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Using the PMBoK Framework on Small Business IT Projects

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Abstract

Nearly all businesses manage projects, including small businesses with eleven to 100 employees. Is the PMBoK framework appropriate for small business IT projects, or is it too cumbersome and formal? This paper stipulates that the PMBoK framework can benefit small business projects, though the framework may be applied differently as compared to a large organization. With a focus on IT or information security projects, this paper will explore the differences between small businesses and larger businesses when managing projects, share perspectives from experienced project managers in the field, and suggest PMBoK-based initiatives that offer the most benefits for small business technology projects.

1.   Introduction

Successfully managing information technology (IT) projects is a complex endeavor. Project management frameworks might seem overreaching or incompatible with some of the characteristics common to small organizations, like multi-function employees and smaller budgets. It's tempting for managers in small organizations to simply "jump in" to executing a project without formal planning. However, solid project management is as critical to small organizations as it is to large ones. Situating a project management culture in a small organization positions the organization to successfully develop projects as it grows larger and the project components become more complex.

This paper seeks to answer several questions:

- Which universal components of project management that apply to both large and small organizations?
- Which challenges are commonly encountered by small organizations?
- How can small organizations take advantage of the positive characteristics of small size, while minimizing the impact of potentially negative characteristics?
- Is the PMBoK framework appropriate for small business IT projects, even though it is typically used in larger organizations?

We expect to uncover both similarities and differences between large and small organizations. We predict that characteristics specific to small organizations create benefits and challenges to the project management process. With some streamlining and customization, we expect to find a structured project management approach like the PMBoK increases the chance of success in small organizations.

2.   Approach

Initial research into small business project management was done by conducting in-depth personal interviews. The interviewees were project managers with an average of 16 years of project management experience. Interviewees had managed IT projects across a mix of private and government organizations within the United States. Because the project management experience can differ so broadly, the interviews focused on narratives and qualitative answers rather than surveys or quantitative data. This paper does not, by any means, explore all of the

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impacts of organizational size on all of the PMBoK's Knowledge Areas; it is intended to highlight issues that were most commonly discussed by the interviewees, and uncovered by additional research.

The results of the interviews were combined with research in academic journals, books, and project management guides to uncover differences between large and small organizations. Best practices were referenced to suggest effective project management techniques for small organizations.

For the sake of a common lexicon, the project management framework used in this paper is the PMI project management framework as defined by the PMBoK Guide 5th Edition.

Different data-gathering entities define the term "small organization" or "small business" differently. Most use either employee count or revenue to define the size of a business, and the definition may differ by industry. Employee count is a frequent measure of organizational size, and is usually interchangeable with other measures of size (Agarwal, 1979). For the purposes of this paper, the following definitions are used, based on categories studied by Verizon Business for information security and data breach reporting (Verizon Business, 2012). Micro organizations were not in scope of the interviews or research. Though medium organizations were not excluded from research, interview narratives mainly focused on the differences between small and large organizations, since these were more evident to the interviewees.

Business Category	Number of Full-Time, Paid Employees
Micro organization	1-10
Small organization	11-100
Medium organization	101-1000
Large organization	1000 +

After the interviews were complete, the responses were collected and compared to identify commonly-encountered challenges and advantages. Several interviewees mentioned similar environmental factors and methodologies, including Agile, as significant factors in project management. The most common elements in interview results were incorporated into the paper.

3.   Project Management Methodologies

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There is no single best project management methodology that applies to all projects, industries, or organizations. The field of project management has evolved significantly in recent years, but continues to be a discipline under development and contention, even among experienced project managers. What works well for one organization may not work for another, even within the same industry (Wysocki, 2013). In the interviews and in project management guides, several other project management methodologies were referenced and suggested for small environments, and these are briefly summarized below.

While common or best practices often contribute to a preferred structure, even projects within the same organization may vary in how they are managed. The following frameworks and methodologies can be combined with each other to work effectively, or they can be implemented independently. For example, the PMI framework can be used to plan for and manage a project, while a Scrum technique is used to develop and execute deliverables within the PMI framework. The interviewees reported success using all of the following methodologies on small business projects. Small organizations should select the project management methodology that is most compatible with their project requirements and environment.

3.1 PMI (PMBoK)

The Project Management Institute, PMI, is a US-based professional organization dedicated to fostering professional project management. The organization boasts over 600,000 certification holders, and 400,000 active members (Project Management Institute, 2014). In 1986, it developed a foundational standard for project management that was published in the Project Management Body of Knowledge (PMBoK). The fifth edition of the PMBoK was published in 2013.

The PMBoK presents a standard framework for project management. The framework provides guidance for project managers, from project selection to closure. The knowledge areas and associated phases of the PMI framework are listed in Appendix A.

PMI also publishes an Organizational Project Management Maturity Model (OPM3), designed to assess and develop capabilities in project management. The Third Edition was published in 2013.

3.2 Agile

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Agile development refers to a group of methods that challenge the traditional, linear-based approach to software development. A brief description of the concept, the Agile Manifesto, was introduced by a panel of software engineering consultants in 2001 (Agile Alliance, 2001). The Manifesto states:

> We are uncovering better ways of developing software by doing it and helping others do it.
>
> Through this work we have come to value: **individuals and interactions** over processes and tools, **working software** over comprehensive documentation, **customer collaboration** over contract negotiation, and **responding to change** over following a plan.
>
> That is, while there is value in the items on the right, we value the items on the left more.
>
> (Agile Alliance, 2001)

In practice, Agile development focuses on iterative and incremental work. Design and requirements are developed throughout both project planning and execution. In the traditional waterfall model, a single design is created, and a finalized product is constructed, tested, and implemented based on that design. In Agile development, software developers focus on creating a working product and adapt quickly to changes and requests to refine it over time. Among other techniques, this is accomplished with team programming, time boxing, prototypes, and frequent customer and stakeholder involvement (Agrawal, Tripathi, Maurya, & Singh, 2014).

There is no single Agile development methodology, but several popular ones include Extreme Programming, Crystal Methods, Scrum (explained below), and Feature Driven Development (Williams, 2007).

Several project manager interviewees noted that Agile development works particularly well in small environments. Smaller organizations can be situated well to respond to change in their industry environment, which generates the type of input Agile is designed to accommodate. One interviewee, Eric L., commented "Some project managers prefer a structured methodology and do not thrive in a dynamic environment. So SDLC and Waterfall methodologies may be more difficult in a small business."

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Though Agile began as a software development approach, it can also be incorporated into information technology life cycle project management. Agile methods are mentioned in the PMBoK as an effective way to rapidly adapt to change and engage stakeholders (Project Management Institute, 2013).

3.3 Scrum

Scrum (scrum.org) is a lightweight process framework. The framework is commonly applied in conjunction with Agile methods. Scrum can be used as a lightweight framework to guide the execution phase of a project (Banda, 2012).

Scrum works well on projects that include application or software development. It has the advantage of quickly adapting code to changing design. Scrum suggests the use of working modules called "sprints", in which team members have a time period to work on suggested functionality with a solidified set of requests (Sutherland, 2004). A sprint is supplemented by daily and weekly status meetings.

3.4 Prince2

Prince2 is an acronym for 'Projects IN Controlled Environments, version 2.' It is a process-driven project management method, a de facto standard for UK government projects and used throughout the private sector internationally (Axelos, 2014).

Prince2 is comprised of several components. It uses a process model that includes starting up a project, directing a project, initiating a project, managing stage boundaries, controlling a stage, managing product delivery, and closing a project (ILX Group PLC, 2009). Though the PMBoK and Prince2 sometimes use a different lexicon, they can be roughly mapped together. Since Prince2 is a methodology and the PMBoK is a collected framework of recognized best practices, they can be used to complement one another (Wideman, 2002) (Siegelaub, n.d.).

4. Environmental Differences between Small and Large Organizations

Enterprise environmental factors are organizational conditions, not under control of the project team, that influence projects (Project Management Institute, 2013). Environmental factors have a cascading effect through every stage of project management. Large and small organizations both face factors that benefit or impede project management, but the factors are different. In fact,

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positive environmental factors for large businesses are often weak points for small organizations, and vice versa (Aldrich & Auster, 1986).

4.1 Organizational Age

The combination of smallness and newness in an organization contributes to a high early dissolution rate. Additionally, many organizations begin small, and increase in size with age. As a result, small organizations are, on average, younger than large organizations (Aldrich & Auster, 1986).

Increased organizational age has some negative effects on project management. Older and larger organizations both suffer from bureaucratic processes and time-dependent processes. Additionally, entrenched managers with vested interests in the organization may reduce the organization's ability to respond to change (Ranger-Moore, 1997). Interviewee Julie Y. noted "the larger the company, the more politics you have to play." In worst-case scenarios, inflexibility and conflicting interests may lead to the natural end of an older organization via obsolescence. In contrast, smaller organizations with less project management experience lack the entrenched processes and roles that contribute to obsolescence, and so may be better situated to respond to environmental changes.

However, a higher organizational age also confers benefits to project management. Older organizations have organization capital - inertia from continuous development that contributes to efficiency (Atkeson, 2005). Experienced managers also contribute to the institutional knowledge and experience, which provides a benefit in efficiently managing projects. Small organizations lack the organization and knowledge capital that can increase efficiency in project management. To combat the problem of project management inefficiency, small organizations should focus on increasing their level of experience and project management competency. This can be accomplished with actions that include hiring experienced project managers, offering training and development to existing employees, and managing projects with a time-tested, best-practice methodology.

4.2 Resource Constraints

An organization's financial resource power has an effect on nearly every component of project management. Generally, a larger number of employees support an organization's ability to

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generate more revenue, so small and newer organizations often struggle with all types of resource availability. In Churchill and Lewis's analysis of small company life cycles, they identified four resource constraints that particularly affect small organizations: financial, personnel, systems, and business resources (Churchill & Lewis, 1983).

An organization's resource constraints contribute to an environmental factor that affects nearly every component of project management. Several of the interviewees touched upon the challenges of constrained resources in smaller environments. Attracting, training, and paying qualified employees complicates human resource management. In procurement, larger organizations have the ability to take advantage of economies of scale, and are less likely to feel the effects of financial volatility. Financial constraints can create fierce competition from the project selection process all the way through execution. Careful planning, controlling, and monitoring of resources is essential throughout the entire project for small organizations.

4.2   Project Management Support

Large organizations with rosters of projects are more likely to have already developed a formalized, pre-existing structure that supports project management. This includes organizational process assets like process documentation, software tools, and a Project Management Office (PMO).

A lack of a support structure in small organizations was a common theme in conversations with project managers. Often, a project manager must develop project management policies, documentation, and structure at the beginning or during a project, which can result in extra work or delays. Many small organizations have never had the need to develop a formal document management system, which can further complicate a project manager's efforts to maintain orderly, up-to-date communications and management documents. Diana S. noted: "Smaller organizations struggle more with documentation."

However, the lack of a pre-existing support structure does not appear to be as much of an obstacle as it was in past years. Many resources are scalable to small organizations, like software to guide the project management process. Diana S. noted "There [are] a lot more resources out there than there used to be. You can download software for a trial period for 30 days to make better decisions."

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In small projects and environments, the role of the project manager is different. It is common for project managers in small environments to take on several roles normally provided by a Project Management Office or support staff (Harvard Business School Press, 2004). Several interviewees commented on the need for flexibility in order for small-environment project managers to be successful in an environment with limited project management support. Eric L. noted: "[An important skill is] the ability to wear multiple hats: the project manager, business analyst, et cetera. They should use a flexible project management style. The style they choose should be project dependent."

4.3   Culture

Small organizations are reputed to have cultures that support innovation, effective communication, and productivity. They benefit from fewer formal structures, resulting in a more fluid employee structure and culture. In fact, a common problem organizations face as they grow is the struggle to maintain the entrepreneurial dynamic that contributed to their earlier success.

Organizational culture is an influencer to project management success. Organizational culture is shaped by the shared experiences and expectations of members of an organization, but is often driven by executives. As organizational leaders share their vision and decide which behaviors are rewarded and expected, they gradually steer the organization's culture (Fulmer, 2014).

Many of the previously explored limitations contribute to small business culture. For example, a simpler IT infrastructure may mean employees in small organizations are more likely to rely on personal contact rather than formalized communication structures. If an organization has fewer financial resources to pay qualified employees a high salary, it may rely on non-monetary compensation like time off or even part ownership in the business. Generally, small businesses encourage their employees to take risks and innovate to encourage market growth, especially compared to larger organizations (Isom & Jarczyk, 2009). These practices all contribute to a more entrepreneurial, "get-it-done" culture within small organizations.

4.4   Including Environmental Factors in Project Management

The nature of environmental factors is that they cannot be controlled by the project manager. However, that does not mean they should be ignored! It is important for small organizations to

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consider the benefits and drawbacks of unique environmental factors when planning and managing projects.

For example, consider a small organization with one location and 30 employees, a casual culture, and little experience managing IT projects. Prior to initiating a project, they may choose to budget in quality, low-cost project management training for one or more of their employees. To accommodate a single location with constant communication, a simple contact matrix and daily project huddles may suffice for most project communication. The small size of the organization and the lack of a previous structure means the organization will be flexible and adaptable to change. However, since they are inexperienced with project management and have limited resources to waste, they need to prioritize carefully controlling and monitoring costs, resources, and project timelines.

5. Project Management Knowledge Areas for Small Business

In the PMI framework, a Knowledge Area represents the concepts, terms, and activities that make up a field in project management. In this section, we will explore the particular ways organizational size affects each of the knowledge areas of project management. These knowledge areas are listed in Appendix A.

5.1 Project Integration Management

Project Integration Management includes the processes and activities that combine and coordinate processes. Integration ensures new decisions or information are accounted for in each of the project areas they affect - essentially, "tying up loose ends". The deliverables of this Knowledge Area include the project charter, the project management plan, change control and requests, project management plan updates, and the final results of the project as it reaches closure (Project Management Institute, 2013).

Solid integration throughout a project is critical to success, no matter the size of the project or organization. Because project management integration touches every other process in project management, it is arguably the most important component of project management to master.

A project charter is an agreement that states the definition, scope, and main objectives of the project. Project charters are common to project initiation in the Prince2, PMI and other project management frameworks. Since they are the basis for the project management plan and are used

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to measure success throughout the project, project charters are critical to both small and large organizations. All projects need a charter to be officially launched, and a project management plan, regardless of size (Goulston & Palachuk, 2014).

Project management plans are a critical component of any project. The project management plan is the overarching plan for the work of the project. Because the enterprise environmental factors and organizational process assets figure heavily into the project plan, this component is affected by the organization's size and pre-existing support structure.

Large organizations tend to be more process-driven and are more likely to have document management systems and project management support in place. Large organizations may have document repositories, support personnel, software, handbooks, and consultants on hand to assist a project manager. Because of this, small organizations are often at an initial disadvantage when integrating projects. However, the project manager often has more input or discretion into the tools she will use to complete her project, which can be an advantage.

The purpose of change control is to integrate requested changes into the project management process and communicate them to potentially affected stakeholders. While a larger organization may implement custom-designed ticketing system with workflows and approval features, a small organization may be able to streamline the change management process. For example, an organization with a small number of stakeholders and an informal communication culture may simply need a posted list, a brief in-person or virtual meeting for affected stakeholders, and a project planner to effectively integrate changes into the project plan.

For simple projects, paper-based tools or office suite software may suffice for planning. For more complex projects, project management software can help significantly with project integration. An analysis of free and open-source software tools for project planning are listed in Robert Cormella's whitepaper "Free and Open Source Project Management Tools", located at http://www.sans.org/reading-room/whitepapers/projectmanagement/free-open-source-project-management-tools-34495 .

5.2   Scope Management

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Project managers and executives must agree at the beginning of the project and throughout what the scope of the project will be. The scope is the agreed-upon sum of the results of the project (Project Management Institute, 2013).

"Scope creep", adding components to the project that were not decided upon in the initial project plan, is a common problem for a business of any size. Small organizations typically have heavily constrained resources. Since project failure is defined as results not meeting expectations, scope management is critical to the success of projects in small organizations, and failure to manage scope may lead to oversteps in the budget or schedule. Interviewee Diana B. commented "I think requirements gathering and requirements scope containment would be an interesting challenge in a small organization. There's always the temptation to throw that extra piece in there." An organization should clearly plan and define the scope of any project before starting work. Selecting the right project management framework, and defining the procedures to follow if a participant finds scope is expanding, can also help prevent scope creep.

5.3   Time Management

In the PMI framework, time management means controlling and monitoring the scheduled work of the project to ensure the project is completed on time. Deliverables include schedule-related documents, activity lists, milestones, calendars, and work forecasts and estimates.

Properly managing time in a small organization can be challenging. In smaller organizations, employees are often expected to perform more varied tasks with a larger scope compared to a larger business (Oldham & Hackman, 1981). While large organizations may have project teams dedicated full-time to the completion of the project, employees in small organizations have competing interests. Often, the project team is comprised of employees whose responsibilities include operations work. If resources are not properly managed, "keeping the lights on" can take precedence over scheduled project work, resulting in delays, deviation from the plan, and ultimate project failure.

The PMBoK suggests techniques to prevent this problem. A realistic, carefully designed project schedule is crucial to success. The project schedule should include milestones, dependencies, assigned resources, and a critical path. Critical chain development highlights any work that, if completed late, will ultimately delay the conclusion of the project. This technique generates a list

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of tasks with a hard deadline and an easily-recognizable priority. In a small organization with limited human resources, the scheduler should allocate work while anticipating time periods when fewer team members will be available to complete tasks - for example, holidays, vacation, or family leave.

Finally, time management may also be a sign of a lack of management buy-in to the project. Since the project will likely take time away from the employees' operational responsibilities, functional managers will need to hire more staff, accept the lowered output of a skeleton crew, or make other adjustments during the span of the project. Managers or departments who are not invested in the project may value operations above the completion of project tasks for an individual employee. It is important for project managers to maintain close communication and garner support from the project sponsor and the managers of the employees working on the project.

5.4   Cost Management

Project Cost Management includes planning, estimating, budgeting, funding, and monitoring costs to ensure the project is completed within budget (Project Management Institute, 2013).

By most accepted definitions, small organizations have less revenue than large ones, and so have a smaller operating budget. Limited financial and resource availability can contribute to a smaller project budget, and lead to worse consequences for overstepping the project budget. As Diana S. commented, "I think that there's a 'keep the lights on' mentality. [A larger organization] still has a budget, but there's a surplus there where they can do more than what they've allotted." Cost management is closely linked to the scope definition. Financial constraints can contribute significantly to project failure in a small organization. As a natural result of the financial constraints commonly encountered by small organizations, cost management and linked knowledge areas, like scope management, should be a high priority within projects.

The PMBoK notes that on smaller-scope projects, the initial processes of cost management can be greatly simplified. In many cases, this knowledge area can be reduced to a single process that includes cost estimating and budgeting, executed by a single employee over a short period of time. Project management software can further simplify the process of monitoring and controlling the budget as the project progresses (Project Management Institute, 2013). However,

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it is important to note that project management software is merely a tool. It is no substitute for a competent project manager. Project managers should select management tools that best fit their needs within their organization, and for their unique project.

5.5   Quality Management

The purpose of quality management within a project is to ensure deliverables throughout the project meet the standards set by the organization.

According to a study by advisory service LNS Research, small businesses were more likely than large organizations to value improved customer service and reductions in non-conformances as part of their quality objectives. However, both large and small organizations placed a reduction in the total cost of quality as a top objective of quality management (Roberts, 2013).

It is important to distinguish between quality and grade. Grade is a category assigned to deliverables that have the same function, but different technical characteristics. Quality is adherence to requirements within the project. While a low grade deliverable may be acceptable if it meets the requirements of a project, low quality is never acceptable. For example, a small business with a project to implement a document management system may select a simple, open-source solution that can handle several dozen users and has limited centralized management capability. This option may be a low-grade solution when compared with large-scale solutions with many features, but the quality may be enough for the requirements of a small business (Phillips, 2012).

In the LNS Research study, small organizations cited difficulty with effectively measuring quality metrics. They were also much less likely to cite conflicting data sources or quality systems as a challenge in their quality management program, when compared to responses from large organizations (Roberts, 2013). This may be due to the lack of project management support systems mentioned earlier, which can provide procedures and historical data for quality metrics.

Quality is closely related to requirements development. Small organizations should take care when designing requirements, and provide checkpoints and meaningful values for the measurement of project outputs against those requirements.

5.6   Human Resource Management

Human resource management, within a project, includes processes that manage the project team. This is one area in which large organizations, by our definition, certainly have the benefit of scale. Small organizations are likely to outsource their human resource management, have one or two full-time human resource specialists, or they may even have a management or administrative employee handle human resources in addition to their other responsibilities.

Larger organizations have a larger number of potentially skilled, in-house employees to pull from. Small organizations have a limited pool of employees, and may need to negotiate or use influence with functional managers to get the support they require. One interviewee, David H., stated "If I'm [recruiting for] a network integration in a large organization, I'm going to go after the types of folks who have skill sets in that space. You may not have that luxury in a smaller organization." Another interviewee, David B., commented: "When I think about small offices, I think about competing priorities between projects. […] In small organizations, subject matter experts [and] project participants are shared by operations, as well as many other projects."

However, the flexibility of small organizations can create opportunities for employee development and more fluid movement into new responsibilities. Often, adding tasks or functions to a larger organization may require adding new organizational divisions, which is a costly approach. Small organizations may reorganize at a lower cost and, often, with better cooperation from members. Given the limited time and financial resources small organizations have, it may be most beneficial to spend time on the "Develop Project Team" process of this knowledge area. Given the small pool of project team members, improving needed competencies and developing in-house employees who are also project team members may be a wise long-term investment for the present project and future ones.

5.7   Communications Management

Within a project, communication management includes the planning, distribution, and control of project information (Project Management Institute, 2013). Communication is one area in which large and small businesses differ significantly, in both their processes and their culture. In a large organization, a project may occur in a single department, and the project may be managed within a "silo" that closes it off from the rest of the organization. However, in a small business, it is more likely that the project team continues to work in conjunction with operations or their functional departments. Additionally, small organizations are often more flat and less

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hierarchical, resulting in fewer layers of communication. Interviewee David H. commented: "Working for a large company, you have to report to several layers of management."

Small organizations may lack the infrastructure large organizations typically have in place, like document repositories and public relations departments, to support elaborate communications plans. A communications plan for a project in a small business may simply include email updates, scheduled meetings, and a way to distribute project materials. A simple spreadsheet or matrix may be all that's needed to track communication requirements. However, regardless of the size of the organization, project communications should be stored in an organized way for future reference.

5.8   Risk Management

Risk tolerance is highly variable from industry to industry, and even varies by organizations within an industry. There is a common belief that small organizations and startups are well-positioned to adapt to changing market conditions. Indeed, many small organizations welcome the risk that accompanies innovation. In a study of "high patenting" firms, small businesses produced 13-14 times more patents per employee than large firms (Isom & Jarczyk, 2009). It is possible that one of the drivers for this increased level of innovation is flexibility. An entrepreneurial culture and organic structure both contribute to employees' willingness and ability to innovate. In fact, small organizations in hostile competitive environments were found to perform better when these cultural elements are in place (Covin & Slevin, 1989).

As a result of their increased responsiveness to external market conditions, small organizations contribute a disproportionate share of product and process innovations, and take less time to bring innovations to market.

However, just because a small business is more amenable to the opportunity-based risk of projects does not mean they accept a high level operational or financial risk within the project. As with many of the other knowledge areas, resource constraints have an impact on risk management. Though a small business may willingly accept the risk of lower-than-anticipated market share after the final product is delivered, limited resources mean even minor delays or cost overruns within the project can bleed into impacts on the continued operation of the business (Duong, 2009). In contrast, large organizations may vary in their acceptance of

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opportunity-based risk, and may be better-positioned to absorb operational or financial failure during a project.

5.9   Procurement Management

When a business selects vendors, large businesses have the benefit of scale. Smaller organizations often have smaller scope projects and operating budgets, and are more likely to be newer and less situated in their industry. In an effort to reduce risk, vendors often prioritize stable organizations with significant financial resources when searching for and supporting business partners. This may limit small business opportunities to partner with specific vendors for their projects. Vendors focused on "big fish" may limit support and pricing benefits for small organizations. This can hinder a small organization's ability to plan and control procurements.

However, small businesses do have some benefits over large organizations when they conduct procurement. Most small organizations not have the entrenched processes, pre-established contracts, and vested interests presented by large organizations. As a result, the procurement specialist may select small-scale vendors that work best for their particular project or organization.

5.10   Stakeholder Management

In the PMI framework, stakeholder management includes identifying people, groups, and organizations that could have an impact on the project, and developing strategies for engaging those stakeholders in project decisions and execution (Project Management Institute, 2013).

One of the benefits of project management in a small organization is the flexibility to change, and buy-in to that change from employees and management. Decision-making can happen more quickly in a small organization, because such organizations are flatter, and likely to have fewer stakeholders at the top management level. In a small or single-ownership organization, a single owner or manager may make high-level decisions and remain in close daily contact with the project manager or executing team, in addition to managing business strategy for the organization as a whole.

As organizations grow, vested interests appear for individual employees. Challenging perceptions or suggestions for change may be viewed as mechanisms to gain power. Members in

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older and larger organizations are more likely to resist organizational change unless it provides a personal benefit to them (Chuang, 2011).

6. Conclusion

The PMBoK framework, and compatible project management techniques, are appropriate and beneficial for small businesses. All of the knowledge areas of the PMBoK should be addressed in a project plan, whether the organization or the project is large or small; neglecting any may lead to project failure.

One of the most significant differences between large and small organizations are the resource constraints imposed on small businesses. Small organizations have fewer human and financial resources and potentially high consequences for cost or time overruns. The limited resources and consequences mean solid project planning, monitoring, and controlling are all critical in small business environments.

Often, small organizations lack knowledge capital, documented processes, organizational momentum, historical data, and a support structure to succeed in projects. Interviewees identified this lack of organizational process assets as a common and significant drawback, and noted that project managers may have to take on extra work to develop these assets.

Though resource constraints and a lack of organizational process assets are common problems in small businesses, a smaller environment also confers benefits to the project management process. Small organizations often have a higher rate of innovation and the ability to adapt quickly to changing conditions. Additionally, the reduced scope and smaller number of stakeholders mean communication is simpler, and a more informal and flat communication structure can move project management phases along quickly.

The PMBoK is as appropriate and useful for small organizations as it is for medium and large ones. In organizations with limited project management experience, the PMBoK can help guide a team throughout the project management process and save it from critical failure. However, the framework should not be applied blindly to a project. Project managers should streamline and customize the project management process, using the flexibility inherent to small businesses to their advantage, while being cognizant of the disadvantages of scale. Ultimately, small

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businesses should take advantage of the frameworks and methodologies described by the

PMBoK and other best-practice guides to increase the chances of project success.

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Appendix A. PMI Project Management Knowledge Areas

Project Integration Management

- 4.1 Develop Project Charter
- 4.2 Develop Project Management Plan
- 4.3 Direct and Manage Project Work
- 4.4 Monitor and Control Project Work
- 4.5 Perform Integrated Change Control
- 4.6 Close Project or Phase

Scope Management

- 5.1 Plan Scope Management
- 5.2 Collect Requirements
- 5.3 Define Scope
- 5.4 Define WBS
- 5.5 Validate Scope
- 5.6 Control Scope

Time Management

- 6.1 Plan Schedule Management
- 6.2 Define Activities
- 6.3 Sequence Activities
- 6.4 Estimate Activity Resources
- 6.5 Estimate Activity Durations
- 6.6 Develop Schedule
- 6.7 Control Schedule
-

Cost Management

- 7.1 Plan Cost Management
- 7.2 Estimate Costs
- 7.3 Determine Budget
- 7.4 Control Costs

Quality Management

- 8.1 Plan Quality Management
- 8.2 Perform Quality Assurance
- 8.3 Control Quality

Human Resource Management

- 9.1 Plan Human Resource Management
- 9.2 Acquire Project Team
- 9.3 Develop Project Team
- 9.4 Manage Project Team

Communications Management

- 10.1 Plan Communications Management
- 10.2 Manage Communications
- 10.3 Control Communications
-

Risk Management

- 11.1 Plan Risk Management
- 11.2 Identify Risks
- 11.3 Perform Qualitative Risk Analysis
- 11.4 Perform Quantitative Risk Analysis
- 11.5 Plan Risk Responses

Procurement Management

- 12.1 Plan Procurement Management
- 12.2 Conduct Procurements
- 12.3 Control Procurements
- 12.4 Close Procurements

Stakeholder Management

- 13.1 Identify Stakeholders
- 13.2 Plan Stakeholder Management
- 13.3 Manage Stakeholder Engagement
- 13.4 Control Stakeholder Engagement

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Appendix B. Interview Questions for Project Managers

To gather qualitative data, we interviewed project managers with experience in project management throughout large and small organizations. The interviews were conducted by phone and by email.

Interview questions:

1. How many years of project management experience do you have?

2. What types and sizes of organizations have you managed IT projects for? (government, non-profit, manufacturing, small business, et cetera)

3. What project management methodologies or frameworks have you used for managing IT projects?

4. Do you find one project management methodology or framework tends to work better for small business IT projects than larger ones?

5. Are there any pieces of your project management approach you find **easier** in a **small environment** than in a larger one?

6. Are there any pieces of your project management approach you find **more difficult or limited** in a **small environment** than a larger one?

7. What project management skills or priorities do you feel are **most important** for a **small-business** project manager to have?

7a. Is the importance of these project management skills different for a project manager in a **larger organization**?

8. Are there any other significant project management differences between **small** and **larger** organizations that you want to highlight?

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