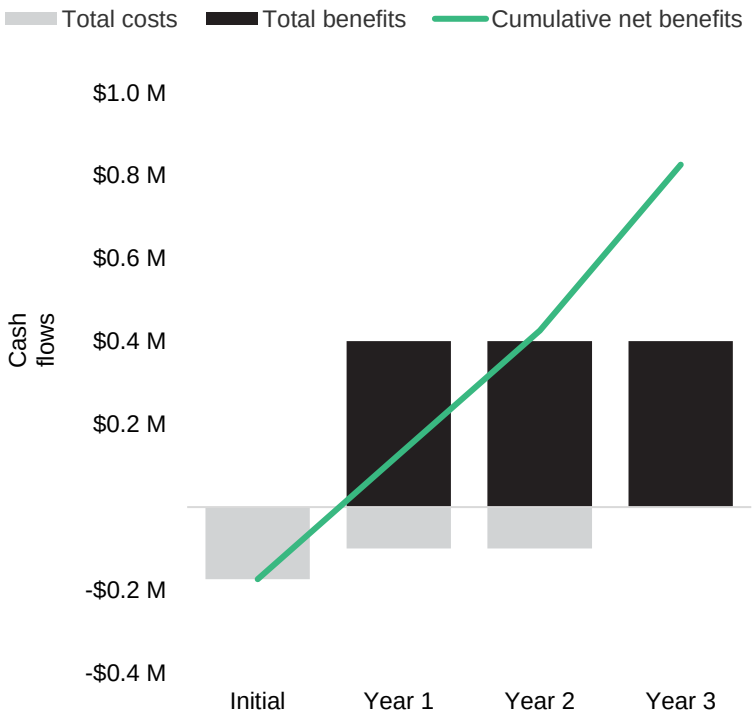
System Cost

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
D1	Hardware: S924 8 - core	From IBM	$73,843			
D2	Annual hardware maintenance fee	From IBM	$2,016	$2,016	$2,016	
D3	Five IBM i licenses	From IBM	$98,217	$98,217	$98,217	
Dt	System cost	D1+D2+D3	$174,076	$100,233	$100,233	$0
	Risk adjustment	0%				
Dtr	System cost (risk-adjusted)		$174,076	$100,233	$100,233	$0
	Three-year total: $374,541			**Three-year present value: $348,033**		

Financial Summary

CONSOLIDATED THREE-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 Analysis (Risk-Adjusted Estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	($174,076)	($100,233)	($100,233)	$0	($374,541)	($348,033)
Total benefits	$0	$379,117	$379,117	$379,117	$1,137,351	$942,808
Net benefits	($174,076)	$278,884	$278,884	$278,884	$762,810	$594,775
ROI						171%
Payback period (months)						8

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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