The Challenges, Benefits, and Best Practices of Effectively Adopting ERP Systems: A Procurement Perspective

RESEARCH PAPER

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Introduction and Scope

This report was motivated by market trends indicating growing adoption of Enterprise Resource Planning (ERP) systems and conversations with professionals who expressed disappointment with the performance of the procurement modules within these systems. It has a four-fold purpose: First, provide greater understanding of ERP systems, their scope, logical frame, and operational capacities. Second, based on original research and data, develop a framework of the most difficult challenges facing organizations when adopting ERP systems. Third, provide procurement professionals practical, best practices for procuring an ERP system. Finally, answer the question: Should implementation of procurement functionalities be envisioned within ERP systems or on a stand-alone basis?

Data[1]

This report is based on data obtained via (1) in-depth review of ERP-focused literature; (2) interviews with nine experienced ERP users, including procurement directors, IT directors, and procurement managers; and (3) survey results from 343 ERP-using agencies. A detailed discussion of the research methodology and data is provided in Appendix A.

ERP: What Is It?

ERP is the technology-mediated automation of organizational-level processes, data, and associated communication. Such systems, and the software on which they are based, can be either open-source or proprietary. Although conceptually ERPs have their roots in an extensive intellectual[2] and practice[3] base, ERP has recently become primarily synonymous with software-based management systems that integrate traditionally separate organizational functions. For purposes of this report, "ERP" is used in this contemporary sense.

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[1] It is critical to emphasize that any generalization beyond the scope of the sample should be made with extreme care and consideration to the methodological approaches.

[2] Some trace historic roots of the ERP idea/conceptualization as far back as Ford Whitman Harris's economic order quantity (EOQ) model.

[3] More directly, ERPs draw their historic roots from material requirements planning (MRP) and manufacturing resource planning (MRPII)—two approaches to managing scheduling, inventory, resources, and production in manufacturing. ERP represents the logical evolution of MRP and MRP II to the larger organizational (and non-manufacturing) context.

An ERP system is not simply *a product. It is the digitization of a systems management approach reflected through a technical architecture that links disparate organizational processes*. As such, it is helpful to keep in mind that developing a successfully functioning, technology-based ERP system will emphasize technical effectiveness ahead of organization management processes and practices.

An ERP system is typically composed of several applications which track organizational processes at different levels.[4] These applications are designed on common data definitions, structures, and databases. What makes ERP systems different from previous generations of organizational management systems is the fact that they allow these function-level applications to communicate among each other within common units of analysis while extending beyond production processes. Such systems also seek to centralize data and information storage and availability. As such, organizational decision makers have access to the same information in one central location and no longer need to pull data in different formats from several organizational functions. Within an ERP, organizational functions and processes are typically organized under modules (e.g., procurement, human resources, finance and accounting, project management, etc.). In most cases, developers go to great lengths to ensure that there is a common theme ("feel") across modules. It is also increasingly common for ERP systems to operate in real time as this is becoming a "taken-for-granted" expectation.

In early stages of their diffusion (1990s), ERP systems focused largely on internal functions (e.g., administration, finance, etc.). Starting in the early 2000s, however, most ERP systems started to incorporate external-facing functions, such as commerce or customer relations. The evolution was both supported and aided by the fast dispersion and institutionalization of the Internet and Internet-based platforms at the individual and organizational levels. In some cases, this second generation of ERPs are referred to as ERP II, or enterprise application suites (EAS).[5] Due to the sheer scale and both management and technical demands associated with such complex systems, only large organizations were originally able to afford these systems. Today, given technological advances (mainly cloud-based solutions) and competition in the software market, even small organizations can find affordable solutions.

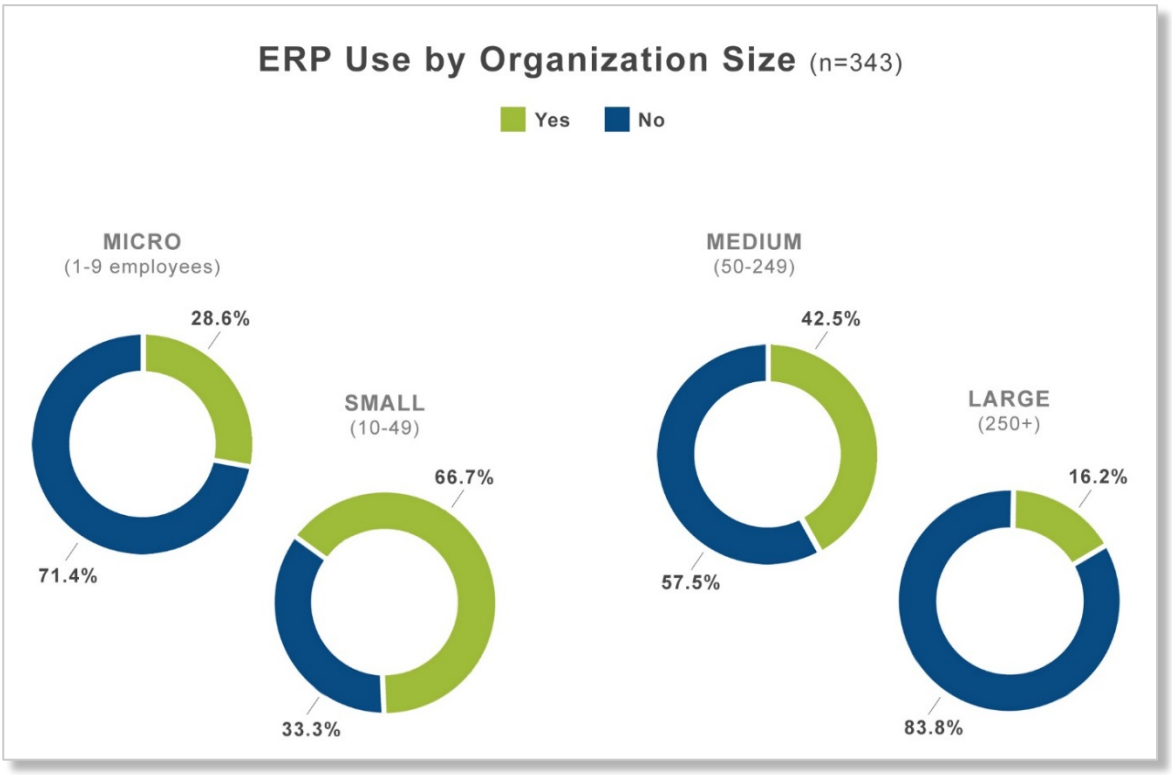
Of those participating in the ERP usage study, 69% indicated that their organization currently makes use of an ERP system. Furthermore, in 91% of those cases, the ERP systems include a procurement module.

Why or Why Not Adopt an ERP?

Survey and anecdotal responses indicate several benefits and advantages associated with the adoption of ERP systems. Together the identified advantages make ERP platforms quite attractive to organizations, though none of the benefits or advantages are guaranteed.

[4] There is a growing trend of having the ERP system be a unique application with numerous sub-applications rather than an interface that allows separate applications to communicate. In other words, systems are adapting processes to the specific nature of the application rather than adapting the processes of specific applications.

[5] EAS typically focus primarily on communication integration and automation.



Advantages and Benefits

- ***Efficiencies*.** Adopting ERP systems improves administrative and overall organizational efficiency and performance (e.g., inventory accuracy, time to order, etc.).
- ***Cost savings*.** Adoption of ERP systems is often promoted as *leading* to cost savings.
- ***Improved decision making.*** Implementing an ERP system provides executive management with the tools needed to make better informed decisions.

  "To make good decisions you need live data; you need the right data. You need to see things as they happen. That's what an ERP allows you to do."

  —IT Director

- ***Higher organizational "agility."*** ERP systems afford organizations the ability to be more flexible, integrated, and agile as they adapt to changing environments.

  "Organization can no longer afford to operate in silos. In order to deal with fast changing environments and conditions, every unit has to work collaboratively with each other and share data back and forth. ERP systems allow us to do that."

  —IT Director

- ***System security.*** In many ways, ERP systems could be significantly more secure than the sum of multiple non-integrated software/programs. This is not clear-cut, however. An ERP system could also expose the organization to more damage than the breach of a local/non-integrated software/program should the system be compromised. Understanding and reviewing system

security architecture options during the information gathering and requirements definition period will better inform the ERP award decision.

- ***Organizational coherency and cohesiveness.*** Given that most modules within an ERP system behave and look similar, adoption of an ERP system could lend the organization and its internal culture a much more coherent and cohesive perspective on overall organizational processes, providing the basis and stimuli for synergies.

  > *"Many people forget that ERP stands for "enterprise resource planning"—that is, the main philosophical concept behind ERPs is to help organizations efficiently plan their resources. ERPs have been born as a planning tool. Traditionally, every function had its own system. There was hardly an easy way to share information about resources between different functions. They simply weren't on the same page. The ERP system is a way that allows the organization to do that—to operate cohesively."*
  >
  > —IT Director

- ***Simplification of relationship management.*** Organizations that transition fully to ERP systems should see a significant drop in the resources necessary to manage systems-related relationships. In other terms, while the organization had to manage several developer relationships (for each process specific program in part) before an ERP, there is generally just one relationship to be managed after its implementation.
- ***Improved transparency.*** By their nature, ERP systems improve data access and can help enhance transparency and accountability.
- ***Enhanced collaboration.*** In theory, ERP systems should provide the conceptual and logistical grounds for improved internal and external collaborations.

  > *"One very important benefit of having an ERP is that it increases collaboration across departments. The ERP allows the entire organization to be on the same page and see the same picture, so to speak."*
  >
  > —IT Director

- ***Lower risk.*** Through centralization and integration of data processing and storage, the adoption of ERP systems is expected to lead to lower administrative, operational, and legal risks.
- ***Historic data retention.*** By design, ERP systems centralize collection, standardization, and storage. This allows for improved data retention (and uniformity) and consequent use (e.g., reporting, audit, etc.).

Obviously, ERPs and their adoption is not perfect. While there are benefits to implementing a system, ERPs also come with possible drawbacks.

Disadvantages and Drawbacks

- ***Cost.*** Although ERP systems are becoming much more cost accessible than they have been at any point in the past, they are still relatively expensive (especially if customization is required). What is perhaps even more important to consider is the fact that much of the costs are front-loaded.

  > *"ERPs are very expensive to implement and maintain. There are very high front-end and maintenance costs. That's especially true for legacy systems which had to be*

customized in order to integrate other native software. All things considered, the cost savings are not always as evident as vendors make it sound."

—IT Director

- ***Indirect costs.*** The adoption of ERP systems typically come with an associated "shock to the system" (e.g., process redesigns, structurer redesigns, role reshaping, retraining, etc.). These reorganizational changes carry notable indirect costs for the organization. If badly managed, the consequences to organizational culture and performance could be quite disastrous.

"What ERP vendors don't like to admit is that the price of an ERP is only one part of the ERP life-cycle cost of the product. It might be an important part, but it is not even always the largest part. When you add up the cost of training, transition, dealing with errors and delays, the cost of updates and all other direct and indirect costs over the length of the contract – the true costs of the system can be 10 times higher than the one vendors put on the table."

—Procurement Director

- ***Off-the-shelf options.*** ERP developers often push the organization to adopt off-the-shelf versions of the product. While "off-the-shelf" is certainly easier to adopt and service, it represents what the developer thinks is best for the organization, not vice-versa. More often than not, such solutions also represent the minimal common denominator across the sector. If the organization has unique needs, it either has to pay a high price for customization or find process-level solutions to work around the ERP constraints.

- ***Captive contracts.*** To monopolize program and financial longevity, developers design ERP systems in a manner that makes transition to other platforms difficult, or at the very least, expensive. As a result, contracting organization will have very little leverage in secondary contract negotiations and, in many instances, will be at the "mercy" of the developer unless negotiations are carefully executed during the original contracting phase.

"At my last agency the upgrades have become so expensive that we had to delay them several times. As a result, our system fell behind several generations. We delayed updating the system to the point where it was not functioning anymore."

—Procurement Director

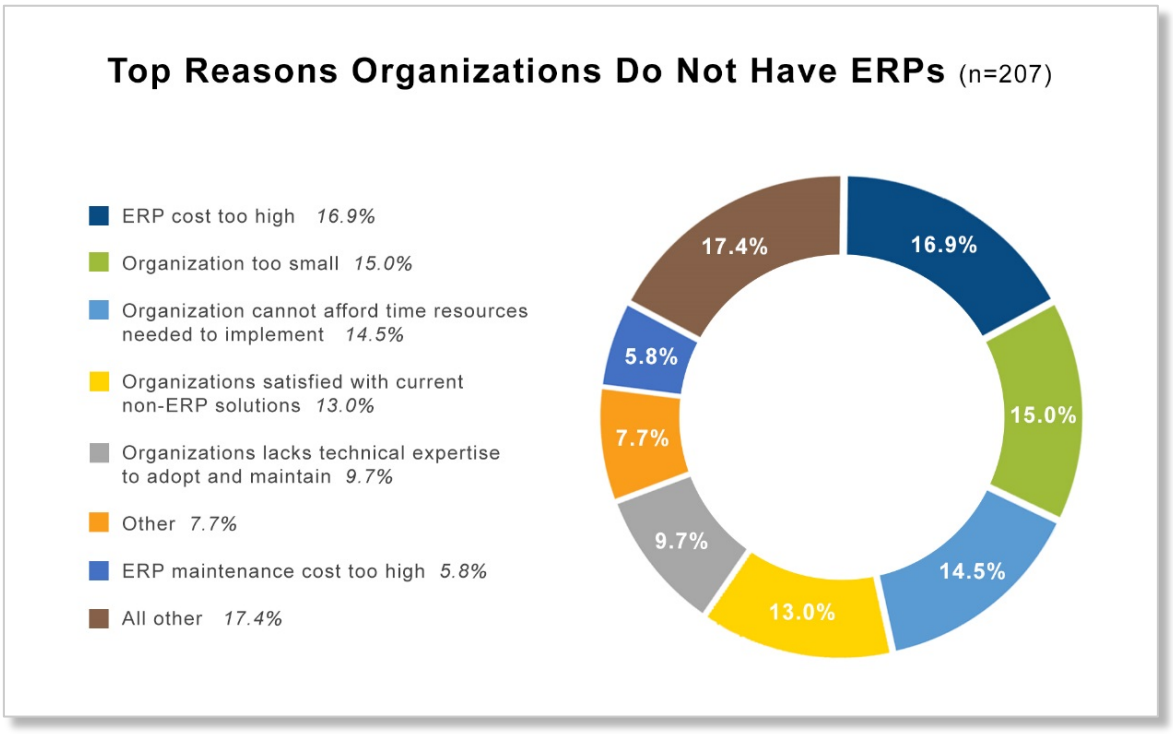
- ***Unfriendly User interfaces.*** Given the need to maintain module visual and data consistency, many ERP systems converge toward the most basic common denominator. This often leads to interfaces that are neither intuitive nor aligned with process-specific structures and terminology, discouraging use and increasing resistance to adoption that prompts undesirable behaviors, e.g., maverick purchasing or conscious errors.

"The design of the procurement module is bad. I mean, [it is] really bad. It's so bad we don't even use it. It makes no sense. It does not align at all with our needs and our processes. I bet that if you take a look at it right now, you wouldn't know what to do and where to start. It's just that bad."

—Procurement Director

- ***Missing out on new technology.*** The resource and time investments required for ERP adoption can be so large that organizations become de facto attached/dependent on the ERP. The psychological power of sunk costs and the mere threat of a new, vast change can lead to an organization missing out on the latest technological developments.

When asked why organizations did not have an ERP platform, the three most frequently cited motives were that (1) the system is too expensive (17%), (2) the organization too small (15%), and (3) the ERP is too resource intensive to implement (14%).



What Makes a Good ERP System?

There are several factors that an organization should consider when developing/deciding on an ERP system. Ideally, the ERP system implemented will carry all of them.

- ***Flexibility/customizability.*** An ideal ERP system is flexible and easily adjustable to the organizational realities and needs. If customization is needed, it is not overly expensive, and it is both feasible and non-cost-prohibitive in the long run.
- ***Constructed on best practices.*** ERP systems should be constructed and operationalized in a manner that reflect the best industry/sector practice (e.g., best practices in the public sector vs. best practices in the private sector).
- ***Real time.*** Ideally, an ERP system provides real-time data that reflects changes as decisions are being made.

- ***Meaningful efficiencies/improvements.*** An ERP system should provide meaningful efficiencies and savings (e.g., reduction in error rates, decreased administrative costs, higher productivity, reduced costs of compliance, improved decision-making, synergies, etc.) over pre-implementation processes and designs.
- ***Stability/predictability.*** An ideal ERP system should be stable (tested). Its performance should be both predictable and reliable.
- ***Service/maintenance/upgrades.*** The developer should be able to provide in-time (responsive) and reliable service and support. Ideally, the system's proprietary design does not preclude other providers (outside of the original developer) to maintain and upgrade the system (hence the organization is not "captive" and tied to one single provider by default).
- ***Compatibility.*** An ERP system should be relatively compatible with other non-ERP software used by an organization. Furthermore, an ideal ERP will enhance (rather than stymie) inter-agency data sharing and networking.
- ***Security.*** An excellent ERP system will enhance the overall security of the organizational data and processes, minimizing or eliminating weakness/breach points.
- ***Scalability.*** An ideal ERP system can be easily scaled depending on the organization's needs.
- ***Feasible/reasonable implementation.*** An ERP system should be relatively easy to implement.
- ***Technologically advanced.*** Ideally, an ERP system should reflect the latest technological advances in the industry, such as mobile device support, Internet integration, or cloud-based solutions.

The Most Commonly Used ERP Systems?

The market for ERP software is rather complex and competitive. There are numerous solutions that are available for organizations based on their size and nature of business. Based on their market presence, the following are some of the most dominant ERP suppliers (the order in the listing is random and is not associated with any particular level of importance; the listing is also not exhaustive): Deltek, Epicor, Ellucian, IBM, Infor, IFS, IQMS, Kronos, Ellucian, Exact, Microsoft, NetSuite, Oracle, QAD, Sage, SAP, Syspro, Tyler Technologies, and Workday.

Among those who participated in this study the most used suppliers indicated were Tyler Technologies (26%), Oracle (25%), Ellucian (9%), SAP (8%), and Microsoft (5%). All other suppliers were identified less than 5% of the time.

Future Trends in ERP Systems

There are several trending topics associated with ERP development and adoption likely to persist and evolve over the next 5–7 years.

- ERP providers are attempting to develop systems that operate in real time. Due to market competition, this is becoming an essential requirement for many customers.
- ERP systems are becoming "size-independent." Developers and vendors are focusing on designing the system in such a manner that they don't require a critical mass of users to be economically justifiable.

- In the ERP market, there appears to be a consolidation, fueled by mergers and acquisition, of ERP providers and ERP-related solutions.
- ERP developers are focusing on designing ERP systems compatible and fully operational within the context of mobile devices.
- There appears to be a trend to conceptualize ERPs as integration solutions, which allow process-specific specialized programs to communicate, rather than one single colossal suite with distinct modules.

> *"The landscape of ERP systems is changing. Historically, all software was written in different languages. There were no common languages. Modern day technology has open standards of architecture which makes it easy for applications to talk between each other … I believe that we are witnessing the beginning of the end for traditional colossal ERP programs. From this point on, ERPs will be all about integrating function specific software and data."*
>
> —IT Director

- It is increasingly more common to have ERP conceptualized as software as a service (SaaS) (cloud-based solutions).
- There appears to be a trend to integrate social media capabilities within an ERP's default architecture.
- ERP developers are seeking to gain a marketing edge by introducing high-level modules (capabilities), such as strategic decision-making and stakeholder relationship management, into their systems.
- ERP developers are increasingly relying on artificial intelligence technology to automate much of the back-end functions within ERP platforms (e.g., data migration, data matching, etc.).
- ERP developers are incorporating increased big data analytics capacities within the systems.

Challenges Adopting ERP Systems for Procurement Purposes

To best serve their organizations, procurement professionals should be vigilant and informed on the major challenges associated with adopting and institutionalizing ERP platforms, such as, but not limited, to:

- Developing and implementing effective ERP solutions requires thoroughly understanding an organization's own processes and designs. Entering ERP adoption without an honest, upfront self-study is almost certain to lead to failure.
- Although ERP systems are designed following what is believed to be best practices in the industry, it is still the developer's interpretation of what the best practices are. Developers, however, will be somewhat biased towards practices that are the easier to design and standardize.
- Adoption of ERP platforms usually entails significant process changes. Without intentional change management planning and leadership, ERP implementations often come as a shock.

> *"ERPs allow us to standardize business processes. However, the organization needs to be committed to change. It needs to be committed for re-engineering processes. Otherwise, everything will simply go to waste."*
>
> —IT Director

- Organization-wide adoption is a very complex and time-consuming process. It is certain to take numerous months, possibly years, to implement.
- There are always trade-offs to be made between customization and fully off-the-shelf solutions. Customizable solutions carry the main benefit of having developers fully adjust the ERP functionalities to reflect organizational realities. Such solutions also provide organizations the capacity to maintain any specific process-related strategic capabilities which the organization might hold pre-implementation. By contrast, advantages of off-the-shelf solutions are that they typically cost less and their developers more able (and willing) to provide higher quality support and responsiveness.
- Organizational culture (especially internal politics) is often one of the most fundamental and difficult barriers to success. Public sector organizations traditionally resist drastic changes. As it reflects a comprehensive reevaluation of procedure, ERP adoption certainly constitutes a dramatic change.
- Only in rare cases, and under best case scenarios, does an ERP system fully meet the entire set of needs and process intricacies of the organization (even with heavy customization). More commonly, the organization must still identify solutions for those "process spaces/gaps" not provided by the ERP.

Best Practices/Questions for Procuring ERP Systems

The selection of an ERP system is, in many regards, the most important part of the ERP adoption process. Given the complexity of ERP systems, the adoption processes associated with them, and unique agency needs, there is no one set of practices and questions to guide procurement professionals. However, there are a few best practices and questions that frequently enter conversations during the ERP selection process.

Supplier Selection Best Practices

- The organization should engage in a self-study to assess existing change-management capacity and expertise and to identify and operationalize its architectural and design requirements.

> *"I believe it is important to accurately assess your organization's needs before embarking on an ERP system acquisition. Often times, organizations will take this route when they see other leading organizations doing so. That is, an organization will pursue an ERP system because it is popular or trendy, rather than it being something they truly need.*
>
> —Procurement Director

> *"Procurement does know business operations. In order to successfully procure an ERP system procurement should take the time to study the organization. Procurement should gather process requirements and share it. A good ERP decision cannot be made without understanding business operations at the process level."*
>
> —IT Director

- Given the sheer size and complexity associated with ERP adoption, obtaining executive leadership buy-in and support is critical. Without it, the ERP procurement and adoption is unlikely to be a successful project.

> *"We can acquire the top of the line ERP, however that will mean nothing if top management is not committed to making it work. In my experience, there is nothing as critical in the success of IT procurement as top management buy in."*
>
> —Procurement Director

- Ideally, especially in very large and public transformational processes, recruit the support of external sponsors. These can be highly respected administrators, executives, or elected officials.
- Identify all stakeholders and seek input (this, however, should be managed with extreme care as excessive or overly-active input can have a debilitating effect on the selection process).
- Involve the end users, especially in the conceptualization phases and demo testing.

> *"Relationship with end users and employees is critical. If you don't bring them along and make them feel part of the process—they will always resist. I always tell employees that this is a 50-50 process—you are here 50 per cent for yourself and 50 per cent for the organization. The success of the adoption lies on the ability of each employee to buy into process and work towards achieving a common organizational goal."*
>
> —IT Director

- Review suppliers and ERPs based on supplier reputation, market share, number of consultants, number of clients, commitment to the product, reliability, user friendliness, compatibility, ease of implementation, technical advances, scalability, upgrade capacity, customization, flexibility, and total direct and indirect costs.

> *"An important aspect to consider is the track record of performance for the selected ERP. Leading systems like Oracle and SAP tend to be "tried and true", although they are also more expensive than newer companies that try to offer the same ERP functionality (but are unproven)."*
>
> —Procurement Director

- The selection team should contain both technical experts and change management leaders.

> *"Currently, no single ERP product does everything well. Each ERP has its strengths and weaknesses. Going into this process you have to realize that no solution will be perfect. You need to identify what type of organization you are and what are your strategic priorities and then choose an ERP that does well at those. Choosing an ERP is hardly a technical question. It's a human and management question above all. Change management expertise is as important to a successful ERP implementation as an ERP's technical parameters."*
>
> —IT Director

- Treat "the technology" and "the supplier" as two distinct elements for evaluation. Ask questions that are specific to the solution proposed; then ask questions that are specific to the proposing supplier. Do not "mix together" technology questions and supplier questions. This approach mitigates any tendency to assume or generalize solution attributes based on supplier attributes - and vice versa.
- Identify similar organizations and study their ERP procurement process and experience.

> *"When selecting an ERP, talk to people! Conduct site visits. Everyone will have a different perspective. You'll quickly find some people who love it and some who hate it. Make sure that you talk to those who hate it. That's where you'll learn most about the program."*
>
> —IT Director

General Questions

- How mature is the product?
- What are the general architectural characteristics of the system?
- Is the product a complete ERP solution or is it several integrated suites?
- What operating platforms is it compatible with?
- Is the software open-source or proprietary?
- Is the ERP hardware, operating, and database system independent?
- Is the system scalable?

- How feasible is integration with other programs currently used by the organization? How readily does the ERP allow external-facing integrations to support e-commerce, supplier notification and communication, or others? Is integration possible with systems used by network/partnering organizations?
- What is the back-up structure? What is the timeline for restoration?
- What modules does the ERP system provide? What are the module-specific functions?
- How realistic is customization, and what will its true cost be?
- What is the workflow process? Is it fixed or can it be customized?
- What are the general design characteristics of the implementation process? What is the "worst-case-scenario" implementation timeline?
- What are the upfront costs? What are the reoccurring/maintenance costs? What are the costs to transition to an alternative solution in the future?
- To what extent does the ERP rely on cloud-based solutions?
- What are the security features of the system? What are the security safeguards against possible breaches and data compromising?
- Does the system's design preclude transition to other platforms in the future?
- What support is available (e.g., add-ons, patches, etc.)? Training? Customer references?
- What is the wireless devices compatibility and technology support?

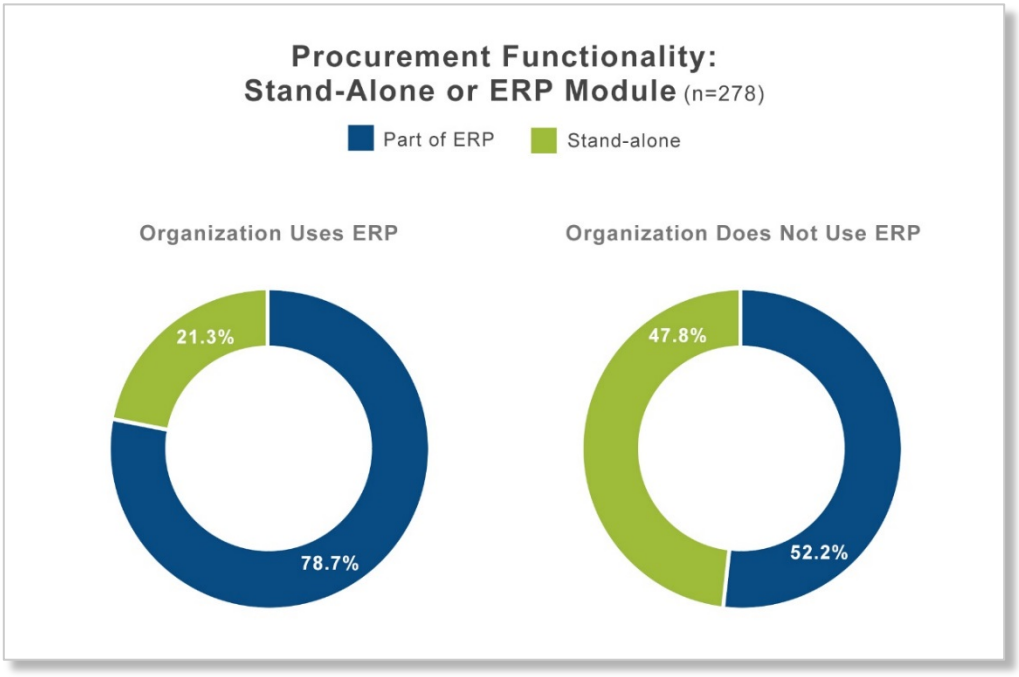
Procurement: Stand-Alone or Part of ERP?

Whether procurement should be conceptualized within the scope of a large ERP program or stand-alone specialized system with data migrated into a larger ERP system draws dividing and, sometimes, rather strong opinions. On the one hand, being part of an ERP systems (as a module) comes with benefits that are typically associated with ERPs. On the other hand, ERP procurement modules tend not to offer the full operational capacity and intuitive process flow that comes from a procurement-only system.

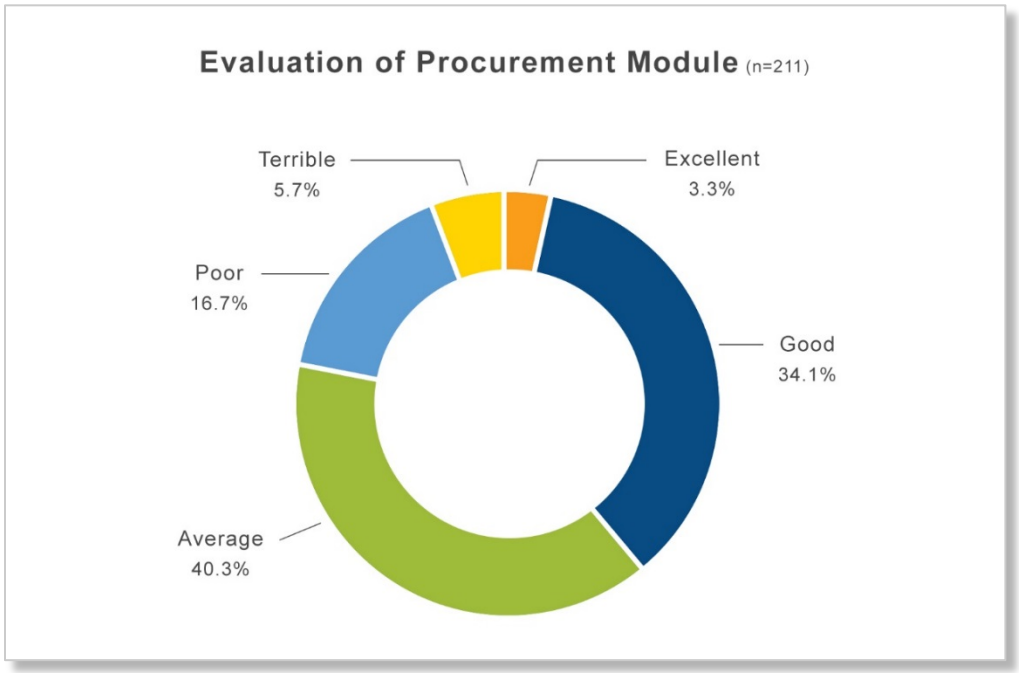
> *"The ERP system does have a procurement module but is rather clunky. We currently use a specialized procurement tool to initiate POs, which are exported to the ERP after the requisitions receive final approval. The ERP number is then returned to the specialized procurement tool before PO distribution to the supplier."*
>
> —Procurement Manager

> *"In my opinion, the future of procurement lies in procurement specific software. While there are many appealing things that come with an ERP, I find that the latter is costlier and does not provide the capabilities nor the intuitive feel that procurement specific programs do."*
>
> —Procurement Director

When asked to evaluate the performance of their procurement module within the ERP, 63% of respondents indicated that performance was average or below average.



Although the evaluation of procurement within ERP systems wasn't overly positive, most procurement specialists who participated in this study still saw the future of procurement within ERPs (72%), with those whose organizations already use an ERP being significantly more positive about it.



Conclusion

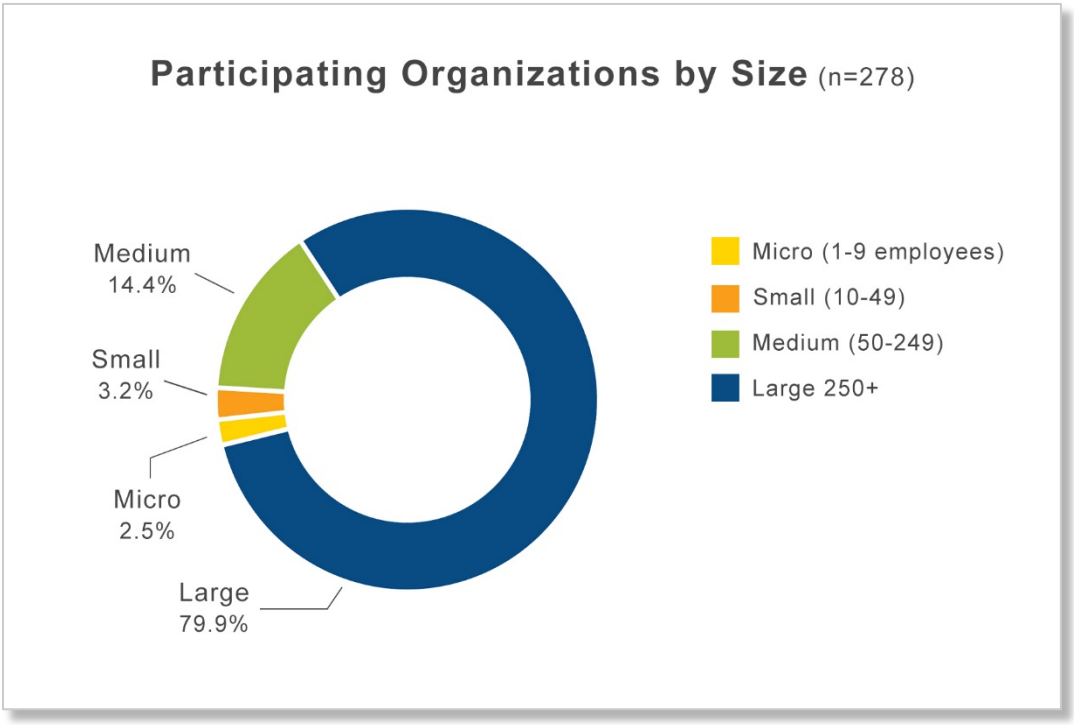
The most important thing to remember when engaging in ERP procurement is that, given the powerful effect that ERPs have on organizational structures and behaviors, successful procurement and implementation cannot be achieved without ensuring leadership and stakeholder buy-in throughout the procurement process. The most dangerous error that an agency can make when choosing an ERP is underestimating the scale and dramatic nature of change necessary during implementation.

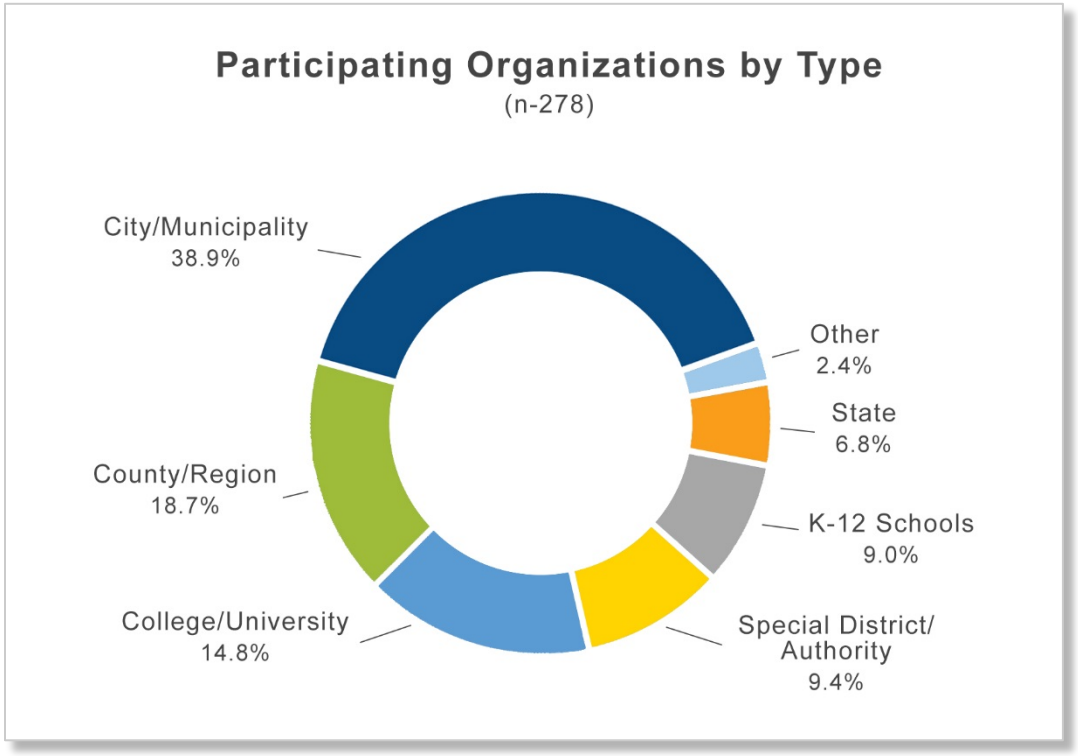
While the procurement field may be divided in its response to the use of ERP systems, data-driven analysis and personal interviews with those in the field suggest that the short-term future of procurement appears to lie within the space set by ERPs, especially for large and growing agencies. Whether as a module of a complete solution or as an integrated application, technology-based procurement functionalities will continue to establish their role in the procurement process status quo. As providers continue to focus on developing more affordable solutions and reduce, if not eliminate, the high cost of adoption, functionalities currently seen as only obtainable by large agencies will become increasingly familiar in agencies of all sizes. While cost remains a significant consideration, its impact is perhaps diminishing as providers are focusing on developing affordable solutions.

Appendix A. Methodological Approach and Data

Data for this report was collected via three main avenues:

- Between September 2017 and January 2018, a total of 52 reports, articles, and publications on ERP have been critically examined to determine system relevance to the procurement industry. A complete list of the examined materials is available in Appendix B below.
- During January 2018, a total of nine interviews (phone and in-person) were conducted with experienced, high-ranking procurement and IT professionals.
- On January 29th, 2018, a short survey instrument was administered to a sample of 1,000 agencies. The sample was randomly drawn from a list of over 3,000 agencies, and the list is representative of the local, regional, and state procurement universe. A total of 343 agencies submitted their answers to the survey instrument. There is a variance in the number of responses across questions due to: (1) respondents whose agency did not have an ERP being asked less questions, and (2) not all participants answering all questions. Respondent characteristics and breakdown are provided below.




Participating Organizations by Type
(n-278)
City/Municipality
38.9%
Other
2.4%
State
6.8%
K-12 Schools
9.0%
Special District/
Authority
9.4%
College/University
14.8%
County/Region
18.7%

Appendix B. Reviewed Publications

Sources referenced in this section are organized alphabetically, not in terms of when a publication, book, article, or other resource was read.

Al-Mashari, Majed, Abdullah Al-Mudimigh, and Mohamed Zairi. "Enterprise Resource Planning: A Taxonomy of Critical Factors." *European Journal of Operational Research* 146, no. 2 (2003): 352–364.

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