

FORRESTER®

The Total Economic Impact™ Of Versapay

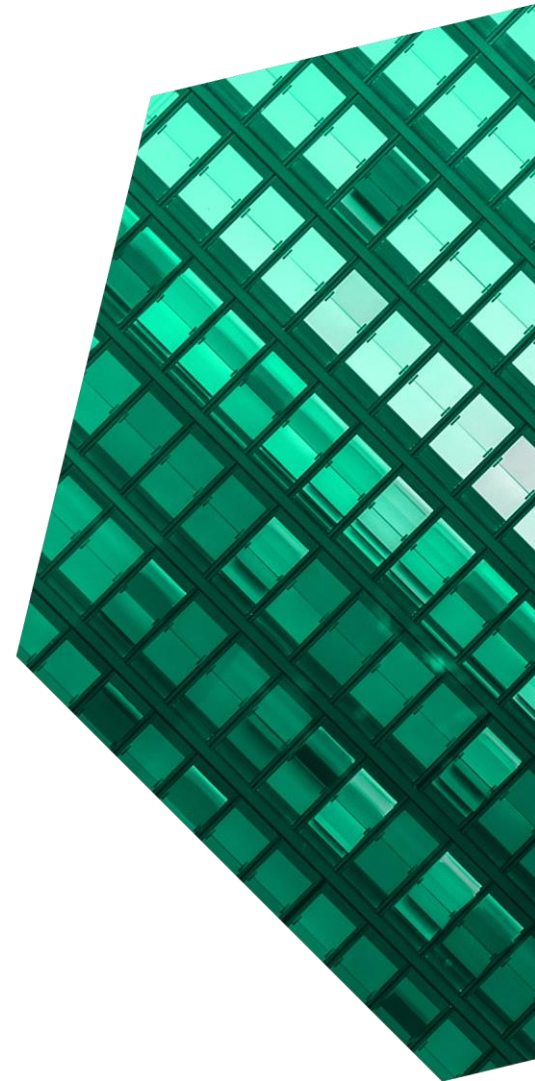
Cost Savings And Business Benefits
Enabled By Versapay

DECEMBER 2022

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ABOUT FORRESTER CONSULTING

Forrester provides independent and objective research-based consulting to help leaders deliver key transformation outcomes. Fueled by our customer-obsessed research, Forrester's seasoned consultants partner with leaders to execute on their priorities using a unique engagement model that tailors to diverse needs and ensures lasting impact. For more information, visit forrester.com/consulting.

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Executive Summary

While businesses continue to trade in their traditional paper checks for electronic payments, checks still accounted for 33% of B2B payments in North America in 2022.¹ That adds up to a tremendous productivity loss with businesses losing a minimum of \$4 for each check they issue.² However, an even greater cost may be in customer satisfaction. The majority of businesspeople are now Millennials, who expect their business payment experiences to be as easy as consumer online banking.

Versapay's Collaborative Accounts Receivable (AR) invoicing and payment platform empowers AR teams and their customers with information, automation, and the convenience and cost-savings of online payments. With Versapay, companies can issue invoices and statements electronically and customers can retrieve those documents, make payments, see credits, and access complete account history through a link sent by email. Both buyer and seller have access to helpful automated features, such as payment reminders, payment scheduling, and custom alerts. Finally, Versapay can also integrate into enterprise resource planning (ERP) systems as well as e-commerce portals.

Versapay commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Versapay.³ The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Versapay on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed five representatives at organizations that use Versapay to process B2B payments. For the purposes of this study, Forrester aggregated the interviewees' experiences into a single composite organization that is a North American distribution company with 15,000 customers and revenue of \$3 billion per year.

KEY STATISTICS



Return on investment (ROI)

305%



Net present value (NPV)

\$8.53M

Prior to using Versapay, interviewees noted how their organizations sunk vast amounts of money into paper and postage every month to invoice their customers, only to struggle to stay ahead of account aging as incoming check payments were tedious to process.

After the investment in Versapay, the interviewees reported that a high percentage of their customers opted to use the online portal to receive and pay their invoices, resulting in a sharp decline in incoming check payments as well as in average account aging and uncollectible debt. Their companies could leverage the time and skills of their AR teams better. Customers had a much better experience, leading to greater brand loyalty and sales retention. The conversion to mostly paperless invoicing benefited the environment as well, helping companies make progress toward sustainability goals.

KEY FINDINGS

Quantified benefits. Three-year, risk-adjusted present value (PV) quantified benefits for the composite organization include:

- **Reduction in check payments and customer phone calls by 70% to 80%, saving nearly 35,000 administrative hours per year by Year 3.** Check payments are time-consuming and expensive to process, so the conversion of 70% of customers from check payments to e-payments provides a significant benefit. The Versapay portal offers customers full visibility into their account history and invoice details, resulting in a decline in incoming customer phone calls. By Year 3, when Versapay is up and running companywide and the composite organization realizes full benefits, the value of this administrative time savings adds up to \$3.5 million annually.

Administrative hours saved annually

35,000



Sales revenue preserved annually

\$12.75M



- **Reduction in customer churn, preserving up to \$12.75 million in sales revenue annually by Year 3.** Versapay connects to other online ordering systems, ensuring that both the customer and the customer service team can

access the same real-time account status information. Orders that were lost due to outdated or inaccurate credit standing are now retained and, instead of frustration and mistrust, customers experience convenience and brand confidence.

- **Reduction in printing, postage, lockbox, and legacy solution costs, for total annual savings of \$1.2 million by Year 3.** By replacing paper-based invoicing and payment systems with instant online transactions, Versapay allows the composite to phase out expensive print-and-mail-based invoicing processes and outdated software.
- **Reduction of bad debt by 60%, for annual savings up to \$4.9 million by Year 3.** As customers discover convenient features like payment scheduling and autopay, and AR teams implement back-office efficiencies, such as automatic payment reminders and red-alert dashboards for late-paying customers, customer payments start coming in faster and less debt goes uncollected.
- **Reduction in certification scope for payment card industry (PCI) compliance, saving more than \$60,000 in Year 3.** The fact that Versapay can handle all aspects of credit card processing, rather than having the composite do its own self-attestation, reduces the scope of effort for annual PCI compliance. What used to be a three-month distraction for the executive and managerial teams is now a much simpler and less stressful process.

Unquantified and flexibility benefits. Benefits that provide value for the composite organization but are not quantified in this study include:

- **Boost in employee satisfaction.** The Versapay technology empowers AR team members to do their jobs more efficiently, increase productivity, and increase time on efforts that bring value to

the organization, rather than on menial tasks. Employees feel a higher sense of worth and less day-to-day frustration.

- **Boost in brand value due to transparency.** Offering customers full account visibility and access to available credits enhances transparency and trust, which are key components of a brand promise.
- **Support for company growth across multiple organizations.** Having a user-friendly customer portal that can integrate into B2B ordering systems creates customer stickiness, making it easier for customers to continue doing business with the company. Further, the fact that Versapay also saves time for customers, each of whom is running their own business, supports shifts to higher-value work throughout the business ecosystem.
- **Support for remote work.** Companies whose traditional paper-based payment systems require physically co-located office teams find the move to Versapay allows them to shift to virtual work and realize the benefits of job flexibility, job satisfaction, and lower labor costs.
- **Support for environmental sustainability.** By facilitating a shift to paperless payments for the majority of its customers, Versapay allows the composite organization to save 450,000 sheets of paper every year or 2,000 kg of CO₂ equivalent.⁴

Costs. Risk-adjusted PV costs for the composite organization include:

- **Software costs totaling \$1.1 million over three years.** Annual vendor fees are based on software edition purchased, invoice volume, and number of transactions, and include software subscription fees and, where applicable, fees for invoice overages and/or credit card processing.

- **Implementation costs totaling \$983,000 over three years.** Project time dedicated by internal and external IT professionals to ensure a smooth installation and rollout are front-loaded in the first year of investment.
- **Adoption campaign costs totaling \$116,000 over three years.** A company’s ability to fully realize the efficiency and productivity benefits of Versapay strongly depends upon its customer adoption rate, so running a customer adoption campaign — starting with marketing pieces and continuing with individual customer follow-up — is a worthwhile investment.
- **Support and training costs totaling \$597,000 over three years.** Any technology purchase requires ongoing investments in support and training to ensure that employees fully leverage the benefits of the solution.

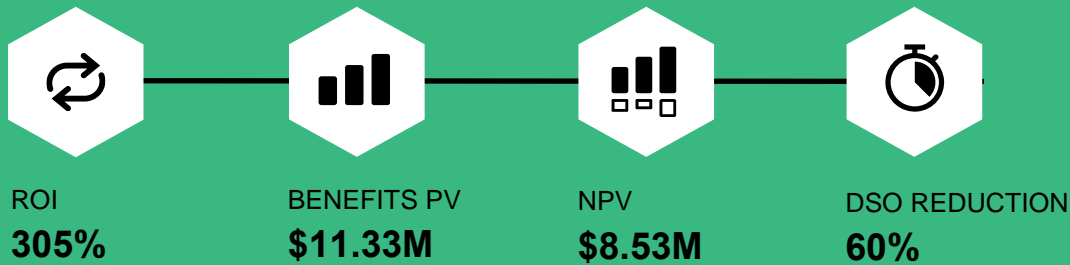
The representative interviews and financial analysis found that a composite organization experiences benefits of \$11.33 million over three years versus costs of \$2.80 million, adding up to a net present value (NPV) of \$8.53 million and an ROI of 305%.

Annual paper savings

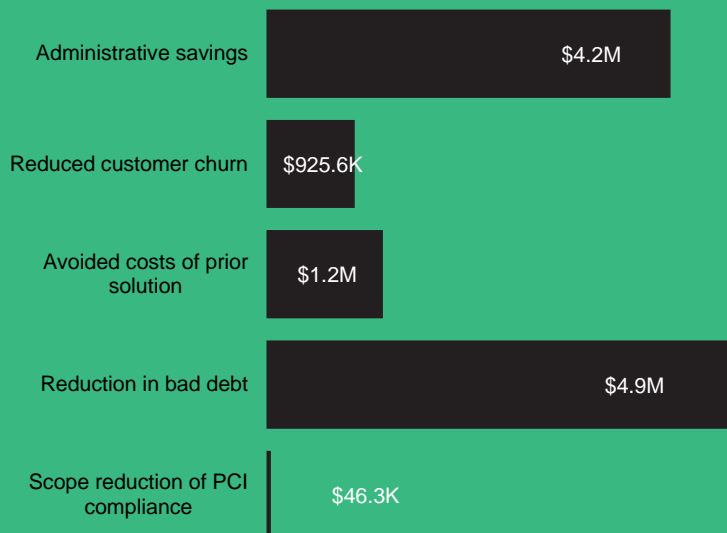
450,000 sheets

Annual carbon savings

2,000 kg CO₂ eq



Benefits (Three-Year)



“While our business has grown, I’ve not increased the size of my team. They’re way more productive. They’re spending more time talking with customers about collecting cash than processing transactions.”

— CFO, distribution, North America

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 Versapay.

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 Versapay can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Versapay 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 study to determine the appropriateness of an investment in Versapay.

Versapay 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.

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



DUE DILIGENCE

Interviewed Versapay stakeholders and Forrester analysts to gather data relative to Versapay.



INTERVIEWS

Interviewed five representatives at organizations using Versapay 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 interviewees.



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 Versapay Customer Journey

■ Drivers leading to the Versapay investment

Interviews				
Role	Industry	Region	Revenue	Customers
CIO/CTO	Distribution	US	\$Multibillion	6,000*
E-commerce manager	Distribution	Canada	\$150M	12,000
Chief accounting officer	Commercial real estate	US	\$600M	5,500
VP of treasury services	Commercial real estate	US	\$600M	5,500
CFO	Distribution	North America	\$3B	15,000

**This organization deployed Versapay with a subset of its customer base.*

KEY CHALLENGES

The five interviewees previously used paper-based systems at their organizations. Not only did this mean that customers received hard copies of invoices and submitted payments by check — all through the mail and all at great cost — but back-office systems and processes were also similarly outmoded.

The legacy ERP systems in which AR team members recorded payments didn't sync up with customer accounts in real time, which resulted in bad customer experiences that led to lost sales and an erosion of brand trust. Further, the amount of manual work required to receive and apply payments and follow up with customers whose payments were late negatively impacted cash flow.

The interviewees noted how their organizations struggled with common challenges, including:

- **High-cost, paper-based systems.** Three interviewees said their organizations printed and mailed every customer invoice, resulting in tens of thousands of dollars spent every year on printing and postage. Companies also paid rental fees for one or more lockboxes to securely receive checks sent by mail.

“A lot of our checks were handwritten and illegible, and our [optical character recognition] (OCR) success rate was anywhere from 20% to 50%. To look at it differently, we had a 50% to 80% failure rate, which is the way I think of it.”

CFO, distribution, North America

- **Labor-intensive and problematic check processing.** According to executives from the commercial real estate company, every incoming check took a minimum of 10 minutes of processing time, with some checks taking 30 minutes or more if they were unreadable or if no payment instructions were included. And, if the AR team's guesswork didn't match the customer's intent, they had an angry customer on top of it. The CIO/CTO of the US-based distribution company said, “When our back office did not apply [the payment] the right way, it

“Everything was manual. We didn’t have any ability to schedule [a customer message saying] your payment is overdue or your payment is coming up.”

VP of treasury services, commercial real estate, US

created a lot of mistrust, even though the right intent was in place.”

- **Cumbersome customer communication.** Interviewees shared that it was difficult for their accounting teams to pull customer status reports, and follow-up emails and phone calls were ad hoc manual tasks that were not tracked within the invoicing software.

The CFO of the US distribution company noted that, because their legacy system did not capture data from customer communications, they had separate software for “credit note-taking,” where collections agents recorded verbal commitments from customers on payment terms.

- **Poor days sales outstanding (DSO) status.** Interviewees reported that aging status and total payments outstanding were challenges for them prior to Versapay. Executives from the commercial real estate company said they had a 32-day DSO, which meant that it took customers a full month, on average, to make payment on an invoice.
- **Sales impacted by poor customer payment experience.** The CIO/CTO at the US-based distribution company noted that neither their customers nor their customer service team had visibility to real-time account data, which led to frustration and lost sales. If a customer had

recently submitted a payment that was not yet reflected in their account summary, an improper credit hold was sometimes issued, resulting in the order being refused by the online ordering system. Further, there was no visibility to customers’ available co-op credits from manufacturers. These issues led to customer mistrust and eroded brand value.

COMPOSITE ORGANIZATION

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

Description of composite. This high-volume distribution company is based in North America. It earns a total of \$3 billion in revenue annually across 15,000 customers, and its average monthly order value falls between \$16,000 and \$17,000. Its 50-person accounting team invoices customers monthly, issuing a total of 1.5 million invoices per year. It also accepts credit card payments, processing 25,000

“Sometimes because of timing, customers didn’t realize that they were pushing the credit limit. They would be about to order something but they couldn’t submit it, and it would take a day or two to resolve. They would probably go to somebody else.”

CIO/CTO, distribution, US

transactions per year, for a total annual volume of more than \$70 million.

Deployment characteristics. The composite organization opts for a phased deployment of the Versapay system. In Year 1, after an eight-month initial implementation process, it offers portal access to 5% of its customers. By Year 2, the company has invited 50% of its customers to enroll, and it reaches full deployment by Year 3. However, not all customers decide to participate, with 15% of customers continuing to send payments by check.

Key Assumptions

- **North American distributor**
- **\$3B annual revenue**
- **15,000 customers**
- **1.5M invoices/year**
- **Average order: \$16,666**
- **Credit cards: 70M annual total over 25K transactions**

Analysis Of Benefits

■ Versapay improves efficiency, customer experience, credit position and cash flow

Total Benefits						
Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	Administrative savings	\$175,559	\$1,750,803	\$3,501,605	\$5,427,966	\$4,237,351
Btr	Reduced customer churn	\$38,248	\$382,485	\$764,969	\$1,185,703	\$925,607
Ctr	Avoided costs of prior solution	\$21,375	\$577,125	\$964,250	\$1,562,750	\$1,220,850
Dtr	Reduction in bad debt	\$202,492	\$2,024,919	\$4,049,838	\$6,277,249	\$4,900,274
Etr	Scope reduction of PCI compliance	\$0	\$0	\$61,670	\$61,670	\$46,333
	Total benefits (risk-adjusted)	\$437,674	\$4,735,331	\$9,342,332	\$14,515,337	\$11,330,415

ADMINISTRATIVE SAVINGS

Evidence and data. Interviewees spoke of administrative time savings in three major areas. Since their customers now had full access to their account history and full control over their payments, the organizations’ accounts receivable teams no longer had to spend so much back-office time on the cash application process. They also saw a notable reduction in incoming phone calls from business customers either seeking information about a past invoice or looking to have a recent payment applied differently. Finally, Versapay’s fast and user-friendly report generation made the customer follow-up process much more efficient.

- Interviewees agreed that they saw the biggest time savings in the cash application process. The fact that Versapay gave customers full account access and let them take charge of their payments essentially transferred this clerical task from the organizations’ AR teams to their customers. According to the chief accounting officer from the commercial real estate company, “Our invoices have multiple lines and customers

have to go [into Versapay] and specifically say exactly what they’re paying.”

In the simplest cases — for the customers who were specific in their instructions on how they wanted their payment applied — this saved the AR teams about 10 minutes per check from lock-box retrieval to system input.

The chief accounting officer continued: “The problem with our customers is that they have a tendency not to pay what matches the invoice. When you’re talking about the checks that we

“Where we run into issues is when a customer pays a specific amount and wants to apply it to very specific things. One of our main benefits was getting that alleviated from our AR team.”

E-commerce manager, distribution, Canada

have absolutely no idea how to apply, that could be hours, and it's pick-up, put-down."

The e-commerce manager from the Canadian distribution company agreed, "The [customers] that take up the most time are those who send in a check, but don't relay how they want it applied." An AR team member's best guesswork in payment application often led to customer frustration and time-consuming dispute resolution. The e-commerce manager continued: "Disputes take the longest time when it comes to making corrections and understanding what was supposed to happen and getting all the details right. Those take tens of hours a week."

Interviewees also noted that once Versapay gave their customers more access to — and more control over — their accounts, they didn't need to call the AR office as frequently. According to the CIO/CTO for the US-based distribution company: "Our call center had about 100 folks, most of whom were contractors. Before, about 15% of their time was spent dealing with customer confusion about statements that weren't real time. Now, with Versapay, there's still some questions every now and then, but I'm almost certain we've reduced it to maybe 1% or 2% of our calls."

The e-commerce manager for the Canadian distribution company expanded on that point: "Our AR associates were taking a number of phone calls for things like, 'Hey, can I get this old invoice?' The more we can take away those calls, it frees them up to focus more on the collection side, which is needed more than anything else."

Not only did AR teams have more time to focus on following up with late-paying customers, but Versapay's reporting capabilities made this process much more efficient than it had been before. According to the CFO of the North American distribution company: "Before, they had to run these really challenging queries that gave

"The credit team can create their own dashboards of red-alert customers, and then just shoot off a message to the customer, often through automatic reminders. It took a lot of the friction out of the work."

CFO, distribution, North America

the information in a very unfriendly format. In Versapay, you can see the customers however you want to. You can focus on those that have balances above a certain level or aged a certain way. It's really simplified them doing their job."

Modeling and assumptions. The composite organization turns these workload reductions and efficiency benefits into quantifiable savings.

Assumptions include the following:

- The composite organization pilots Versapay in Year 1; reaches 50% deployment in Year 2; and has the system fully up and running by Year 3. Benefits are phased in accordingly.
- The company eventually sees an 80% reduction in customer phone calls, each of which took approximately 15 minutes before Versapay.
- While 85% of the organization's customers paid by check before, the option of enrolling in Versapay and paying online by bank transfer or automatic clearing house (ACH) brings that down to 15%.
- The organization saves 10 minutes of baseline processing time for every avoided check payment, which adds up to 21,000 hours saved in Year 3.

- For the 20% of checks that do not come with payment application instructions from the customer, more extensive research time is required. By also eliminating this work, Versapay saves the AR team an additional 12,600 hours per year.

Flexibility. A different way to evaluate the business impact of time saved is through the higher-value work that employees now completed.

The CFO of the North American distribution company reported that the resulting time savings from the move to Versapay finally created the capacity for an AR department reorganization that they had contemplated for a long time. This interviewee noted: “A year ago, we did a reorganization within the credit function. Rather than having a separate credit team for each of our regions, I made a shared service function, taking care of all of the transactions that were germane to every region. That left the remaining credit team members to focus on customer care.”

This same interviewee noted that, with AR team members no longer mired in cash-application work, they had more time for customer outreach: “Our employees are covering more transactions, but not necessarily doing more work, because the technology is doing a lot of things for them. So, now

they’re able to touch more customers.” Other interviewees echoed this statement.

More frequent and/or consistent customer touches that happened earlier in the account-aging process accelerated payments and further reduced uncollectable debt. And the additional time that AR employees dedicated to negotiating payment terms with customers likely paid off in revenue gains.

Risks. The most important factor that could reduce this benefit is overestimating the number of checks that will be converted to electronic payments. If organizations have a lot of enterprise-level customers that are likely to already have their own electronic customer portals, they may not see such an extensive reduction in the number of incoming checks. However, risk can be mitigated with Versapay E-Invoice Connectors, which allow organizations to automatically deliver invoices with line-item detail to their enterprise-level customers’ Accounts Payable (AP) systems in the required formats.

Results. To account for this risk, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$4.2 million.

“While our business has grown and the number of transactions has increased, I haven’t increased the size of my team. In fact, we changed the way we operated so we could more effectively leverage the team.”

CFO, distribution, North America

Administrative Savings					
Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	Total customer calls per day	Interviews	25	25	25
A2	Percent of calls avoided per day	Interviews	5%	40%	80%
A3	Average customer call time (mins)	Interviews	15	15	15
A4	Subtotal: Time savings in customer calls (hrs/yr)	$A1 \cdot A2 \cdot A3 \cdot 260 / 60$	81	650	1,300
A5	Total customers	Composite	15,000	15,000	15,000
A6	Versapay rollout completion	Composite	5%	50%	100%
A7	Customers paying by check before	Interviews	85%	85%	85%
A8	Customers paying by check now	Interviews	15%	15%	15%
A9	Check payments avoided (per month)	$A5 \cdot A6 \cdot (A7 - A8)$	525	5,250	10,500
A10	Baseline check processing time (mins)	Interviews	10	10	10
A11	Checks requiring research for cash application (per month)	$A9 \cdot 20\%$	105	1,050	2,100
A12	Average cash-application research time (mins)	Interviews	30	30	30
A13	Subtotal: Time savings in check processing (hrs/yr)	$(A9 \cdot A10) + (A11 \cdot A12) \cdot 12 / 60$	5,880	58,800	117,600
A14	Hourly rate of accounts receivable agent (fully burdened)	TEI standard	\$31	\$31	\$31
At	Administrative savings	$(A4 + A13) \cdot A14$	\$184,799	\$1,842,950	\$3,685,900
	Risk adjustment	↓5%			
Atr	Administrative savings (risk-adjusted)		\$175,559	\$1,750,803	\$3,501,605
Three-year total: \$5,427,966			Three-year present value: \$4,237,351		

REDUCED CUSTOMER CHURN

Evidence and data. Interviewees noted that Versapay offered customers a simple and user-friendly interface and full credit visibility, which boosted loyalty and repeat business. Interviewees highlighted that:

- Versapay offered their customers a good user experience, which was reflected in customer satisfaction surveys. The CFO at the North American distribution company said: “An email link would get them right in. And in a very intuitive presentation, they could see the details about their credit limit, the total amounts outstanding, and all the credits on their account that they hadn’t used yet. It gave them the experience that we’ve come to expect with our online banking relationships.”

The CIO/CTO of the US-based distribution company elaborated, noting that Versapay’s user-friendly experience was one more factor in keeping customers coming back. They said: “A lot of folks do business with us because Versapay makes it easy for them.”

- The fact that Versapay offered customers full visibility to their available credits was a significant factor in keeping customers loyal.

According to the CFO of the North American distribution company: “[Customers] could see all the credits on their account that they hadn’t used yet. They didn’t know what those were before because they didn’t have visibility to them. And they’d have to call and say, ‘Hey, do I have any unapplied credits that I can use?’ Now, it’s all right in front of them, and when they go to pay, they can use those credits before cash.”

Before Versapay, the CIO/CTO at the US-based distribution company noted their organization struggled because neither their customers nor their own agents had access to real-time account status information. Not surprisingly, that company

lost a significant amount of sales due to credit holds, often levied erroneously due to lack of access to real-time payment and credit data.

According to the company’s CIO/CTO: “While our call center agents had access to our ERP system, they would have to get on the phone with the AR department to resolve [credit standing disputes]. It was never a first-call resolution in a previous life, and it would lead to a lost sale. But by moving all that [information] upstream, as soon as the phone rings, we can say where the customer stands in terms of their balances and what the issue may be.”

- Finally, the CFO of the North American distribution company also pointed out that providing customers with an accurate view of available credits ensured that businesses got to keep what was rightfully theirs, instead of surrendering it to government unclaimed property programs. While they were unable to share the total amount of money their company transferred to government treasuries each year across its 15,000 customers, they said it was significant.

Modeling and assumptions. Calculations with some basic sales data show that the composite organization retains up to \$765,000 in profit annually after moving to Versapay. Again, the value of the

“If customers don’t use their credits within three years, then we have to submit that cash to the unclaimed property program. And then they’ve got to go to the government to get it back.”

CFO, distribution, North America

benefit in Years 1 and 2 is adjusted based on deployment completion.

Flexibility. Discussions with two interviewees suggested that reducing payment friction had wider-ranging impacts, any of which may factor into the approach to measurement. Company leaders shared the following:

- Besides increasing the likelihood of re-orders, making transactions easier can also increase the success of cross-sell, upsell, and add-on programs. According to the e-commerce manager of the Canadian distribution company: “Our plan is to continue to push customer adoption into the Versapay platform. The ease of doing business broadens the ways we can interact with customers, get them into our company funnel, and have them continue to engage with us.”
- The CIO/CTO of the US-based distribution company, who emphasized how Versapay helped their company increase transparency and

trust, noted that trust can also have a cash-flow impact: “In many cases, customers have not only opted to make the payment, but they’ve also said, ‘Now that I trust these guys, I’ll just sign up for autopay.’”

When an increase in autopay signups leads to a higher percentage of payments coming in on time without any investment of administrative time, organizations can take that increased customer trust to the bank — literally.

Risks and results. The value of reduced customer churn can be impacted by variability in nearly every line of the benefit table, from monthly order volume to the extent of previous credit-related order loss to average order size and operating margin. To account for these multiple areas of variability, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of \$926,000.

Reduced Customer Churn					
Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	Customer orders per month	Composite	15,000	15,000	15,000
B2	Versapay rollout completion	Composite	5%	50%	100%
B3	Orders previously lost due to incorrect credit information	Interviews	0.5%	0.5%	0.5%
B4	Average order value	Composite	\$16,666	\$16,666	\$16,666
B5	Operating margin	Composite	6%	6%	6%
Bt	Reduced customer churn	$B1*B2*B3*B4*12*B5$	\$44,998	\$449,982	\$899,964
	Risk adjustment	↓15%			
Btr	Reduced customer churn (risk-adjusted)		\$38,248	\$382,485	\$764,969
Three-year total: \$1,185,703			Three-year present value: \$925,607		

AVOIDED COSTS OF PRIOR SOLUTION

Evidence and data. Interviewees said that their organizations’ moves to Versapay allowed them to retire several legacy costs.

- Two interviewees recouped license fees prior software vendors levied. The CFO at the North American distribution company also mentioned phasing out a separate and additional software package for “credit note-taking,” a feature that is built into Versapay.
- No matter what their prior software solution, all five interviewees said they incurred extensive printing and postage costs. The interviewees from the commercial real estate company, which had 5,500 customers, reported spending more than \$30,000 per year on printing and postage, and the CFO at the North American distribution company, which had 15,000 customers, paid \$1 million per year to print and mail monthly invoices.

Not surprisingly, this line-item declined significantly as customer portal adoption increased. The CFO at the North American distribution company, for example, noted their

organization reduced its printing and postage costs by 70% after moving to Versapay.

- All five interviewees rented secure lockboxes to receive incoming check payments by mail. After moving to Versapay, as the volume of checks declined, so too did their lockbox space needs, though, like postage, this is a cost that was not entirely eliminated.

Modeling and assumptions. The composite organization realizes only minor cost savings in Year 1, since it can’t retire its prior software until Versapay is deployed companywide. Savings in printing, postage, and lockbox costs accrue over time as the company converts more of its customers from paper checks to electronic payments. However, these savings never reach 100%, since approximately 15% of its customers opt to continue receiving invoices and sending payments by mail.

Risks and results. To account for variability in legacy system costs and in the extent to which Versapay reduces paper check payments, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV of \$1.2 million.

Avoided Costs Of Prior Solution					
Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Avoided printing and mailing costs	Interviews	\$22,500	\$315,000	\$630,000
C2	Avoided lockbox costs	Interviews	\$0	\$5,000	\$10,000
C3	Avoided cost of prior payment software	Interviews	\$0	\$287,500	\$375,000
Ct	Avoided costs of prior solution	C1+C2+C3	\$22,500	\$607,500	\$1,015,000
	Risk adjustment	↓5%			
Ctr	Avoided costs of prior solution (risk-adjusted)		\$21,375	\$577,125	\$964,250
Three-year total: \$1,562,750			Three-year present value: \$1,220,850		

REDUCTION IN BAD DEBT

Evidence and data. Interviewees all shared Versapay accelerated customer payments and significantly reduced their outstanding debts.

- Versapay’s user-friendly customer portal resulted in more customers paying electronically rather than by check. The CFO of the North American distribution company noted that they went from 16% of customers paying electronically to about 60% paying electronically within 12 months of Versapay deployment.
- Versapay’s interface also facilitated more efficient and effective customer follow-up on the administrative side. According to that same CFO: “It helped us more effectively follow up with customers that were past due. We’re just more effective in the way we can manage our receivables portfolio because of Versapay. And we have virtually no bad debt for a company of our size.”
- The commercial real estate company had the most dramatic improvement in their DSO metric, partially because their prior vendor had a policy of holding all incoming checks for three days before posting the payments. According to that company’s chief accounting officer: “Prior to Versapay, we were at 32 days. We are now at seven. It’s been huge. The biggest cash flow increase we saw was in losing that three-day hold [from our prior vendor]. And then, we may have received the cash, but we didn’t know how to apply it.”
- The US- and Canadian-based distribution companies likely experienced more typical results, with their representatives reporting a 60% improvement in total payments outstanding and a two-day improvement in DSO, respectively.

Modeling and assumptions. Typically, about 5% of a company’s customers have outstanding invoices

“When I look at the last two and a half years, our bad debt has been the lowest in our history.”

CFO, distribution, North America

that are 60 days or older. Then, about 60% of that amount goes uncollected.

The composite organization experiences a total uncollectable debt reduction of 60%.

Finally, the value of the benefit during each year reflects the rollout’s state of completion at that time.

Risks and results. Since averages for the composite organization may not be exactly the same for all companies across all industries, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of \$4.9 million.

Reduction In Bad Debt					
Ref.	Metric	Source	Year 1	Year 2	Year 3
D1	Customers with outstanding invoices that are more than 60 days old before Versapay	5%*15,000	750	750	750
D2	Invoices likely to go uncollected	D1*60%	450	450	450
D3	Average order value	Composite	\$16,666	\$16,666	\$16,666
D4	Annual bad debt before Versapay	D2*D3	\$7,499,700	\$7,499,700	\$7,499,700
D5	Reduction in customers with outstanding invoices that are more than 60 days old due to Versapay	Interviews	60%	60%	60%
D6	Versapay rollout completion	Composite	5%	50%	100%
Dt	Reduction in bad debt	D4*D5*D6	\$224,991	\$2,249,910	\$4,499,820
	Risk adjustment	↓10%			
Dtr	Reduction in bad debt (risk-adjusted)		\$202,492	\$2,024,919	\$4,049,838
Three-year total: \$6,277,249			Three-year present value: \$4,900,274		

SCOPE REDUCTION OF PCI COMPLIANCE

Evidence and data. Most interviewees' companies accepted credit card payments. For them, the fact that Versapay now assumed the responsibility for credit card processing and PCI compliance was a significant benefit and played a key role in one company's decision to move to Versapay.

Interviewees shared the following:

- The e-commerce manager of the Canadian distribution company shared that, when they made the decision to move away from their prior solution, they had seriously considered building their own invoicing and customer portal. They had taken on similar custom software builds in the past, so this was a viable option. What put the nail in the coffin, however, was the specter of self-attestation and taking full responsibility for PCI compliance. This interviewee stated, "PCI compliance would have cost us roughly \$40,000 a year just to maintain," on top of the technical expense of building and maintaining the platform.
- According to the CIO/CTO of the US-based distribution company: "We were doing self-attestation of credit card payments, but now, all the credit card processing is done by Versapay. That's a huge, huge benefit. Otherwise, it's a yearly nightmare for certification, especially if you have an external audit. I can't even put a dollar value to that productivity loss."

Modeling and assumptions. The composite organization accepts all major credit cards prior to Versapay, running about 25,000 transactions per year for a total of \$70,000 annually. Self-attestation and the annual administrative effort of proving PCI compliance is a significant burden, involving 25% to 50% of the work time of several executives and IT managers over a three-month period.

Unlike several of the prior benefits, these administrative time savings can't reasonably be "phased in" over three years, but only materialize in

"Versapay is taking on the [credit card attestation] responsibility, which is a huge benefit for us. Now, the team is able to focus on customer acquisition, growth, efficiency, et cetera."

CIO/CTO, US-based distribution company

Year 3, when Versapay is fully deployed companywide.

Flexibility. It's relatively easy to quantify time savings, but less straightforward to put numbers to what may be the more valuable aspect of this benefit: not having to be solely responsible for satisfying an audit and for preventing a security breach. However, companies who have themselves either experienced audit penalties and/or mitigated a security breach in the past — or who can look to similar companies in their own industries that have faced these situations — might be able to put approximate risk percentages and dollar values to these avoided costs.

Risks and results. Not all companies that process credit cards will have the exact same staff members assigned to the annual compliance effort. To account for this variability, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of \$46,000.

Scope Reduction Of PCI Compliance					
Ref.	Metric	Source	Year 1	Year 2	Year 3
E1	Avoided certification preparation time (months)	Interviews			3
E2	Manager time dedicated to project	Assumption			50%
E3	Number of IT managers	Assumption			2
E4	IT manager salary, fully burdened	TEI standard			\$120,150
E5	Subtotal: Manager time reduced	$E1 * E2 * E3 * (E4 / 12)$			\$30,038
E6	Executive time dedicated to project	Assumption			25%
E7	CISO annual salary, fully burdened	TEI standard			\$285,000
E8	System admin annual salary, fully burdened	TEI standard			\$94,500
E9	Network engineer annual salary, fully burdened	TEI standard			\$108,000
E10	Software developer annual salary, fully burdened	TEI standard			\$128,250
E11	Subtotal: Executive time reduced	$E1 * E6 * (E7 + E8 + E9 + E10) / 12$			\$38,484
E12	Benefit ramp-up factor	Composite			100%
Et	Scope reduction of PCI compliance	$(E5 + E11) * E12$	\$0	\$0	\$68,522
	Risk adjustment	↓10%			
Etr	Scope reduction of PCI compliance (risk-adjusted)		\$0	\$0	\$61,670
Three-year total: \$61,670			Three-year present value: \$46,333		

UNQUANTIFIED BENEFITS

Interviewees mentioned the following additional benefits that their organizations experienced but were not able to quantify:

- **Boost in employee satisfaction.** Versapay reduced friction and frustration for organizations' AR teams, which facilitated more successful recruitment and stronger retention. According to the CFO of the North American distribution company: "[Employees] certainly [realized a] savings of time, but I think the biggest thing was the savings of frustration that they had in doing their jobs. It's substantially streamlined the way they do things."
- **Boost in brand value due to transparency.** The CIO/CTO of the US-based distribution company talked about how a lack of up-to-date information, erroneous credit holds, and customers' inability to see and use their own account credits had created feelings of distrust. For this organization, the move to Versapay — with the access and control it offered customers — boosted brand value and customer loyalty.

The CIO/CTO noted, "If you do not provide the transparency and the customers do not trust what you're saying, that results in customer churn," stressing that they considered the customer experience and brand benefits to be even more important than the efficiencies Versapay provided. They continued: "Most companies look at it from a finance back-office automation or efficiency gain. For us, our model is to deliver great customer experiences. After we deployed this capability, many of our customers are raving about it, and I feel really proud that absolutely differentiates us from our competition."

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer

“Customers can get the statement when and where they want to. Then they can pay it at their own convenience. Versapay allowed us to give transparency and choice to the customer.”

CIO/CTO, distribution, US

might implement Versapay and later realize additional uses and business opportunities, including:

- **Support for company growth.** Interviewees spoke of Versapay's role in supporting their companies' growth, both from the cost side in terms of enhancing the efficiency and scalability of their AR operations and from the revenue side in terms of increasing customer loyalty and repeat business. According to interviewees, a key factor leading to that growth in sales was that the Versapay portal is easy for customers to use.

With the right strategy, companies leveraged this benefit even further, from simply reducing customer churn to actively growing new sources of sales. For example, the CIO/CTO of the US-based distribution company discussed how the integration of Versapay with their B2B portal further enhanced the “stickiness” of doing business with their company. “That ensures that every time customers are looking for something, they're also looking at my virtual inventory. When we started this journey, about 30% to 35% of our revenue was digital through our B2B portal. Now, we're tracking around 90% of our total revenue as a digital revenue share. We've grown the company exponentially.”

- **Support for growth across multiple organizations.** The CIO/CTO of the US-based distribution company pointed out that Versapay’s efficiency and productivity benefits extended not just to the company that purchased the solution, but to the thousands of other organizations that it worked with as its customers. They said: “The less time they spend on mundane things [such as processing invoices], the more time they have to do the things that grow their businesses.”
- **Support for remote work.** While all five interviewees’ AR and collections teams already worked virtually prior to their Versapay migrations due to the global COVID-19 pandemic, organizations that still rely on local, in-office teams might realize additional employee-satisfaction, recruitment, and employment benefits in the fact that Versapay supports a shift to remote work.

Employees enjoyed greater job flexibility and satisfaction by working from home and setting their own hours. From the organizational side, this shift improved recruitment ease and success, and even potentially lowered employment costs, as it opened up the possibility of recruiting employees from less expensive hiring markets. Finally, there were even economic and societal benefits, as companies that operated virtually had the opportunity to support income growth in economically depressed regions.

- **Support for environmental sustainability.** All five interviewees said that Versapay allowed their AR departments to go mostly paperless. While their organizations still had to print and mail some invoices, the paper savings were substantial.

The composite organization, with over 12,000 of its 15,000 customers adopting Versapay’s paperless payment system, saves an estimated 450,000 sheets of paper every year after full ramp-up is reached, assuming that each monthly statement averages two pages plus an envelope.

This figure does not include the paper savings from the customer side, as the majority of those 12,000 customers also save at least one sheet of paper and one envelope per month as well, now that they no longer mail a three-part check.

The carbon footprint of one sheet of office paper, “from cradle to customer,” ranges from 4.29 to 4.74 grams of carbon dioxide equivalent (g CO₂-eq).⁵ Therefore, the total annual carbon savings from this organization’s move to Versapay can be estimated at somewhere between 1,930 and 2,133 kg CO₂-eq.

Moving to paperless invoicing via a software solution that makes work easier and more efficient for both customers and employees is also a relatively painless way for companies to make progress toward their sustainability goals, which offers benefits in the way of brand strength and, increasingly, in regulatory compliance, as more oversight organizations are requiring a sustainability component of periodic financial reporting.

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



Once full Versapay ramp-up is reached in Year 3, the composite organization saves 450,000 sheets of paper every year.

Analysis Of Costs

■ Quantified cost data as applied to the composite

Total Costs							
Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Ftr	Software costs	\$0	\$384,615	\$444,150	\$510,300	\$1,339,065	\$1,100,112
Gtr	Implementation costs	\$589,838	\$432,338	\$0	\$0	\$1,022,175	\$982,872
Htr	Adoption campaign costs	\$60,910	\$60,910	\$0	\$0	\$121,820	\$116,282
Itr	Ongoing support and training costs	\$0	\$238,098	\$244,608	\$238,098	\$720,804	\$597,495
	Total costs (risk-adjusted)	\$650,747	\$1,115,960	\$688,758	\$748,398	\$3,203,864	\$2,796,761

SOFTWARE COSTS

Modeling and assumptions. Versapay's subscription costs start with a license fee based on the Collaborative AR edition selected and number of invoices. Each pricing tier includes the ability to send a set number of invoices per month with additional invoices going toward an invoice overage.

This part of the financial model also includes credit card processing fees. Since the composite organization already accepts credit card payments,

the only additional cost it incurs by working with Versapay is the vendor's own processing fees; transaction fees the credit companies levy themselves are not included. All of these costs are phased in according to the percentage completion of the Versapay rollout.

Risks and results. To account for possible growth, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$1.1 million.

Software Costs

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
F1	Annual license fee	Composite		\$360,000	\$360,000	\$360,000
F2	Total annual invoice overages	Composite		\$66,000	\$66,000	\$66,000
F3	Total annual Versapay credit card transaction fees	Composite		\$60,000	\$60,000	\$60,000
F4	Versapay rollout completion	Composite		5%	50%	100%
Ft	Software costs	$F1+(F2*F4)+(F3*F4)$	\$0	\$366,300	\$423,000	\$486,000
	Risk adjustment	↑5%				
Ftr	Software costs (risk-adjusted)		\$0	\$384,615	\$444,150	\$510,300
Three-year total: \$1,339,065				Three-year present value: \$1,100,112		

IMPLEMENTATION COSTS

Modeling and assumptions. The composite organization relies on a combination of third-party professional services and internal IT capabilities to support the Versapay rollout. While the rollout is phased in over three years, the implementation costs are front-loaded in the initial period and in Year 1.

Risks and results. To account for underestimation of implementation time and costs, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of \$983,000.

Implementation Costs						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
G1	Professional services	Interviews	\$150,000			
G2	IT manager FTEs	Interviews	1	1		
G3	IT team FTEs	Interviews	4	4		
G4	IT manager salary, fully burdened	TEI standard	\$120,150	\$120,150		
G5	IT generalist salary, fully burdened	TEI standard	\$72,900	\$72,900		
Gt	Implementation costs	$G1+(G2*G4)+(G3*G5)$	\$561,750	\$411,750	\$0	\$0
	Risk adjustment	↑5%				
Gtr	Implementation costs (risk-adjusted)		\$589,838	\$432,338	\$0	\$0
Three-year total: \$1,022,175			Three-year present value: \$982,872			

ADOPTION CAMPAIGN COSTS

Evidence and data. The interviewees’ ability to fully realize the benefits outlined in this study depended heavily on their customer adoption rate for the Versapay portal.

As such, interviewees spoke of the efforts their teams undertook in reaching out to customers via email marketing campaigns, printed inserts in monthly statements, one-on-one phone conversations, and educational videos to make customers aware of Versapay, educate them about the benefits of enrolling, and assist them with account setup.

Modeling and assumptions. The composite organization develops a printed marketing flyer that is

inserted twice in customers’ mailed statements. Then, AR employees invest in follow-up phone calls to reinforce the message, answer questions, and address concerns.

Risks and results. The effort and cost involved in running a successful adoption campaign will depend on the makeup of the organization’s customers. If customers tend to be more traditional or less technologically inclined, the campaign may require more iterations or more time-consuming follow-up calls. To account for this variability, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of \$116,000.

Adoption Campaign Costs						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
H1	Flyer development costs	Composite	\$500	\$500		
H2	Printing and insertion costs	Composite	\$50,000	\$50,000		
H3	Subtotal: Marketing costs	H1+H2	\$50,500	\$50,500		
H4	FTE dedicated to follow up	Interviews	25%	25%		
H5	Follow-up period (months)	Interviews	3	3		
H6	Manager salary, fully burdened	TEI standard	\$120,150	\$120,150		
H7	Subtotal: Follow-up costs	H4*H5*H6/12	\$7,509	\$7,509	\$0	\$0
Ht	Adoption campaign costs	H3+H7	\$58,009	\$58,009	\$0	\$0
	Risk adjustment	↑5%				
Htr	Adoption campaign costs (risk-adjusted)		\$60,910	\$60,910	\$0	\$0
Three-year total: \$121,820			Three-year present value: \$116,282			

ONGOING SUPPORT AND TRAINING COSTS

Modeling and assumptions. The composite organization conducts up-front and ongoing training for all of its AR team members. The bulk of these costs come in Years 1 and 2 during the company’s phased deployment. However, training is a consistent investment as employees turn over and as Versapay releases software updates.

- Each new user needs 12 hours of up-front training. There are 20 new users in Year 1, 30

new users in Year 2, and five new users in Year 3.

- All users need an annual four-hour refresher training, which covers advanced functions or new features.

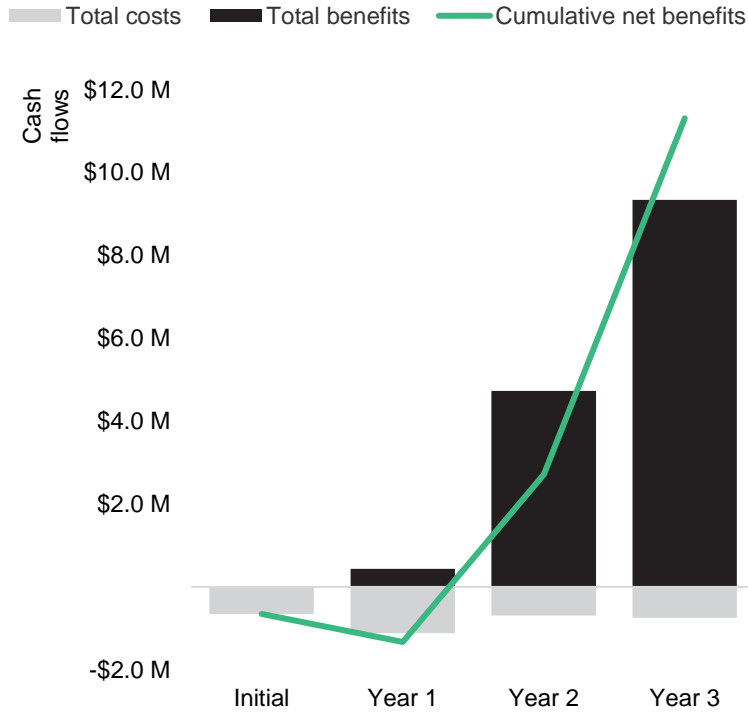
Risks and results. To account for possible underestimation of initial or ongoing training needs, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of \$597,000.

Ongoing Support And Training Costs						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
I1	IT team FTEs	Interviews		3	3	3
I2	IT generalist salary, fully burdened	TEI standard		\$72,900	\$72,900	\$72,900
I3	Subtotal: IT support costs	I1*I2		\$218,700	\$218,700	\$218,700
I4	Accounting team members new to system	Composite		20	30	5
I5	Initial training hours per employee	Interviews		12	12	12
I6	Accounting team members already on system	Composite		5	25	50
I7	Ongoing training hours per employee	Interviews		4	4	4
I8	Hourly rate of accounting agent (fully burdened)	TEI standard		\$31	\$31	\$31
I9	Subtotal: Training costs	((I4*I5)+(I6*I7))*I8	\$0	\$8,060	\$14,260	\$8,060
Itr	Ongoing support and training costs	I3+I9	\$0	\$226,760	\$232,960	\$226,760
	Risk adjustment	↑5%				
Itr	Ongoing support and training costs (risk-adjusted)		\$0	\$238,098	\$244,608	\$238,098
Three-year total: \$720,804			Three-year present value: \$597,495			

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 and NPV for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted ROI and NPV 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	(\$650,747)	(\$1,115,960)	(\$688,758)	(\$748,398)	(\$3,203,864)	(\$2,796,761)
Total benefits	\$0	\$437,674	\$4,735,331	\$9,342,332	\$14,515,337	\$11,330,415
Net benefits	(\$650,747)	(\$678,286)	\$4,046,573	\$8,593,934	\$11,311,474	\$8,533,654
ROI						305%

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%.

Appendix B: Endnotes

¹ Source: "[2022 AFP Digital Payments Survey](#)," Association for Financial Professionals, October 4, 2022.

² Source: Vipal Monga, "[U.S. Companies Cling to Writing Paper Checks](#)," The Wall Street Journal, March 10, 2014.

³ 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.

⁴ Source: Ana Claudia Dias, Luis Arroja, "[Comparison of methodologies for estimating the carbon footprint — case study of office paper](#)," Journal of Cleaner Production, March 2012.

⁵ Ibid.

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