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How to Jumpstart a University of Botswana Project Management Group

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Abstract
The success of the Performance Based Studies Research Group (PBSRG) at Arizona State University has been well documented. It used a new model of simultaneous research of basic theory, prototype testing, and implementation of research based systems. It used an alignment of graduate education, and created an industry interface that participated heavily in the research testing. The technology developed by PBSRG was based on best value practices, deductive logic, and simplicity, instead of best business practices. The performance measurements of the research tests were dominantly better than the status quo. PBSRG has tried to unsuccessfully move the research platform and the research to other universities. The authors hypothesize that a complete strategic plan must be aligned with the faculty, the industry need, and the university direction of high impact research, publications, and value added education. A change in organizational structure to a more informal group, with liaisons for funding purposes may be needed until the effort can be officially absorbed by an official academic unit. The test is at the University of Botswana (UB) project management section, in the Civil Engineering Department, in the College of Engineering.

Keywords
University of Botswana, Project management program, Research based program

1. Introduction

The Performance Based Studies Research Group (PBSRG) at Arizona State University was formed in 1994, using a business model that was foreign to the traditional research model of seeking government research grants, responding to issues determined by the government agencies and foundations seeking to improve upon best practices. The Director of PBSRG quickly identified business practices which would have to be implemented to make PBSRG successful (Kashiwagi *et al.*, 2008a; Hamel and Breen, 2007):

1. The research area would have to be sustained over a prolonged period of time to have an impact on the industry.
2. The basic theoretical research, resulting technology, application of the technology would have to be an ongoing and sustainable operation.
3. The basic research would have to have the potential of dominant results that would not only improve performance and value, but change industry structure and operations.
4. The funding model would have to be independent of government agencies and government research grant organizations that frequently changed the research focus every couple of years.

5. The research group would have to operate like a private enterprise, proactive instead of reactive to university and industry stimuli, with strategic goals, tactical goals, fiscally responsible budget, funding backlog to ensure weathering of funding cycles, and doing research only in a narrow focused area/core expertise.
6. The research group would have to align research, with graduate or undergraduate classes in the same area. If there is no alignment, the effort takes too much effort.
7. The research group would have to use soft money (non-tenured track positions) to support the research effort's administration responsibilities, research work, and teaching responsibilities. This is the only way to get freedom from the bureaucratic university structure.
8. Every member of the research group has to have a core expertise or strength which aligns with the research area. Members who do not fit, should not be hired. Honesty, hard work, and integrity are required in every employee. This is an environment set by the Director by example, and self regulates the workplace.
9. Members of the research group could be undergraduate, graduate, professor, or staff.
10. All members of the research team were expected to add value to the business.
11. The research group is self sufficient and would not be dependent on any other university department or individuals to meet the research requirement.
12. The research group would handle all requirements in terms of the research group and not as individuals. It would operate as a separate entity from the university around it. Teachers were interchangeable, administration work would not be done by the professor, research assistants would all teach, and no research team member was restricted solely to their job description.
13. There is total freedom in the research group to do what was required to add value.
14. It was the objective of the director, all professors, staff, research assistants, and student workers to ensure that everyone fit into this model, everyone's best interest was always served, everyone produced in dominant measured terms, and everyone was paid the maximum amount that they could be paid.
15. The research group would have dominant performance measurements: research tests, funding levels, awards, impact, and publications.

If the research is theoretically sound and accurate, the researchers are aligned, and the industry can see the potential impact to solve their issues, the research will be dominant. PBSRG dominant performance measures (Kashiwagi, 2009):

1. Duration: 15 years.
2. Funding: $7M plus, with an average overhead rate of 25%, with multiple funding activities, no university research grant funding, minimal grant funding sources.
3. Education program: developed entire FM/PM masters program to match the research effort. Program became major concentration in DEWSC graduate program.
4. Staff size: 15, with soft-money salary of $600K/year, excluding professors who are tenured or tenure track, including full time marketing/coordinator, two professors with one part-time leadership professor, three research assistants, three full time researchers, two man video/internet crew, ½ time publications expert, and five undergraduate student workers.
5. PIPS/IMT is licensed Arizona State University Technology, licensed to research clients.
6. 600 construction tests, $528M of construction services.
7. 10 tests outside of construction industry delivering $1.5B of services.
8. 98% customer satisfaction.
9. Over 150 refereed publications.
10. Working Commission 117 Using Performance Information in Construction, Co-coordinator, WC 117 home office, International Council for Research and Innovations in Building and Construction (CIB).
11. Editor CIB Journal for the Advancement of Performance Information and Value (2008).
12. CIB WC 117 platforms in Netherlands and Botswana, future platforms in Australia, China, and Malaysia.

13. International Project Management Association PMForum Editorial Advisor (2009).

PBSRG has been looking for tests to move not only the technology but the research business plan/operations to other universities and countries. In 2004, using the third largest general contractor in the Netherlands, PBSRG tried to create a CIB TG 61 cell in the Netherlands. This effort was in response to the five years of collusion in the Netherlands on large government projects. PBSRG was requested in by George Ang, one of the key people in both the CIB and the Dutch effort in 2003 to present solutions that would fix the issues. The results of the effort included:

1. Heijmans purchased the PIPS license and started a three year effort to apply it to their internal supply chain, into their various groups which not only provided construction services, but bought construction as an end user, and to take PIPS to their clients/buyers. Heijmans quickly realized that efficiency, alignment, accountability, and having the clients transfer the risk and control to the contractor would be key to maintaining viability. They also realized back in 2004, that contractors in the Netherlands may not be efficient due to culture and the Dutch best business practices in construction. Heijmans was the only general contractor who attended the presentation to mainly government personnel and consultants in 2003.
2. However, PBSRG and Heijmans could not immediately convince the construction management university academics/researchers that the deductive PIPS/IMT logic was the correct solution. The proposal that results from simplistic models of industry structure, the concept of alignment of resources, minimized management and control, and that the client's bureaucratic delivery system was the major source of collusion problems, seemed to be a complete change in paradigm for the detail oriented and technically based academic researchers.
3. The Rykswaterstaat, Ministry of Transport, Public Works and Water Management group was also licensed with the PIPS technology, but implementing the PIPS concepts in a large bureaucratic organization, was a very slow procedure.

The effort crawled along for two years until 2006/2007 when the Scenter group, a private research group led by Sicco Santema, who was also a part time professor at Delft University in the mechanical engineering area, was exposed to the PIPS technology. The PIPS technology was a mechanism to procure best value, force the minimization of transaction costs, and bring tremendous value to clients in every business. In 2007/2008, the following transpired:

1. Sicco Santema and Jeroen van de Rijt became the coordinators for the CIB TG 61, and now WC 117 group in the Netherlands.
2. They brought together the efforts of the Ministry of Transport, Scenter led testing with a major dredging boat shipbuilder and the fourth largest contractor in the Netherlands, Ballast Needam, and the Heijmans efforts.
3. They along with Heijmans started to vigorously expand the effort, holding presentations for procurement officers, major businesses, and other major contractors. The preliminary test results were very encouraging and dominant, and the Scenter, under the CIB W117 and other procurement conferences, has gathered the visionaries to give the effort life.

The effort has been energized. There are more sub-vendors who believe in PIPS/IMT, more clients/buyers of construction, and other business ventures that are now interested in the new model. This is due to the forward thinking vision of Heijmans, who financially made it possible for PIPS to be transported to the Netherlands for repeated presentations and training sessions. A characteristic of Heijmans was the sharing of the concepts with other general contractors. A major boost to the effort was Sicco Santema, who already was focused on some of the same concepts of PIPS/IMT, especially the minimization of transaction costs, but was still missing the mechanism behind the structure. With their constant efforts, it was a matter of time before exposure to the concepts would attract the visionaries who could see the concepts were accurate, could solve the Dutch construction and procurement issues, and

realize that the difference in culture from the United States did not impact the logic, the accuracy, and the predictable dominant outcomes of PIPS. The Dutch effort was successful because:

1. PBSRG did not have to convert or convince Heijmans or Sicco Santema to change their thinking or course in life. They were already there. They were already visionaries and believers in PIPS/IMT. Santema gave the effort a huge boost because of his understanding that he was looking for visionaries. Santema's personal approach to life can be characterized by all the concepts of PIPS/IMT (Kashiwagi, 2007).
2. Santema brushed aside peer pressure, and proceeded to identify "believers" in PIPS, and spent little time with "non-believers".
3. He was not in the construction management technical area, and was not well known by the construction management experts. He had no "wrong concepts" or "misperceptions" that had to be corrected, and jettisoned before coming online. He was well versed in supply chain analysis, understood the minimization of transactions and transaction costs, and that management was a creator of transaction costs.
4. Did not require consensus from his peers to move ahead and was already successful.
5. He understood the value and impact of PIPS/IMT.
6. He had a sustainable business model, including funding, marketing, and research.
7. He was a part of a major university, Delft University, and at the same time the Director of a privately funded group Scenter. He was government, but not government, giving him total flexibility.
8. Worked in close coordination with PBSRG.
9. Created the industry/academic research interface.
10. Comfortable with doing the basic research, prototype testing, and implementation research at the same time.

This is the first time the PIPS/IMT technology has been successfully transferred. The platform took four years to stabilize, to find the right components, and to bring the individual research efforts together. It was interesting that the academic construction management group was not a major player in the effort. The major components of the technology transfer and setup of the platform included:

1. Informal organization.
2. Platform made up of different individuals and organizations.
3. Leadership by the most visionary member.
4. Individual components allowed to running their own tests.
5. Synergy of test results.
6. Core group meetings that reviewed test results. Test result knowledge that transaction costs were being created by parties without evening knowing it based on what they did not know.

2. University of Botswana Project Management Section and Masters of Project Management Program

Two individuals, PD Reimewella and Joe Ssegawa, were instrumental in bringing the PIPS/IMT technology to the University of Botswana and the Masters of Project Management (MPM) graduate program. Reimewella had interfaced with Kashiwagi at CIB meetings in the UK, Far East, and in the United States for the past ten years, and discussions were held on how to bring the technology to Africa. In 2007, Ssegawa requested through the US State Department program to bring Kashiwagi and the PIPS technology from the Performance Based Studies Research Group (PBSRG) at Arizona State University, to the University of Botswana (Kashiwagi *et al.*, 2008c). In negotiations with the State Department, the University of Botswana (UB), and PBSRG, an agreement was reached for Kashiwagi to come to UB four times for a month at a time, over a year's time period. This is unusual due to PBSRG's heavy research load which was not conducive to a long hiatus away from ASU.

PBSRG's objective was to use the same methodology that was used in the Netherlands, but to get faster results. The challenges in implementing the research program included the following:

1. There was not a faculty member at UB with the understanding of Sicco Santema. The political environment was therefore much more complicated. Introducing the PIPS/IMT technology without upsetting the traditional educational approach. The PIPS/IMT technology and deductive logic simplifies many of the project management "technical topic" issues that usually take more time, more education, and more technical expertise. This is an unsettling to a traditional education project management program.
2. The PIPS/IMT based education is a research based program. It forces an industry and academic research interface and collaboration. This is a huge change for the education program that has a curriculum based on traditional education, for students who are expecting the traditional textbook education and who are now forced to exercise literature searches, research practice of hypothesis, methodology, and hypothesis testing, study general theoretical concepts and apply concepts to actual application (Kashiwagi *et al.*, 2008d).
3. Instead of programs, processes, and charts, PIPS/IMT emphasizes deductive logic, basic theory, dominant models, and application of the concepts. Students must now process, analyze, and create instead of memorize and present (Sullivan *et al.*, 2007).
4. Requires the faculty to change as they are instructing the students. It is a new approach to understand that the faculty are continually changing, and do not know all the answers.
5. The scarce resources of the PM section must be aligned to increase their workload while meeting the everyday administration and teaching requirements of the College and Department. A reward system must be worked out to motivate the section to work harder.
6. The PM section staff must increase their research capability and production and meet the college and department goals of publications, research, and teaching.

3. Hypothesis

The authors propose that under the existing structure of the College and the Department, an informal group must be formed to work under the existing structure. The new structure must be a core group of industry research partners, section faculty, PBSRG, and MPM and CEM students. The group must be flexible, with a strong leader. This group must have a strategic plan to sustain a research based technology, to integrate into and support the MPM program, to publish, present, and market to a greater audience, and to increase the synergy that will allow the core group to become more expert in the technology. However, the group must be an informal group due to the political situation in the department that has its own funding for publishing and marketing purposes.

4. Methodology

A core group will be formed with a leader who proves themselves by being active, being available, runs research projects, and has a greater understanding of the PIPS technology.

The core group will have the following objectives:

1. Obtain masters degrees and theses.
2. Obtain PhDs and dissertations.
3. Successfully implement PIPS in organizations.
4. Publish.
5. Make presentations.

6. Hold annual conference for continent of Africa.
7. Modify current practices and regulations.
8. Raise funding for the publication of papers, marketing, and research.

The core group will meet on a regular basis. After the core group is formed, other members of the group will meet once a month. The group will identify the following:

1. Short term goals and long term strategic goals and performance measurements.
2. A monthly newsletter identifying activities, projects, and goals.
3. An all Africa conference either in 2009 or 2010 in the UB.
4. Publications: number and which conferences.
5. How to assist the core team members succeed in raising their performance.

The core team will have the following guidelines:

1. All core team members have the same status regardless of position, academic rank, and position in the participating organization.
2. All efforts of the core group will be publicized to all in the group, ensuring that if another core team member/organization can utilize the effort, the synergy will add value.
3. The objective of all core team members is to increase efficiency, effectiveness, and performance.
4. All core team members will assist in the publishing and marketing of the objectives.
5. All core team members will attend monthly meetings.
6. All core team organizations will be licensed by Arizona State University and have the rights to the developed technology for five years.
7. Core team members/organizations will be interdisciplinary and can come from any industry.

The platform for the group shall be the CIB WC 117 group, using performance information in construction. However, the group can include other disciplines. The funding organization shall be PBSRG, and the funds will be used to support publications. Once research funding is generated, the funding will be moved to the UB project management branch.

5. Current Status of the Research Effort

The core group at UB PM section in the Department of Civil Engineering, and College of Engineering has been established. The current core group members include:

1. Five faculty members of the PM section.
2. Bank of Botswana.
3. Botswana Development Corporation.
4. US Embassy.
5. UB IT Department.
6. MPM graduate students.
7. PBSRG.

The leader of the group is Pasis Mselle, and her coordinator is Mex Muatjetjeja.
Research tests have been started or confirmed for the following:

1. US Embassy: irrigation and landscaping project, project for CDC posters, project for the logistics and facilitation of the training of health care workers and at risk participants
2. Bank of Botswana: design and construction of executive suites
3. Botswana Development Corporation (BDC): construction project

4. UB IT Department: IT procurement

6. Integration of PIPS/IMT Technology and Core Group into the MPM Program

The PIPS/IMT Technology is being implemented in four different courses of the MPM program:

1. Project assessment, monitoring, and evaluation.
2. Project procurement.
3. Risk management.
4. Quality control and safety.

The following suggestions are being made to the MPM program syllabi and coursework for the above classes:

1. Standard components. There are some standard components that should be taught in all four classes. Standard modules include the Information Measurement Theory (IMT) module, the Industry Structure model explanation with supporting models, the Performance Information Procurement System (PIPS) structure/process, and the Risk model. These modules should open the above four classes. IMT and the accompanying Kashiwagi Solution Model (KSM) is a deductive logic and a simplistic analysis tool which will quickly overcome inconsistent thinking, faulty analysis, and poor project management decision making. The logic is deductive, requires no technical expertise, and often exposes best practices (what is being practiced, accurate or not, validated or not) that are not best value practices (Kashiwagi *et al.*, 2008b; Kashiwagi *et al.*, 2006; Kashiwagi and Mayo, 2001).
2. The four MPM course listed above are all related. All of the above identified models should be taught. Four classes could be combined for the first four weeks. The objective of procurement, assessment, monitoring, and evaluation, and quality control is to minimize risk or risk management. Quality control is activity of the supplier to minimize the risk of deviation, and quality assurance is an activity of the buyer to ensure the supplier is practicing their quality control program. Procurement agents who minimize risk must have a process that assesses the requirement, selects the best value, forces quality control which monitors the deviation from the baseline plan, and then evaluates the performance of the supplier. The performance rating must be used in future procurements if it is to have any impact on increasing the performance of the suppliers. Procurement agents are forcing suppliers to do quality control if they are assessing, monitoring, and evaluating their performance (Chong *et al.*, 2007).

The authors propose to make the following modifications to the MPM program structure:

1. Transform the program from education based to research based.
2. All faculties should be involved in research tests with their classes, or be conduction data collection from research clients which will impact risk management.
3. All students should understand the term “dominant” information, or where decisions are not required. Students, who do not understand dominant, will not understand the relationship with decision making and risk, and the transfer of risk and accountability.
4. All graduate students should be able to measure their implementation of the IMT concepts.
5. Interface the education program with research tests. The research tests will be used by students as teaching tools.
6. Students will either be running their own tests for their theses, or using theoretical principles to identify tests in current events, or to improve their own performance in the classes by identifying risk events in current affairs, or learning how to do the weekly risk report on their own course performance.

7. Ensure that the principle concepts of IMT/KSM, industry structure, and PIPS are reviewed over and over in the different courses.
8. Require the Best Value PIPS manual mandatory reading in the above four classes.
9. Allow students to pick their thesis topic earlier in the curriculum then use each class to develop their thesis.
10. Change the emphasis from testing students to students creating value. Students should concentrate on analyzing current processes and procedures, identifying which practices are not consistent, modifying current practices, and implementing the new practices.
11. Every student should apply the concepts learned in their course, and should be required as an assignment at the end of the class, or as part of the final exam. All implementations should have a measurement system, and a personal measurement.
12. Every student should be planning a presentation to their organizations. This should be a requirement in the above four classes.

7. Conclusions and Recommendations

The MPM program is being improved by the formation of an informal core group implementing PIPS/IMT. The technology is being implemented into four course syllabi, taught to four faculty members who will are responsible for the courses, and tied to the core group which includes industry organizations and individuals who are testing the technology. The authors recommend to the MPM program coordinator to develop research that has impact, encourage students to give their organizations presentations, conduct research tests, and continually change the program requirements. The course requirements should move away from textbook material, and move more toward the student's analysis of different systems and their performance in delivering on time, on budget, and meeting client's expectations, and resulting dominant results showing value. The individual core team members all have their individual goals and objectives; however, any effort in moving the best value PIPS alignment of resources forward is aided by synergistic efforts.

The MPM program enhancements are coming in the space of four months in a nine month period of time. The lack of expertise and experience of the UB staff and industry (compared with Sicco Santema and Scenter in the Netherlands) is being compensated for by the Fulbright Professor's concentrated effort (four – one month periods). Differing from the Scenter model, which is heavily driven by Scenter, this model is more a synergistic effort by all parties. The informal organization, allows sustainability, as the parts of the team are all tied back into the parent PBSRG. This will help the organization sustain itself until the group can be self sustaining.

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