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Project Management Practices in the Information Technology Departments of Various Size Institutions of Higher Education

Charles R. Johnston
Midwestern State University

David C. Wierschem
Midwestern State University

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ABSTRACT

The demand for information technology at institutions of higher education is increasing at a rapid pace. It is fueled by student, faculty, and administrative needs. This paper examines project management practices at these institutions with respect to the sizes of the institutions. Survey results indicate an emphasis on operational concerns at small and medium size institutions when selecting IT projects. The prominence of the role of project manager and adoption of formal PM tools/techniques by IT departments generally increase with the sizes of the institutions. The importance of having a project plan is recognized by all sizes of institutions of higher education.

INTRODUCTION

There are many issues currently straining the available resources of higher education Information Technology (IT) departments. Many of these issues are student related and lead to others of a broader context. Student related issues include the increased use of notebook computers, online courses and course support, electronic classrooms, and the demand for Web access. Connecting students' computers to institutional networks only adds to the growing burden faced by their IT departments in dealing with security issues. In addition to dealing with viruses on a daily basis, concerns for protecting student and employee information must also be addressed. Federal laws such as the Gramm-Leach-Bliley (GLB) Act, The Family Educational Rights and Privacy Act (FERPA), and the Health Insurance Portability and Accountability Act of 1996 (HIPAA) all have significant effects on how computer technology is deployed on campuses.

In the broader context, distance learning is being used by institutions of higher education of all sizes and types to enable students to complete degrees after relocating and to make programs at their schools available to larger potential student populations. Internet courses are increasingly used to provide student and instructor scheduling flexibility, and to contribute to additional course offerings without the need for new classroom facilities. More and more technology is being permanently placed in both new and existing classrooms, further taxing demands on IT staffs for maintenance and security. New to the scene is wireless technology with the capability to eventually connect everyone on campus to the institutional network and the Internet at any location on the campus.

IT departments at institutions of higher education are being asked to do much more and as a result are facing a wide variety of challenges. For example, the top priorities according to the fifth annual EDUCAUSE survey (EDUCAUSE, 2003) include administrative/ERP/information systems, funding IT, infrastructure management, security and identity management, strategic planning, service and support. The Market Data Retrieval (MDR) report (MDR, 2004) cited the rapid growth of wireless technology on campuses during the last three years, as well as the growth of outsourcing to save money for other priorities. Finally, several of the top five overall strategic objectives of university presidents, CAOs, and CFOs identified in Eduventures' annual Higher Education Survey on Leadership, Innovation, and Technology also directly impact IT departments. These include: supporting faculty research, improving business processes, and enhancing the productivity of faculty and administrators, all of which potentially involve information technology (Editor's Note, 2004).

Obviously, providing all this technology and then being able to adequately support it requires significant funding. The MDR report estimated that institutions of higher education would spend more than $5.3 billion in 2005 for technology-related products and services. At the same time, Information Technology departments are increasingly being asked to do more with less. In this regard, large institutions have more flexibility than smaller ones when allocating available funds. Small institutions generally have smaller staffs and available resources, but in many

respects their needs are equivalent. Proven technologies and systems that help them remain effective and competitive must be put in place and maintained (Cossey, 2004). With evidence suggesting that simply moving to the next iteration of established information technology produces diminished returns (Evans & Morton, 2004), there is now pressure to undertake more and varied types of IT projects.

It is apparent that large sums are being spent by institutions of higher education on many varied information technology initiatives in an effort to meet the many challenges they face. All these "projects" must be managed, but how they are managed is not clear. However, it is clear that without formal recognition of all the aspects of managing a project being addressed, achieving success is a high-stakes gamble at best. One such international effort to provide a quality online learning environment detailed the results of a loosely defined project approach (Kenny and McNaught, 2000). In attempting to implement new learning technologies for the delivery and renewal of online courses, only a planning process appears to have been adopted. Without specifically relating them to the lack of accepted project management practices, the authors reported problems including a lack of timely information, no change control process, no clear lines of responsibility, and a lack of resources.

Additionally, effectively dealing with factors affecting IT project performance, such as conflict resolution and requirements uncertainty (Chen et al., 2004) and proper planning for testing to insure the completeness of requirements (Nindel-Edwards & Steinke, 2007), mandates paying attention to the project management practices employed. With the globalization of education as well as business, future projects undertaken by institutions of higher education could involve IT departments from different locations and cultures. The need for developing a collaborative project management approach in such situations has also been proposed (Chen, Romano, & Nunamaker, 2006).

THE NEED FOR IT PROJECT MANAGEMENT

A project can be thought of as any temporary undertaking with the intent to produce a unique product (PMI, 2004). A product in this context has a very broad definition, such as a complex weapons system, a building, or it can be an information technology implementation. Uniqueness, as defined here, means that what is being produced is out of the ordinary for the sponsoring entity. In addition, a project is normally constrained by a schedule (It has a starting and an ending date.), limited resources (It has a monetary budget.), and specific expected outcomes (It has requirements that must be met.).

This research focuses on IT projects. They have existed in significant numbers for a much shorter period of time than the other examples noted. A brief history of the convergence of IT development projects and traditional, formal project management practices is necessary in order to understand the impetus for this research effort.

Since their beginnings, information technology projects grew in number and complexity. By the 1980s many failures were noted and research intensified as to why this was happening. Despite efforts to identify factors leading to IT project success, by the mid 1990s most projects were still being delivered late, over budget, with missing requirements, or abandoned prior to completion. With over $250 billion being spent annually on approximately 175,000 projects, the need to increase the rate of successful project delivery became critical. Responding to this situation, a study was conducted in 1994 by The Standish Group and published in 1995 (Standish Group, 1995). They surveyed 365 U.S. IT executive managers with regard to the success rate of over 8,000 IT projects. For the purposes of the survey, a successful project was defined as one that was delivered on schedule, within budget, and having met all initially specified functions. The study was titled "CHAOS" when it was found that the overall success rate was only 16.2 percent. In addition, over 31 percent of the projects were abandoned at a cost of $81 billion to U.S. businesses.

One fundamental conclusion of the study was the necessity for improving IT project management practices. Further reinforcing the importance of adequate project management was an additional study of Canadian private and public institutions, sponsored by KPMG in 1997 (Whittaker, 1999), which found that poor project planning was one of the top three reasons for failed IT projects. Sufficient project planning is one of the most important aspects of professional project management practices. In discussing project planning, Schwalbe (2006, p87) points out that the planning process is often difficult and unappreciated, but necessary to guide execution. Outputs from planning involve all project management knowledge areas according to the *PMBOK® Guide 2004* (PMI).

THE BUSINESS RESPONSE TO THE NEED FOR IT PROJECT MANAGEMENT

In response to the CHAOS study, the business community recognized the need for improved IT project management. The Standish Group's follow-up studies of 1998 (Standish Group, 1998) and 2001 (Standish Group, 2001) indicated improvements in the success rate of IT projects to 26 percent and 28 percent respectively. Importantly, cost overruns and outright failures significantly declined at the same time. Improved project management was cited as a principal factor in the gains achieved.

The recognition of the need for skilled IT project managers has grown. In 2003 it was reported that despite a seemingly large pool of skilled IT professionals in the U.S., finding capable project managers possessing the necessary business skills was extremely difficult (Dubie, 2003). Companies were increasingly searching for the combination of technical and business knowledge that could contribute to the bottom line. Further evidence of the continuing need for professional IT project management is shown by the growth in membership of the Project Management Institute (PMI). Membership has increased from 70,000 to over 100,000 in the last three years, fueled by the demand for Project Management Professional (PMP) certifications from IT professionals.

Mahaney and Greer (2004) concluded that there are benefits for businesses in encouraging project managers to obtain PMP certification. Additionally, at a special panel discussion of the Southwest Decision Sciences Institute's annual meeting in March, 2005 (Southwest DSI, 2005), the value of PMP certifications for IT professionals was examined. It was generally agreed that PMP certification is becoming a necessity to work in IT project management and that it has become a critical factor in hiring decisions. It was pointed out that for the Dallas Chapter of the PMI, numbering almost 3,000 members; by far the greatest number of active members held IT project management positions.

THE RESPONSE TO THE NEED FOR PROJECT MANAGEMENT IN THE HIGHER EDUCATION IT ENVIRONMENT

A review of existing literature fails to show whether or not IT departments of institutions of higher education have responded as enthusiastically as business to the call for the application of sound project management (PM) practices to new IT projects. Most of the examples found are dated and application specific. They include the use of PM techniques to support the development of a fundraising system (Conway, 1995), instructional materials (Murphy, 1994), and in one case a campus-wide information system (Yerk-Zwickl, 1995).

However, the recognition of the possible benefits of a more formal approach to managing their IT projects is nonetheless taking place. Bickers (1993) pointed out that moving from informal to formal PM development structures is potentially beneficial in terms of increased efficiency and success. Ever tightening state budgets have also resulted in the mandatory use of formal PM methodologies for IT projects in some states (Rider 9 and State of Virginia).

In an even broader context, general research into all aspects of project management both in the United States of America and internationally has been extensively conducted since the mid 1990s without mention of the higher education "industry." Kwak and Ibbs (1997) in reporting on a study sponsored by the PMI to examine "current PM levels and practices in various companies and industries" selected "industries including High-Tech Manufacturing; Information Movement and Management; Engineering and Construction; and Utilities." Likewise, in attempting to establish metrics for use by managers to measure their Return on Investment for Project Management (PM/RoI^{sm}), the industries surveyed were engineering-construction, information systems, financial services, and high-tech manufacturing (Ibbs & Reginato, 2002). These are but two related examples of not finding higher education considered in PM research.

Additionally, Morris (2000) attempted to set an agenda for future PM research that would more closely relate PM practices to business objectives. Project based industries mentioned included construction, transport, oil & gas, power & water, electronics, pharmaceuticals, finance/banking, software (development firms), and defense/aerospace. Finally, Crawford (2000) in two separate papers examined what constitutes a competent project manager by collecting data from project managers in the IS/IT & Telecommunications, Engineering & Construction, and Business Services industries. Simply stated, the current status of project management activities in the IT departments of institutions of higher education is largely unknown.

RESEARCH OBJECTIVES

Therefore, it is useful to determine PM practices in academic environments in order to understand the current situation and to make recommendations for additional research. Some precedent exists for looking at this in terms of private versus public institutions. Private institutions are not subject to state legislative mandated practices such as those previously mentioned. Also, private institutions of higher education are generally thought of as not being faced with the degree of budgetary constraint experienced by public institutions. However, in discussing a recent survey by Educause on the IT practices of colleges in the U.S., Brian Hawkins, their president, stated that "For the most part, the differences between publics and privates weren't very significant" (Olsen, 2003). This view is further supported by Wierschem and Johnston (2005) who found that no significant differences existed between public and private institutions of higher education in regards to the formal usage of project management.

An alternative way to examine the issue is analogous to comparing small and large businesses, or related to the size of the institution. The supposition is that the complexity and costs of IT projects at larger institutions are greater, and therefore would drive the adoption of formal PM practices to manage them to a greater extent than at smaller schools. This study is exploratory in nature and focuses on examining PM practices in terms of the sizes of the institutions to see if there are any useful generalizations that can be made and if directions exist for additional productive research.

While some basic project management is practiced on even small projects, such as schedule and budget control, much of this can be done "informally." The adoption of "formal" project management techniques for IT projects has grown significantly in recent years as discussed earlier. Much of this growth is attributed to competitive pressures and fiscal accountability by upper management. Traditionally, the halls of academia have been isolated from these environmental influences resulting in a generally more conservative and slower adoption rate of new technologies. However, change is a constant and institutions of higher education are finding themselves more and more subject to these forces. One research objective of this study is to determine if, in regards to the adoption of formal project management techniques, those institutions that are subject to these market forces to a higher degree than others will have a higher adoption rate. In particular, larger schools with their larger budgets and more intense competition (resulting in more complex and greater numbers of projects to manage) should reflect higher adoption rates of formal PM practices than smaller schools with their more limited budgets and less competitive environment.

A second objective of the research is to identify what formal PM tools/techniques are being used by institutions of higher education in their IT departments and if any differences exist across the various size institutions. Recognizing that not all activities may be of a significance requiring the use of formal PM tools/techniques, the question of what factors influence this decision is also explored.

Other questions asked might be considered contextual and of general interest to provide understanding for the more factual nature of the primary reporting. Establishing any differences among the various size institutions of higher education for the factors influencing the prioritization of IT projects, the importance of a project sponsor, designating a project manager, and regulatory impact are intended to provide additional insights and possible directions for further research.

METHODLOGY

Institutions of higher education information technology departments were surveyed in 2004 to gather data. The instrument consisted of thirteen questions designed to evaluate PM practices and the use of formal project management tools and techniques in IT departments of the various size institutions. To help classify the sizes of the institutions, demographic data was also collected including the number of students enrolled and the number of employees in the IT departments. The survey questions focused primarily on various aspects of usage of formal PM tools and techniques, such as what was used and rankings of their importance. Additionally, other questions dealt with IT related issues including sponsorship of projects, prioritizing projects, and the designation of individuals as project managers. Project priority selection factors, project management tools/techniques used, and the determinants of PM tool/technique usage incorporated into the survey instrument for this exploratory study were all selected after reviewing current project management textbooks, research, and Project Management Institute (PMI) literature. Complete explanations of the questions asked are provided in the Results section. The survey instrument was

piloted among colleagues and institutional IT professionals for usability and modifications made prior to distribution for data collection.

The population chosen from which to sample was obtained from the Higher Education Directory. It consisted of the Carnegie classifications of Doctoral/Research Universities-Extensive and Intensive, Master's Colleges and Universities I and II, Baccalaureate Colleges-Liberal Arts and General, and Baccalaureate/Associate's Colleges. A sample set of 500 institutions of higher education were randomly selected from this population which totaled 1,469 institutions.

The survey instruments, addressed to the "Director of IT," were distributed by mail to the sample set of institutions. Because the survey was anonymous, a second full follow up mailing was performed after four weeks. Potential respondents were requested to complete only one survey for their institution. A total of 111 returned surveys were determined to be usable, resulting in a response rate of 20 percent for the study.

For the purposes of this study, the sizes of the institutions of higher education were defined by the number of students enrolled. The respondent sample ranged from 300 to over 83,000 students. A study of the literature identified a variety of graduation methods. One method is the arbitrary creation of groups as exhibited by Yao (Yao et al., 1998). They created four size categories of small (1000 – 4999), medium (5000 – 9,999), large (10,000 – 29,999) and very large (over 30,000). Another method, as used by Cohen (2003), evenly distributes the sample into the selected number of categories. A third method is to utilize an accepted industry standard categorization. The third option was selected. Petersons (2006) is one of, if not the most, widely recognized university references available. Petersons identifies four categories of university size: small (less than 2,000 students), medium (2,000 – 4,999 students), large (5,000 – 14,999 students) and very large (greater than 15,000 students). The distribution of our sample set and the associated descriptive statistics using this categorization method are illustrated in Table 1.

The survey consisted of a series of thirteen questions. The first three questions identified the general demographic information of the respondents. This information included the number of students enrolled, the number of IT employees and whether the institution was public or private. The breakdown of this information is also presented in Table 1.

Table 1: Study Sample Statistics and Demographics.

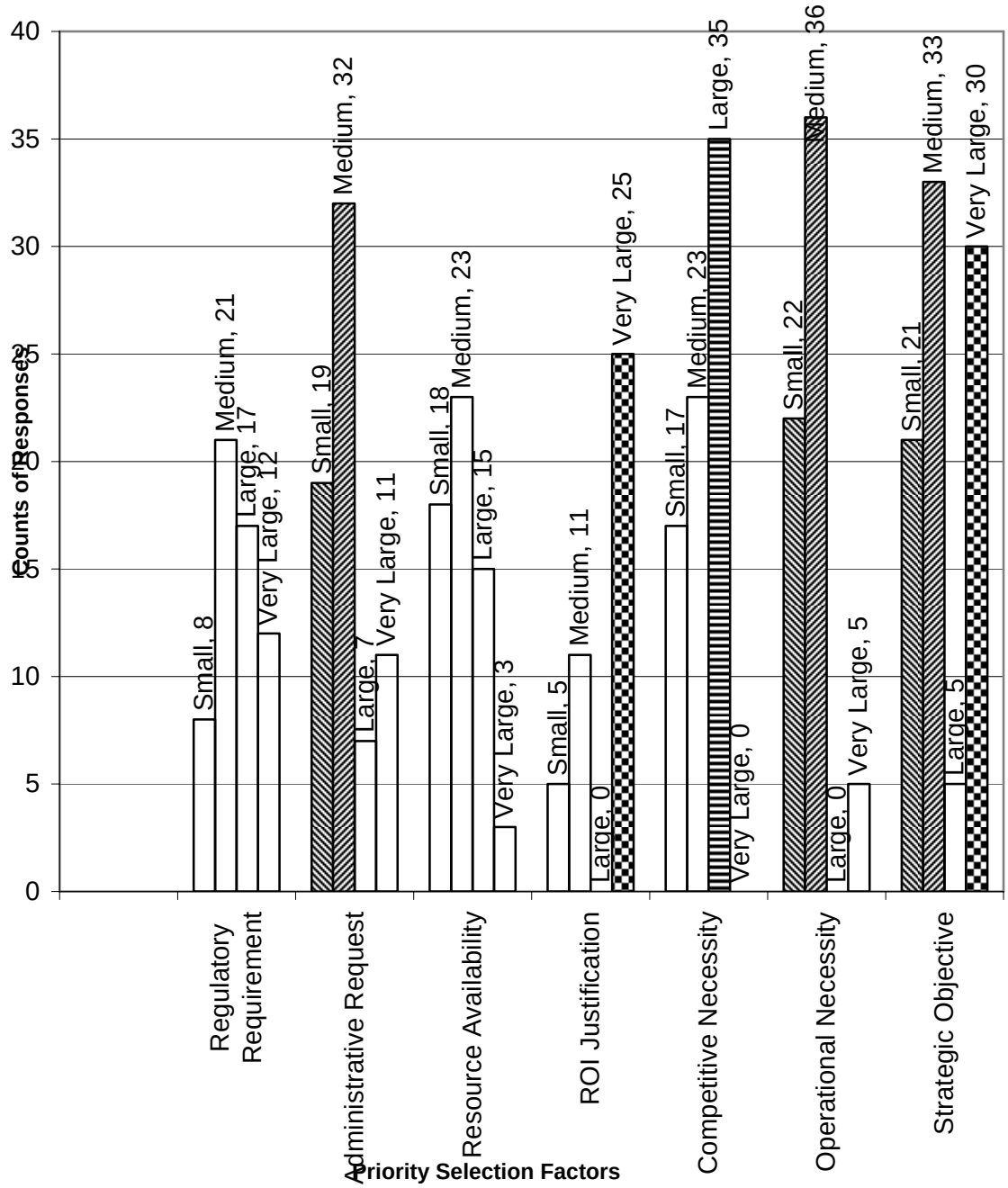
Institution Size	**Small < 2,000**	**Medium 2,000 – 4,999**	**Large 5,000 – 14,999**	**Very Large >= 15,000**
# of Responses	30	39	25	17
Average # of Students	1,258.5	3,300.5	8,149.8	28,314.5
Std. Dev.	465.22	803.02	2,817.29	15,593.72
Maximum # of Students	1,950	4,800	13,800	83,177
Minimum # of Students	300	2,200	5,000	15,000
Average # of IT Employees	9.2	18.5	41.0	167.2
% Public	10%	28%	52%	94%
% Private	90%	72%	48%	6%

It is readily apparent that there is an inverse relationship between the size of the institution and the likelihood that it is a private institution. It is interesting to note that the percentage of private, small institutions is very similar to the percentage of public, very large institutions in this sample.

RESULTS

In order to gather some additional useful information, three questions were asked of all respondents with respect to their IT projects. The first was to identify their top five factors that influence the priority of their selection of IT projects. This was to determine to what degree the market forces are driving their decision making. A series of seven factors were provided to choose from. They included: Regulatory Requirement, Administrative Request, Resource Availability, ROI Justification, Competitive Necessity, Operational Necessity and Strategic Objective. Chart 1 shows the counts of the number of times each factor was selected in the top five by the various size institutions. High counts are shaded for emphasis.

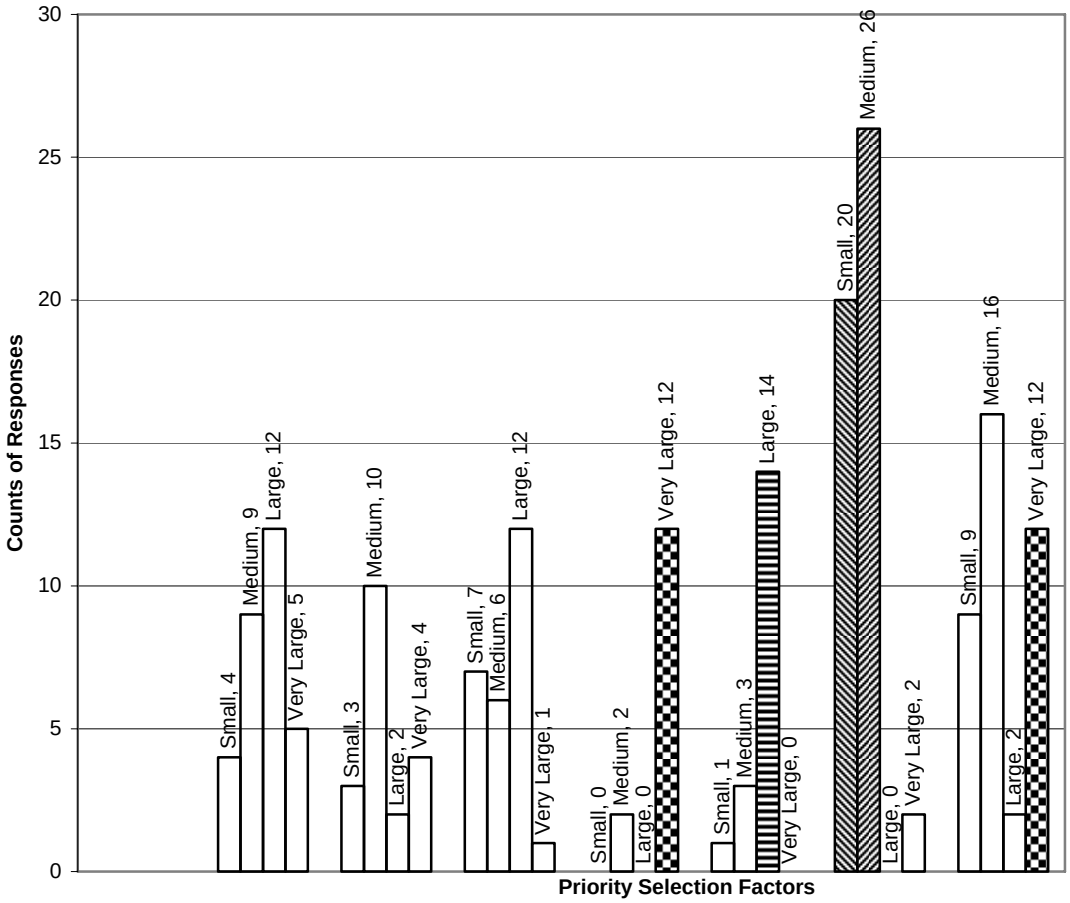
Chart 1: IT Project Priority Selection Human Factors.



A Kruskal-Wallis test was performed on the total counts resulting in a P-value of 0.0499. It is clearly evident that there is a difference between the various size institutions of higher education. The Small and Medium schools are virtually identical in their identification of which factors affect their project priorities with Operational Necessity being the prime driver, followed closely by Strategic Objective and Administrative Request. The Large schools are dominated by Competitive Necessity. The Very Large schools are more forward thinking with Strategic Objective being their primary driver and also using ROI Justification to prioritize IT projects.

This simple analysis identifies very different operational environments for different size institutions of higher education. However, this analysis does not take into account the direct importance of the various factors. Chart 2 provides the counts for each factor, if it was ranked either as number 1 or 2 by the respondents.

Chart 2: IT Project Priority Selection Factors Ranked 1 or 2.



As might be anticipated, the ranking of 1 or 2 produces the same primary drivers of project prioritization for the various size categories; Operational Necessity for Small and Medium size institutions of higher education, Competitive Necessity for Large institutions, and Strategic Objective for Very Large institutions. It is noted that for Very Large institutions, ROI Justification was also ranked 1 or 2 as often as Strategic Objective. Also, while prominently appearing in the top five rankings of Small and Medium size institutions, Strategic Objective and Administrative Request were not nearly as often ranked 1 or 2 as Operational Necessity. A Kruskal-Wallis test on priority factors ranked 1 or 2 resulted in a P-value of 0.5510 and failed to find any significant difference between the various size institutions.

The next question asked how important it was to have a project sponsor or champion in getting a project selected and completed. A 5-point Likert scale was used ranging from Absolutely (1) to Not at All Necessary (5). As presented in Table 2, Large institutions rate the necessity of having a sponsor much lower than the others at an average of 2.72. The Very Large had the highest rating with a 2.12 average. However, the results of an ANOVA test of Sponsor Importance across the various size institutions resulted in a P-value of 0.8217 and failed to find any significant difference. This is somewhat at odds with findings for business organizations and may warrant further investigation.

Table 2: Project Sponsor Importance.

Institution Size	Small	Medium	Large	Very Large	Overall Average
Average Rating	2.47	2.18	2.72	2.12	2.36
	p = 0.8217				

The formal utilization of project management techniques requires an appreciation and understanding of project management concepts. A primary indicator of this understanding is the designation of a project manager for individual projects. When asked if project managers are assigned to projects, all sizes of institutions of higher education said they did, as presented in Table 3. However, it is interesting to note that the Medium size institutions are more likely to assign project managers than Large institutions. However, it is evident that the role of project managers generally becomes more prominent as the size of the institution increases.

Table 3: Percent Assigning Project Managers.

Institution Size	Small (n=30)	Medium (n=39)	Large (n=25)	Very Large (n=17)	Overall Average (n=111)
Yes	70%	92%	88%	100%	86%
No	30%	8%	12%	0%	14%

Any organization has projects in the course of performing its various operations. However, the means for managing and monitoring them varies considerably. It is expected that as organizations get larger, the necessity for more formalized project activities increases in importance. Small organizations are often able to achieve successful results without having to resort to formal project management practices. Therefore, each institution was asked if they utilized any 'formal' project management tools/techniques.

Respondents were directed to the next question for examples if necessary, but the definition of 'formal' was left to them. This resulted in a self-selected group based upon their individual definitions. Of the 111 respondents, 76%, or 84 of them, identified themselves as using formal project management tools/techniques. Table 4 presents the results in percentages by institution size.

Table 4: Some Formal PM Techniques Used.

Institution Size	Small (n=17)	Medium (n=30)	Large (n=20)	Very Large (n=17)	Overall Average (n=84)
Yes	57%	77%	80%	100%	76%
No	43%	23%	20%	0%	24%

The results are as expected. There is a direct relationship between the size of an institution and their use of formal project management tools/techniques. In comparing Tables 3 and 4, it should be pointed out that except for Very Large institutions, the percentages of all other sizes of institutions of higher education using formal PM tools/techniques is consistently less than the percentages designating project managers.

The remaining questions were restricted to the 84 institutions that identified themselves as using 'formal' project management tools/techniques. The counts for the various size institutions in this subset of the sample are also presented in Table 4.

Of those respondents who stated they utilized formal project management tools/techniques, they were asked to rank, in order of importance, up to ten formal tools/techniques they used. The list from which to choose was developed by examining those discussed in current project management texts. Table 5 presents the counts for both the total number of times a particular tool/technique was identified in the top ten in importance and the number of times it was ranked as either first or second in importance.

Table 5: Formal PM Tools/Techniques Used.

PM Tools/Techniques	Total Count	%of Respondents (n=84)	Count Ranked as 1st or 2nd	%of Respondents (n= 84)
Project Plan	65	77%	48	57%
Project Monitoring	59	70%	15	18%
Status/Budget Reporting	55	65%	8	10%
Review Meetings with Stakeholders	54	64%	17	20%
Scope/Other Change Control System	38	45%	5	6%
Gantt Charts for Scheduling	33	39%	7	8%
Work Breakdown Structure (WBS)	32	38%	9	11%
Risk Monitoring/Management	32	38%	2	2%
Resource Loading/Allocation	32	38%	3	4%
Cost Analysis for Project Selection	31	37%	12	14%
Formal Organization PM Methodology	29	35%	14	17%
Critical Path Analysis	21	25%	1	1%
Resource Leveling	13	15%	0	0%
PERT Diagrams	5	6%	0	0%

By far the most important and the tool/technique most identified as first or second, is that of Project Planning. It should be noted that some discrepancy exists for the remainder of the tools/techniques. For example, after Project Planning, Project Monitoring was the second most identified tool/technique that was ranked in the top ten of importance. However, the tool/technique that was ranked most often as either first or second in importance was Review Meetings with Stakeholders. While it was not ranked in the top ten as often as Project Monitoring, when it was identified, it was rated as having high importance.

Of the top five tools/techniques ranked in the ten most important, only three of them were also in the top five of being rated first or second in importance. The common three tools/techniques were: Project Plan, Review Meetings with Stakeholders and Project Monitoring. The two tools/techniques in the top five of ten most important, but not in first or second rankings, were Scope/Other Change Control System and Status/Budgeting Reporting. The two

tools/techniques in the top five of first or second rankings, but not in the top five of ten most important, were Cost Analysis for Project Selection and Formal Organization PM Methodology.

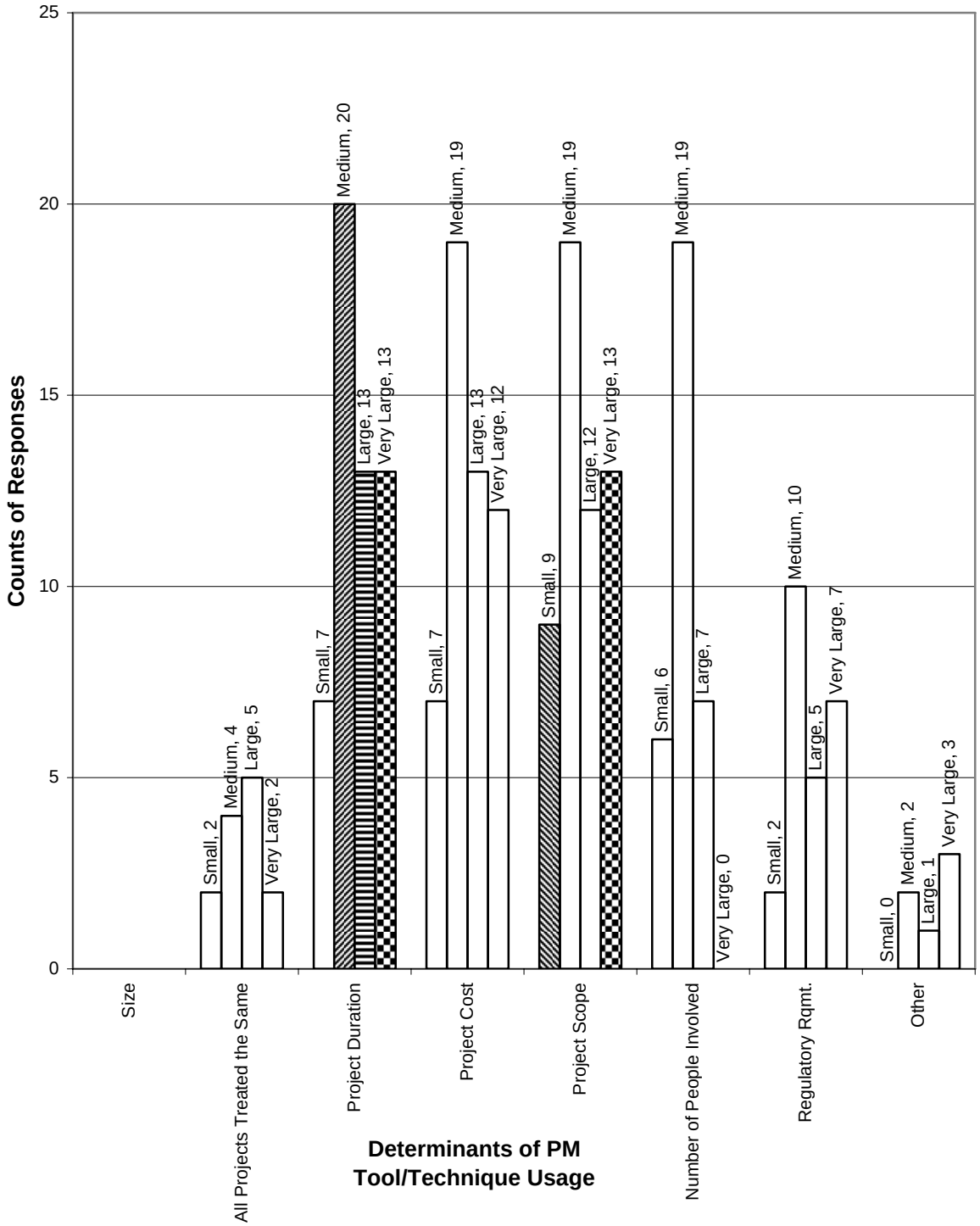
Reviewing the counts across institution size, Table 6 provides more detailed information. A Kruskal-Wallis test was performed on the total counts resulting in a P-value of 0.0059. This indicates that there is a significant difference in the importance of the listed tools/techniques among the various sizes of institutions of higher education. Like the aggregate data in Table 5, all sizes of institutions identified the Project Plan most often in their top ten ranking and first or second in importance. Of the top five previously identified tools/techniques ranked in the top ten most important; four were common across all sizes of institutions. These were the Project Plan, Project Monitoring, Review Meetings with Stakeholders, and Status/Budget Reporting. However, of the top five previously identified as ranked first or second in importance, only two were common across all sizes of institutions; the Project Plan and Cost Analysis for Project Selection. A Kruskal-Wallis test on PM Tools/Techniques ranked first or second produced a P-value of 0.8570 and failed to find any differences among the various sizes of institutions of higher education.

Table 6: Tool/Technique Identification and Importance by Institution Size.

PM Tools/Techniques	Total Count				Ranked 1 or 2 Count			
	Small	Medium	Large	Very Large	Small	Medium	Large	Very Large
Project Plan	11	23	19	12	6	20	15	7
Project Monitoring	9	20	16	14	3	5	5	2
Review Meetings with Stakeholders	9	19	16	10	5	7	2	3
Status/Budget Reporting	8	22	14	11	1	6	1	0
Cost Analysis for Project Selection	7	10	3	11	2	3	3	4
Scope/Other Change Control System	7	13	9	9	1	3	1	0
Work Breakdown Structure	5	10	8	9	2	0	3	4
Gantt Charts for Scheduling	5	14	8	6	1	3	2	1
Risk Monitoring/ Management	4	10	8	10	1	0	0	1
Formal Organization PM Methodology	3	7	9	10	1	1	6	6
Critical Path Analysis	3	8	5	5	0	0	0	1
Resource Leveling	2	7	3	1	0	0	0	0
PERT Diagrams	1	3	0	1	0	0	0	0
Resource Loading/Allocation	1	15	8	8	0	3	0	0
	p = 0.0059				p = 0.8570			

Since many IT department activities can be considered routine on a day-to-day basis, the next question asked respondents to rank the top five characteristics that determined if an activity would utilize project management tools/techniques; or in other words, what characteristics serve to determine when a business activity is formally treated as a 'Project'? Chart 3 presents the results for the various size institutions of higher education.

Chart 3: PM Tools/Techniques Usage Determinants.

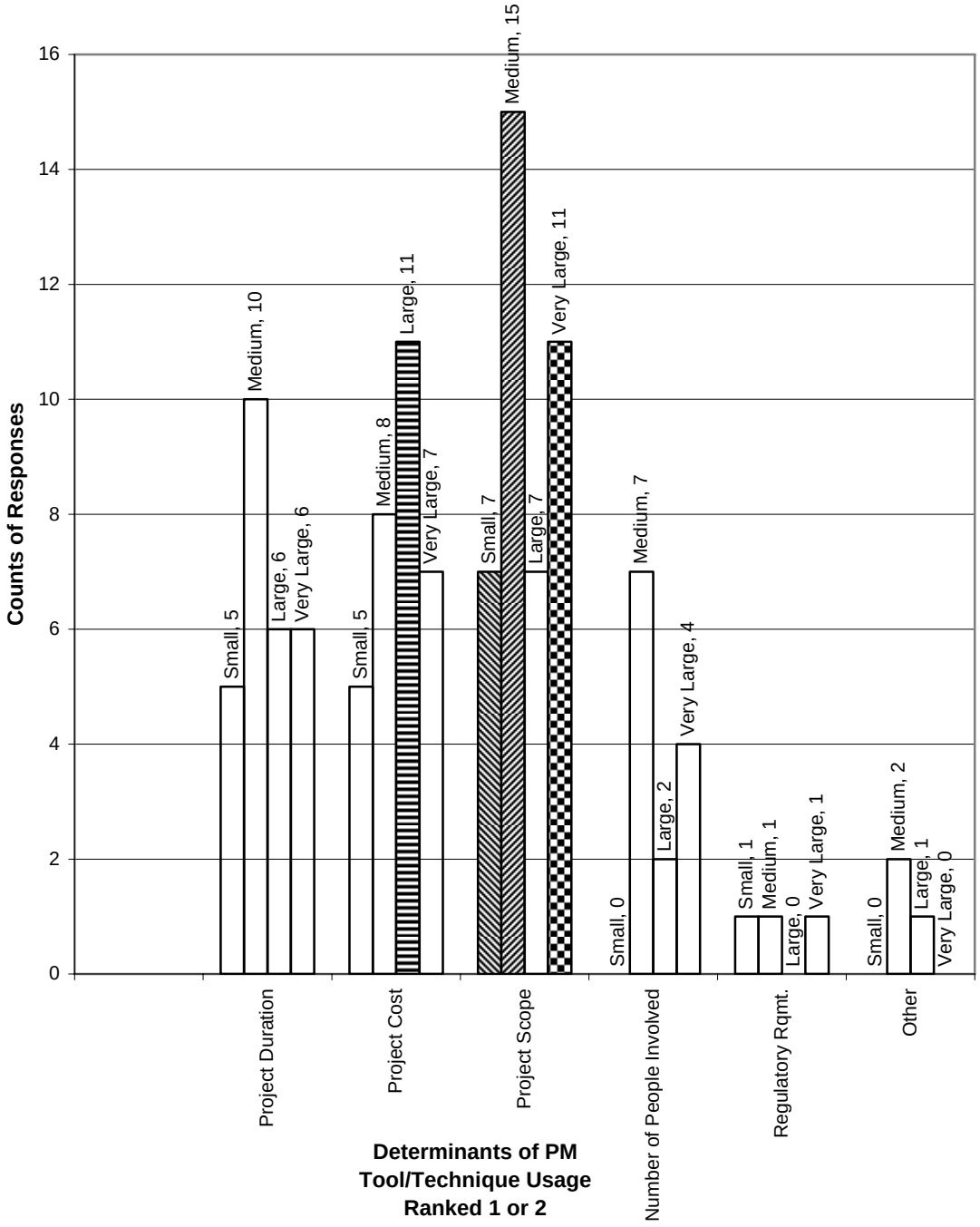


Thirteen respondents identified that they treat all projects the same regardless of their characteristics and therefore did not rank the characteristics. A Kruskal-Wallis test was performed on the Chart 3 data with a resultant P-value of 0.0968. There is limited support for differences between the various institution sizes and their identification of decision criteria.

Their consideration of the importance of factors determining what constitutes a project requiring the use of formal PM tools/techniques may be different. The Small institutions identified Project Scope the most in their top five, whereas the other sized institutions identified Project Duration most often. It is noted that Large institutions placed Project Cost in the top five as often as Project Duration and the Very Large institutions had equal counts of Project Scope and Project Duration. In aggregate, the most identified criteria were Project Scope and Project Duration, followed closely by Project Cost.

Unlike the counts of ranking in the top five of importance, the counts of first and second rankings presented in Chart 4 are much more distinct within each institution size category.

Chart 4: Usage Determinants Ranked 1 or 2.



The Small, Medium and Very Large institutions ranked Project Scope as the primary determinant of when PM tools/techniques would be used, whereas the Large institutions identified Project Cost first or second most often. However, performing a Kruskal-Wallis test on the first and second rankings data failed to show any differences between the various size institutions of higher education with regard to the importance of the factors determining the use of formal PM tools/techniques.

The next question reviewed the impact of regulatory requirements on PM tool/technique adoption. Of the 83 institutions responding to this question, only 12%, or ten, are subject to regulatory mandates that require the use of PM techniques. This data is presented in Table 7.

Table 7: Institutions Subject to Regulatory PM Tools/Techniques Usage.

Institution Size	Small (n=16)	Medium (n=30)	Large (n=20)	Very Large (n=17)	Overall Average (n=83)
Yes	1%	4%	6%	1%	12%
No	18%	33%	18%	19%	88%

Of those subject to regulatory requirements, several specific examples were provided. These included the Graham Leach Bliecy Act and W3C Section 508 compliance for Web accessibility. Several institutions stated that, based upon the financial costs of projects, some regulatory bodies required additional administrative oversight that resulted in the adoption of formal PM tools/techniques. For example, Virginia has legislative and administrative requirements for IT project approval and management for state agencies including higher education. Requirements include (for projects > $1 million): 1. Review and approval (focusing on ROI); 2. Certification and approval of project manager; 3. Project documentation requirements; and 4. Monthly status reporting. See http://www.vita.virginia.gov/projects/projects.cfm for additional details.

Respondents acknowledging use of formal PM tools/techniques were also asked what software project management tools they employed. The results presented in Table 8 indicate a limited variety of software currently being utilized.

Table 8: PM Software Tool Usage.

Institution Size	Small (n=17)	Medium (n=30)	Large (n=20)	Very Large (n=17)	Overall Average (n=84)
No Software Tools Used	6%	3%	10%	none	5%
MS Project	71%	77%	60%	76%	71%
MS Excel	none	7%	none	6%	4%
Tools including Other MS Office and In-house Developed	none	3%	20%	12%	8%
No Response to this Question	23%	10%	10%	6%	12%

By far the most popular tool is MS Project. However, the Large and Very Large institutions utilize specialized tools, either developed in-house or commercial products (such as Primavera), to a much higher degree. This may indicate a more sophisticated approach to the use of formal PM tools. Due to the large number and varied percentages of non-responses to this question, no statistical testing for differences between the various sizes of institutions was performed.

Finally, several institutions provided additional feedback relative to their current effectiveness, or improvement of the PM practices in their IT departments. The most common comment was that they had just recently begun to use formal PM techniques and were looking forward to increasing and improving their usage. One respondent said, "We have just begun to utilize PM tools. I believe they are very important to project success, but adoption in an existing environment is challenging." Another stated, "We have taken standard project management techniques (i.e., PMBOK) and modified/simplified them to meet our needs. Internally, we require PM methodology for all projects requiring more than 1 person months of effort." As a general observation it was stated, "Project planning is critical to staying on-time w/ projects, but I stress that one should not spend more time planning/managing than doing the actual project. Balance is required with a small staff."

CONCLUSIONS AND RECOMMENDATIONS

This study analyzed the practice of project management in four size groupings of institutions of higher education. It provides a cursory look at the usage of PM tools/techniques in the academic environment. The ranking method used by the survey provides an initial look and some significant observations, but is inadequate to make a more detailed comparison between the various sized institutions. Further research on this topic should build on the generalizations of this study and utilize quantitative techniques to produce detailed results that provide more effective comparisons between size groupings.

Overall results indicate a difference between various size institutions of higher education when it comes to the factors influencing the priority of selection of IT projects (Chart 1). The fact that this statistical difference disappears when only the top two ranked factors are considered (Chart 2) shows that the overall difference may be superficial. However, for Small and Medium size institutions it becomes apparent that operational concerns come to the forefront as receiving more attention than strategic objectives. Competitive Necessity is less prominent for Large institutions where Regulatory Requirement and Resource Availability are cited as first or second in importance almost as often. Very Large institutions are more consistent with ROI Justification and Strategic Objective remaining the most prominent factors.

The question of any real differences between various size institutions with regard to how IT projects are prioritized for selection should be further explored in a more quantitative manner, perhaps with additional differentiating factors included. Also, opportunities exist to further examine the prioritization factors identified by this research for each institution size category. For example, it would be informative to explore the relationship between operational and strategic concerns in selecting IT projects at Small and Medium size institutions to determine if they are moving toward a position of more strategic concerns as operational objectives are satisfied.

Further research is certainly warranted to clarify why having a project sponsor, or champion, is most important at Very Large institutions and least important at Large institutions of higher education (Table 2). Perhaps the emphasis on strategic IT projects at the Very Large institutions requires the support of high level administrators to a greater degree than projects at the Large institutions perceived to be necessary to be competitive in the marketplace. Overall, the importance of project sponsors to successful IT projects has been confirmed in numerous research efforts. The same strength demonstrated for this success factor in business IT projects is not apparent for higher education IT projects. Why this appears to be true is of interest in determining if the same success factors applied to business IT projects should be applied to IT projects undertaken at institutions of higher education.

This study shows that virtually all institutions of higher education are aware of the professional practice of IT project management. Only in the Small institution category is there a significant percentage (30%) of institutions that do not assign project managers to their IT projects (Table 3). But even though 86% of responding institutions assign project managers, just 76% utilize formal PM tools/techniques (Tables 3 & 4). As previously documented by the continuing growth of the PMI, fueled by IT professionals, the emphasis on project management practices continues in the IT industry. While there are no directly comparative statistics available, the fact that only 76% of responding institutions of higher education use formal PM tools/techniques in their IT departments may indicate that adoption is lagging behind that of the business community in all but the largest institutions. There is an observable relationship between the size of the institution and the likelihood that it utilizes formal project management tools/techniques. 100% of Very Large institutions utilize them, whereas only 57% of Small institutions do. Medium and Large institutions had similar utilization rates at 77% and 80% respectively. Further research to compare these rates to businesses of similar size groupings could provide direct evidence of where higher education IT departments are lagging their business counterparts in the adoption of formal PM tools/techniques.

As previously pointed out, of those institutions that do use formal project management tools/techniques, the most common used include: the Project Plan, Project Monitoring, Status/Budget Reporting, and Review Meetings with Stakeholders (Table 5). The selection of these tools/techniques may indicate concerns relative to financial, legal, and political accountability. This should be expected relative to the financial pressures being faced by institutions of higher education today. These tools/techniques were consistently selected across all sizes of institutions. However, as with the overall difference in size categories for project prioritization factors, a similar lack of difference resulted for tools/techniques usage ranked first or second by the various size institutions of higher education (Table 6). Again, clarifying research is needed.

While all institutions identified the Project Plan as their top tool/technique utilized, Small and Medium institutions cited Review Meetings with Stakeholders second, and Large and Very Large institutions cited using a Formal Organizational PM methodology as second most important. This would appear to indicate that Large and Very Large institutions have integrated advanced project management tools/techniques to a higher degree than Small and Medium size institutions of higher education. This represents a significant opportunity for continuing research to perhaps place the sizes of institutions within a PM maturity model framework.

Additionally, Table 6 shows the common importance of PM tools/techniques such as the Project Plan, Project Monitoring, Review Meetings with Stakeholders, Status/Budget Reporting, and Cost Analysis for Project Selection. However, the results of this research are less clear for the relative unimportance across institutional size of such PM staples as the Work Breakdown Structure (WBS), Gantt Charts for Scheduling, and Risk Monitoring/Management. One explanation worth considering for clarification is that these tools/techniques were thought of by the respondents to be included in the Project Plan.

The weakness of the indicated difference between various size institutions for the factors determining the use of PM tools/techniques for particular activities (the activities being formally treated as projects, Charts 3 & 4) may be due to the selection of three of the five factors as the classic concerns of project management; the triple constraint of project scope, time, and cost. Issues of requirements, schedule, and budget are generally important on any IT project, are interrelated, and could change in ranking of importance for the use of PM tools/techniques on particular projects. Future research could incorporate additional relevant factors determined through discussions with directors of institutions of higher education IT departments. An alternative would be to accept the universal importance of project scope, schedule, and budget in the decision to utilize formal PM tools/techniques and instead explore in greater detail "how" and "why" these are important in academic IT departments.

The integration of project management practices into the operational fabric of the IT departments of institutions of higher education is no less important than in other organizations. Van Der Merwe (2002) strived to establish a conceptual argument for the "interrelation of business processes and the role of project management in relation to strategy and structure" in organizations. Project management can be the "point of departure for management theory……..where the successful outcome of any change in the organization can only be achieved when business processes and human behavioural processes converge in the person of the project manager." In other words, if they are to be successful in an increasingly demanding environment, the management of higher education IT departments must be willing to continue to develop their PM practices and tools/techniques usage expertise and to explore the potential benefits of IT project management regardless of the size of their institutions.

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