Construction Estimating Guide

An Overview of Estimating Tools and Software

Software Advice™

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Introduction

Construction estimating technology has come a long way in the last 40 years. Estimators traded in colored pencils and clunky calculators for powerful software applications. Thermal faxes became obsolete. "Going paperless" is now achievable. And "building information modeling (BIM)" and "big data" are hot conversation topics.
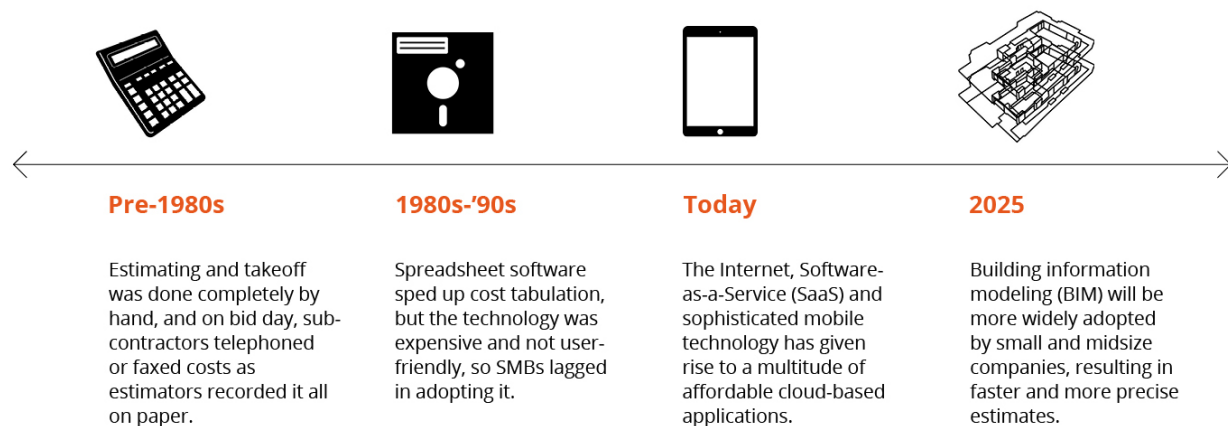
The tools of the trade may have changed, but the job is as important as ever. In fact, an estimator's ability to create reliable, accurate estimates greatly impacts a construction company's overall success. Estimate too high, and you lose the bid. Too low, and your profit shrinks. Take too long to submit the estimate, and the customer thinks you're unprofessional.

As building-owner expectations and the construction industry change, so too will estimating tools. Likewise, construction estimators who want to stay relevant will need to develop skills to use them.

This guide describes current and future estimating technology, the common benefits and challenges of estimating and takeoff software, tips on evaluating it and how to build a business case to get buy-in from your CEO.

Estimating Technology: Then, Now and in the Future

Construction estimating and takeoff tools are undoubtedly more sophisticated than they used to be, and are continually advancing. The timeline below highlights important technology changes in the industry over the last four decades and beyond.

Pre-1980s

Estimating and takeoff was done completely by hand, and on bid day, sub-contractors telephoned or faxed costs as estimators recorded it all on paper.

1980s-'90s

Spreadsheet software sped up cost tabulation, but the technology was expensive and not user-friendly, so SMBs lagged in adopting it.

Today

The Internet, Software-as-a-Service (SaaS) and sophisticated mobile technology has given rise to a multitude of affordable cloud-based applications.

2025

Building information modeling (BIM) will be more widely adopted by small and midsize companies, resulting in faster and more precise estimates.

Pencils and Paper Define the Early Days of Estimating

Before the widespread adoption of personal computers and software, all pre-construction estimating and takeoff was done by hand. Plans were available as hard copies, and estimators used calculators, pencils and paper spreadsheets to do quantity counts and cost calculations. Furthermore, communication happened either on the telephone or in person.

Not surprisingly, the entire process was tedious and error-prone. Since these traditional methods didn't scale well, as the size and complexity of a project increased, so did the number of man-hours needed to get the job done.

"Before computers, pre-construction estimating was stressful. It was labor-intensive, [with] lots of bodies in a noisy room, and everything was done by hand. On bid day, you worked fast and furious, writing line items on an 11 by 17 sheet of paper as calls came in all day long. And if you had bad penmanship, that didn't help."

—Rich Ullrich
Professional Estimator and
President of Everest Estimating

Computers Revolutionize Business Processes

Through the 1980s and into the 1990s, personal computer purchases surged, and the machines quickly became permanent fixtures in the office. General-purpose software programs such as Lotus 1-2-3 and Microsoft Excel made it possible for estimating to enter the digital space.

Early versions of computers and software were clunky and not easy to use, however. And since such general-purpose applications weren't built specifically for construction estimating, users had to modify their processes to work with the software's limitations.

Large construction firms could afford the new technology and figured out how to handle the change, but many small and midsize businesses (SMBs) chose to stick with the traditional tools they were already familiar with.

The Internet Democratizes Software Applications

In the late 1990s and early 2000s, the construction industry witnessed the next major disruptor: the Internet.

As millions of businesses moved their operations online, a wave of cloud-based applications hit the market to support them. Earlier versions of software were deployed "on-premise," meaning they required manual installation on each user's machine—often resulting in different teams using different versions of the software. Cloud-based products, on the other hand, deliver "Software-as-a-Service (SaaS)": They are deployed quickly, updated automatically and accessed via the Web, so everyone always has the latest and greatest version.

The Internet's proliferation also enabled the rapid adoption of smartphones and other mobile devices, which make it possible for estimators to efficiently collaborate with subcontractors and other stakeholders, as well as to work on-site when necessary—rather than in an office many miles away.

More recently, subscription-based pricing models—in which users pay a monthly or annual fee to use the software—have made robust estimating and takeoff applications budget-friendly. Commonly used by cloud-based software vendors, these models have relatively low upfront costs; this means that even small, budget-conscious companies can now afford to implement estimating software.

Estimating and takeoff tools are currently consolidating into single platforms. So, rather than searching price books in one place, viewing plans in another and taking off with something else, all tasks are completed within the same system. This not only increases efficiency, but also gives estimators a bird's-eye view of a project to better determine how changes impact costs.

Intelligent BIM Will Lead to Faster Estimating and Takeoff

Estimating technology has come a long way, but the evolution is just getting started. Over the next decade and beyond, expect to see BIM-powered estimating trickle into the SMB construction market.

Software vendor GraphiSoft defines BIM nicely: "[BIM is] a 3D digital model of the building. This model, however, is way more than pure geometry and some nice textures cast over it for visualization. A true BIM model consists of the virtual equivalents of the actual building parts and pieces. … That allow[s] us to simulate the building and understand its behavior in a computer environment way before the actual construction starts."[1]

Hypothetically, BIM enables takeoff and estimating directly from the 3D model, letting estimators view and interact with it to gather information more easily than is possible in the non-virtual world.

Thus, BIM is often sold as a push-button approach that automatically generates perfectly accurate costs—which has some estimators concerned that BIM will replace them. But Fred Mills, construction professional and founder of resource website The B1M, says there's no need to fear.[2]

"Far from replacing them, [BIM] actually enables estimators to better collaborate with project teams, explore opportunities, eliminate risk and focus spend on a customer's needs more effectively, resulting in a higher-quality built asset that truly supports their business outcomes," writes Mills.

Furthermore, Marcene Taylor, president of construction cost planning and management company MTI,[3] says that BIM offers a lot of potential, but it will be many years before it works well in practice.

"Currently, you can't trust the data that's put into the model, because designers and architects simply don't think the way estimators do. So, it's difficult to trust the answers," says Taylor. "[The industry] is a long way off from the coding standardization needed for estimators to take off of BIM accurately."

Nonetheless, BIM is a technology that estimators shouldn't ignore, because it will eventually be commonplace in the SMB construction sector. The good news is, the skills that are necessary today—knowledge of estimating processes, attention to detail, basic math and the ability to correctly interpret drawings and specifications—will still be important. But the estimators most likely to benefit from BIM will be those who are highly creative critical thinkers.

Taylor says that with "the way the industry is heading—owners wanting pricing earlier [based] on drawings that are less and less complete—estimators who are naturally creative and capable of critical thinking will be able to fill in the blanks and imagine what [a plan] will be when fully designed. They will be the ones who can make sense of the missing pieces to estimate accurately."

Which Tools Should You Use?

Software Advice speaks regularly with SMB estimating software buyers. Based on those conversations, we've determined that estimators rely on three main types of tools to perform takeoff and create estimates: manual methods, spreadsheets and specialized estimating and quantity takeoff applications.
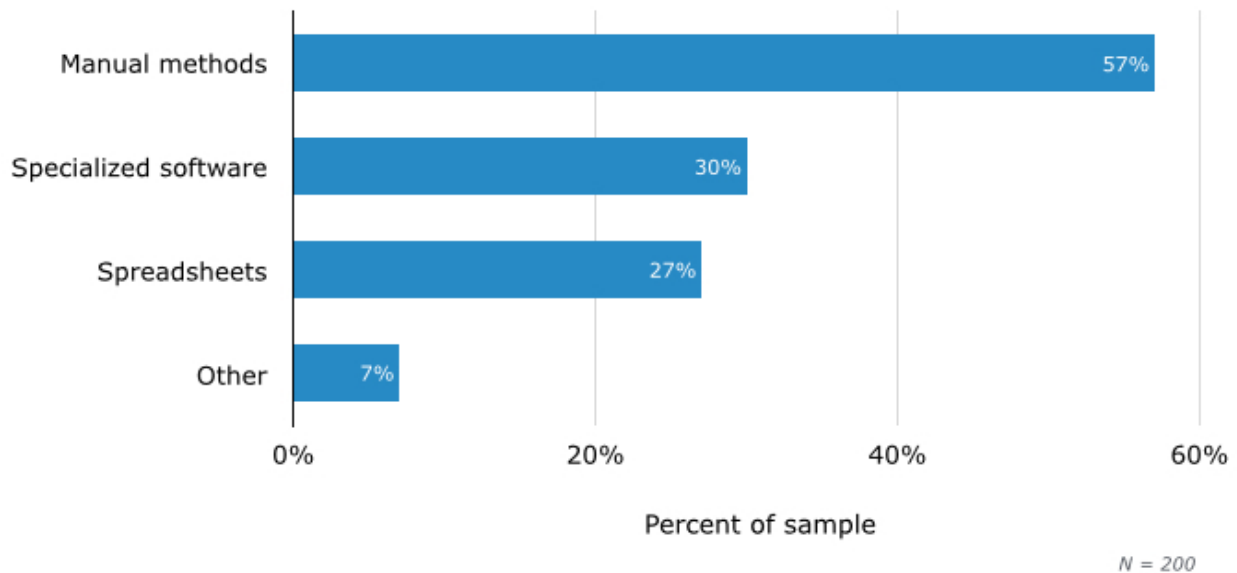
The pros and cons of each are outlined in the table on the next page.

	Advantages	**Disadvantages**
Manual methods	• Low learning curve • Always available • Free or inexpensive	• High error rate • Difficult to share/collaborate • Inconsistent workflow
Spreadsheets	• Automated calculations • Lower error rate • Consistent workflow • Inexpensive	• Difficult to share/collaborate • Does not scale • May not integrate with other software
Specialized applications	• Automated calculations • Low error rate • Consistent workflow • Professional-looking bids • Easy-to-search cost database	• Upfront and recurring costs • Higher learning curve • May not integrate with other software

As shown in the chart below, a large number of prospective software buyers still estimate by hand, despite the availability of general-purpose products (such as Excel) and affordable specialized software applications. Indeed, estimating by hand is still the go-to process for small businesses reporting annual revenue of $5 million or less.

Prospective Buyers' Current Estimating Methods

Method	Percent
Manual methods	57%
Specialized software	30%
Spreadsheets	27%
Other	7%

Percent of sample

N = 200

"I use Excel and on-screen takeoff. On-screen takeoff is the most important piece of software for estimators."

—Marcene Taylor
Professional Estimator and President for MTI

No matter the size of your construction business, software can maximize workflow efficiency, collaboration and estimating accuracy. So, instead of asking whether you need software, a better question is: *When does software become a necessity?*

One easy way to determine when software is worth the cost is to track how much time is spent estimating and taking off plans. Even complex projects can be completed in a day or two with software—so if you're spending more time than that estimating, software will likely be worth the investment.

You can also do a deeper ROI analysis with this calculator to determine how many estimating man-hours can be saved, and about how long it will take to recoup investment costs.

James Kegley
Estimator for John M. Hall Company

Current software: Sage Timberline

Previously used: Paper tabulation

How has software impacted your business? *We can estimate the cost of a project in a day or less with accurate measurements from plan takeoffs. It's a scary thought, but without it, it would probably take three times as long to estimate.*

What is the most helpful functionality? *The assembly feature is the best. It allows me to take off multiple items in a single pass, [such as] framing lumber, insulation, drywall, wall sheathing, paint and baseboards. ... I use a digitizer with the software, so literally, I can measure a wall length and have all those items.*

Estimating and Takeoff Software Functionality

Nearly all estimating products include the capabilities listed in the chart below. Only digital takeoff is an exception: While some estimating solutions include digital takeoff functionality, many estimators use stand-alone takeoff applications for quantity counts, and a separate application or spreadsheets for estimating.

Advantages	What It Does
Cost database	Stores material, equipment and labor costs to reference when creating an estimate. Users can import third-party cost databases, or create their own.
Visual assembly	Displays a 2D or 3D graphical view of a build assembly to visualize which portion of the project is being estimated.
Historical database	Records material, labor and equipment costs and other details of all past projects.
What-if analysis	Models how a bid will change if timelines, materials, labor and other variables change.
Proposal generator	Allows users to customize estimate templates and automatically add cost data to create accurate, professional-looking proposals.
Reporting	Generates cost breakdown reports using charts and graphs to support the analysis of project costs.
2D and 3D takeoff*	Used to measure drawings electronically. Most systems support the on-screen takeoff method, or the use of a digitizer.

Note: Not all estimating applications include takeoff functionality. Many takeoff applications are available as best-of-breed, stand-alone programs.

Jeff Salvatore
Chief Estimator for Mark Cerrone Inc.

Current software: B2W Estimate

Previously used: Excel

Why did you switch? *We were trying to standardize the way we look at things, and [wanted] to become more efficient with our estimates.*

How has software impacted your business? *We have been able to estimate more work, based on available and productive man-hours, as well as build a rate library of equipment, materials and subcontractors that are used within most estimates. Because of this, we were able to bid about twice as many jobs and double our staff in the estimating department.*

Most estimators who are looking to purchase software are most interested in functionality that automates measurement, counting and cost calculation: 72 percent specifically request features to calculate materials, labor and equipment costs; 44 percent want digital takeoff functionality; and 42 percent want the ability to automatically generate a detailed materials list.

Prospective Buyers' Top-Requested Functionality

Percent of sample
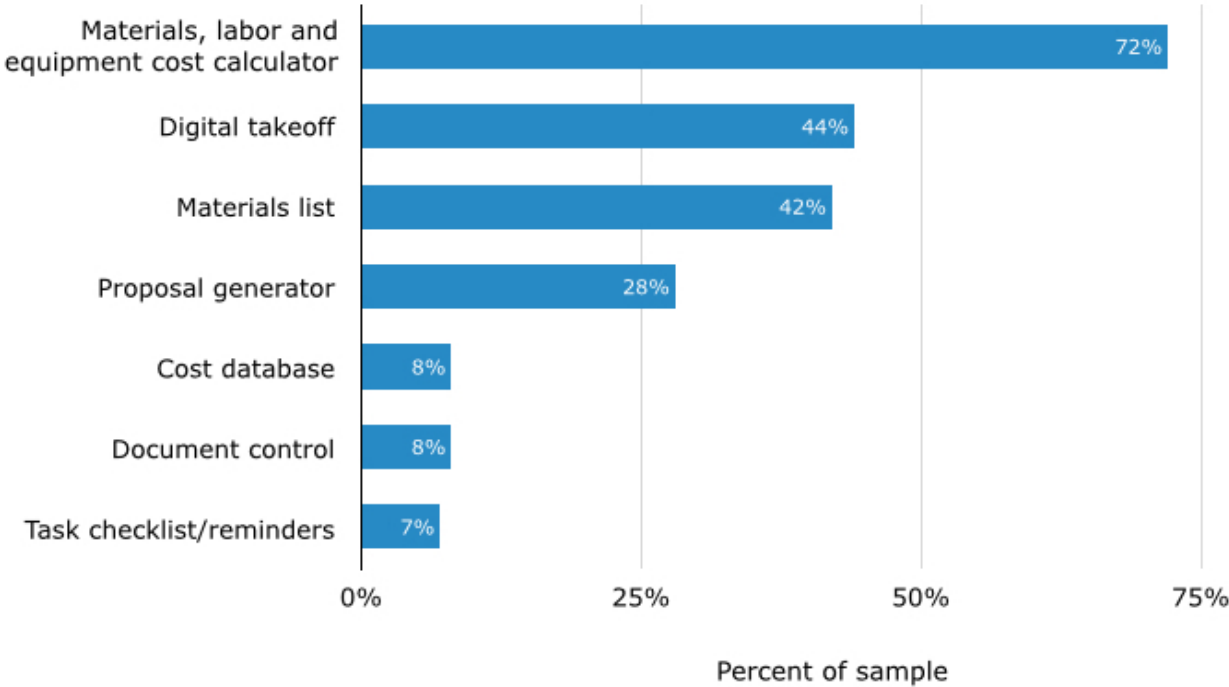
N = 100

Automating common estimating processes can save time. The steps, whether supported by software or not, remain the same, but the difference in time spent performing tasks is significant: In the example below, 6.5 hours are saved by using software.

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Construction Estimating Time Requirements

	No software	With estimating and takeoff software
Research *Study plans, inspect work site and obtain building and safety records and geological reports.*	2 hours	2 hours
Survey and Quantity Counts *From either digital or hard-copy plans, perform measurement and quantity takeoff.*	6.5 hours	3.25 hours
Gather Pricing *Price all quantities using price books, bids and historical data.*	2 hours	1 hour
Calculate Costs *Calculate materials, labor, equipment and markup.*	1.75 hours	.75 hour
Schedule *Establish materials procurement and construction project timeline.*	1.25 hours	.5 hour
Submit *Create formal proposal to submit and present to owner.*	1 hour	.5 hour
Total Estimating Time:	14.5 hours	8 hours

These calculations assume software increases efficiency 50 percent. Many software vendors and users claim estimating efficiency can be improved by 90 percent or more, however.

Phil Cooper
Quality Control Supervisor for Kaplan Paving

Current software: FCS Control

Previously used: Microsoft Access

Why did you switch? *I liked the idea of mobility and the many other advantages the software provided.*

How has software impacted your business? *From start to finish, I can enter a brand new customer, take pictures and have a proposal ready to view or email in 10 minutes or less while on site. [Because of this,] my turnaround time on proposals is twice as fast, on average. [And] the proposals I'm able to provide now have pictures of the exact items attached to the proposal. It's easier to line-item the proposal and provide additional value. Property managers, school districts and general contractors all appreciate this.*

5 Objections and Tips for Handling Them

Touting the benefits of software alone *might* be enough to convince the boss to invest in it, but there's usually some push-back. For instance, managers who are used to manual processes might believe there's no need to change since the company has always done it that way. Perhaps the company's profits are thin, and the CEO sees software as just another number diminishing the bottom line. Or maybe there's concern that it will be too hard to incorporate, so it's easier to avoid the hassle.

Sadly, it often takes a big mistake to motivate reluctant managers to approve a purchase— for example, an over-scheduled estimator who doesn't have time for a site visit misses the 30-foot ceiling on the plan, resulting in underbidding on the project. Such mistakes are costly and sure to get the ball rolling on a software decision, but it's best to get something in place *before* making a major mistake.

On the following page, find some common objections and tactics for countering them.

Objection	Tactic
"Software is too expensive."	Focus on the cost-savings by estimating the number of man-hours that will be saved by using software to complete tasks. From there, figure out how long it will take to recoup the cost of the software.
"We don't have time to learn something new."	Read product reviews and talk to peers about the product's learning curve, and take note of free and premium training offered by vendors. Find out if there is an average "ramp-up time" to expect.
"We won't be able to use it on-site."	Ask vendors if the application is compatible with mobile devices. Many cloud-based applications are accessible on tablets and smartphones, so as long as an Internet connection is available, estimating apps can be used in the field.
"Changing our process will be too disruptive and we might lose business."	Find out how long it typically takes to implement the software and what support the vendor provides during the transition. Put together a plan for transitioning, and carefully outline potential problems and how to resolve them.

How Software Is Priced

When transitioning from manual estimating methods to specialized software for the first time, pricing might seem mysterious. There are many factors that contribute to the software's final cost, including the type of license, recurring fees and additional fees that are often overlooked by first-time buyers.

License Type	Pricing Criteria
Software Pricing	
Recurring Costs	Additional Costs

Here are explanations of these pricing factors, which buyers should understand before asking vendors for quotes:

License Type
Software Pricing

License Type

The two most common types of software licenses are "perpetual" and "subscription."

Perpetual license: An upfront sum is paid to use the software in perpetuity. This is the traditional licensing model, and is most commonly associated with applications installed on-premise (on the construction company's computers and internal servers).

Subscription license: A fee is paid to use the software for a set amount of time. Subscription pricing became popular with the advent of cloud-based software.

While subscription licenses have lower upfront costs—which makes them appealing for budget-conscious businesses—the costs are recurring. For software purchased on a perpetual license, the majority of costs are paid up front. Regardless of the license type, the total cost of ownership converges over time—which means that over the lifetime of the software, users pay about the same amount, no matter which license type they select.

Software Pricing

Pricing Criteria

Pricing Criteria

Software vendors price products in different ways. The most common are "flat fee," "per user," "per project" and "revenue-based."

Flat fee: A single fee is charged for users to access the application. The fee, whether subscription or perpetual, does not change.

Per user: A license fee is paid for each software user. Some vendors use volume pricing: charging a higher license fee for a single user, and decreasing the per-user license cost as the number of users increases.

Per project: This is common with subscription-based software products. Users pay either a one-time fee for each new project, or a monthly fee for each active project. Most of the time, an unlimited number of users—including estimators, project managers and subcontractors—have access to the project.

Revenue-based: This is less common than other pricing methods. The license cost is calculated on a sliding scale based on the construction company's annual revenue.

Software Pricing

Recurring Costs

Recurring Costs

All software requires periodic maintenance and upkeep. Consider these costs when setting a budget.

Subscription fee: Subscription-based software incurs regular license fees, which are paid monthly or annually, depending on the contract terms.

Support: Most vendors provide limited support as part of the license cost. Others may charge a mandatory or optional fee for additional support services.

Maintenance and upgrades: Subscription-based software typically includes maintenance and upgrades with the license fee. Maintenance and upgrades for perpetually licensed software typically incur an additional charge of up to 20 percent of the license cost each year.

Access to cost database: To access and import cost databases, such as RS Means, within the estimating application requires a subscription, unless the vendor explicitly states that it is included with the license cost.

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Checklist: Evaluating Products

☐ Encourage all stakeholders to identify "must-have" and "like-to-have" features.

☐ Have the IT team determine technology requirements and limitations.

☐ Set a realistic budget that includes software implementation, training and support costs.

☐ Create a shortlist of products that meet requirements.

- Use Google to search for products.

- Read online product reviews.

- Ask peers for recommendations.

- Hire a consultant.

- Speak to a Software Advice advisor.

☐ Contact vendors to ask questions and schedule demos.

☐ After demos are complete, meet with stakeholders to collect feedback on the pros and cons of each product.

☐ Make a decision, or repeat the process with a different shortlist if no products are a good fit.

Checklist: Building a Business Case for Software

☐ Outline the expected benefits of implementing estimating and takeoff software.

☐ Identify inefficiencies and problems with existing processes.

☐ Determine how software can fix those problems.

☐ Create a shortlist of products that meet requirements.

☐ Estimate the number of hours and dollars that are wasted each year handling the problems software can solve.

☐ Estimate how long it will take to achieve a ROI.

☐ Identify new revenue opportunities that can be pursued when the software is implemented.

☐ Identify possible problems you might experience with the software, and outline a plan to circumvent them.

☐ Create a realistic timeline to fully implement software and train employees on how to use it.

Methodology

Our advisors regularly speak with buyers who contact Software Advice seeking new construction software. Some data used to create this report was collected by our advisors during those interactions for business purposes rather than for market research. We randomly selected 200 interactions from U.S. buyers during 2015 to analyze for this e-book.

Results are representative of our buyer sample, not necessarily estimating software as a whole. Sources attributed and products referenced in this article may or may not represent client vendors of Software Advice, but vendor status is never used as a basis for selection. Expert commentary solely represents the views of the individual. Chart values are rounded to the nearest whole number.

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