Using Statistics to Run a Public Procurement Office

Bryane Michael, University of Hong Kong
How Can Data Help You Run a Better Procurement Shop?

Professor Bryane Michael
Learning objectives

1. Learn to read statistical analyses and use them in Agency level strategy
2. Create your own statistical analyses and teach/correct your staff
3. Understand the role of variation and the information it contains
4. Form a hypothesis about how you should run your PPO and test that hypothesis with data
5. Use data to allocate manpower and internal resources
6. Learn how to formulate a PP policy, test with data and revise that policy

You need a computer (laptop) to do this course. If you don’t have one, please borrow your neighbours’. The computer should have Microsoft Excel.
Overview of the course

- This is an applied skills course
  - don't follow a boring spoon-feeding approach
  - will feel disorganised
- Don't feel you need to catch everything the first time around
  - we repeat so this difficult material sinks in slowly
- Each slide presents material and then asks questions
  - you won't have all information
  - some data might even be wrong
- First 1-2 hours feel uncomfortable and vexed, then ask why all courses aren't taught this way

No right or wrong answers, instead better or worse answers...
How to do a case study

**Step 1**: I will present the data and the background information

**Step 2**: I will ask a series of questions. The questions  
- test how much you know already  
- let me see what is most useful to teach

**Step 3**: I will present material and ways to help you answer the question

**Step 4**: I will ask for answers. They will often be different views. I will challenge, push and show how/why both answers can be correct.

You don’t need any background in math or statistics, just an open mind
First Session of the Day
Where is strategy in PPA?

Policy objectives like:
- number students taught
- cost of trials (federal)
- number employed

- fostering competitive business enhancing environment
  - local revenues
  - number companies
  - prices and costs

Overseeing procuring agencies:
- budget
- manpower

Rivers State
NEPAD
... improving lives, impacting communities
Warm up: How to Ask Questions of the Data?

1. Do number requests mean PPO more efficient or less?
2. Is average processed per day good or bad (hint: look at telephone consults)
3. Is increase in procedures monitored good or bad
4. What executive order would you pass to find out more (first stab at this)

Data show us where to look – not what we find
Warm up 2: Always look for trends over time and ratios

1. What is happening here?
2. Are local contracting agencies overburdened? What about PPO?
3. What explains the data on the right-hand side of the graph?
4. What executive order would you issue to test your theory?
Let's continue with course:
Expenditure is the incarnation of government priorities into practice.

1. Which area of procurement does the PPO Director need to watch more closely?
2. Why?
PPO effort determines Value-for-Money Gains

Fig 1: Total VfM gains by CPD and CoPEs on behalf of Departments from 1 April 2005 - 31 March 2008 (as recorded at 30 June 2008)

1. What factors likely affected the way the PPO contributed to these VfM gains (I mean, in general)
2. Should the Irish PPO spend more or less on Education and Library?
3. Now that you have worked out the arguments on both sides, how to resolve this issue?
How Do Procurement Mechanics “Twist” the way the PPA Implements Govt Policy?

Contracts are heavily concentrated toward the lower end of the price range

Much increase in values for framework and joint purchasing

Open procedure has the lowest contract values

How does choice of procedure likely affect the effectiveness, cost efficiency and human resource issues in PPO?
Understanding how your own processes twist implementation

You have asked your staff to conduct a survey to find out if procurement methods are distorting your Agency’s strategy to deliver “better” and “cheaper”

<table>
<thead>
<tr>
<th>Procurement Process</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of strategy implementation goals</td>
<td>56</td>
<td>4.5357</td>
<td>.71260</td>
</tr>
<tr>
<td>Procurement need identification</td>
<td>56</td>
<td>4.5357</td>
<td>.76192</td>
</tr>
<tr>
<td>Suppliers sourcing strategies</td>
<td>56</td>
<td>4.39286</td>
<td>.778777</td>
</tr>
<tr>
<td>Supplier appraisal methods</td>
<td>56</td>
<td>4.2500</td>
<td>.79201</td>
</tr>
<tr>
<td>Negotiation process</td>
<td>56</td>
<td>4.2679</td>
<td>.84188</td>
</tr>
<tr>
<td>Transparency of tendering process</td>
<td>56</td>
<td>4.2143</td>
<td>.94800</td>
</tr>
<tr>
<td>Bureaucracy in the procurement process</td>
<td>56</td>
<td>4.4286</td>
<td>.65663</td>
</tr>
<tr>
<td>Level of compliance with Public Procurement and Disposal Act, 2005 (PPDA)</td>
<td>56</td>
<td>4.4464</td>
<td>.87219</td>
</tr>
<tr>
<td>Level of compliance with Supplies Practitioners Management Act, 2007</td>
<td>56</td>
<td>4.4821</td>
<td>.85261</td>
</tr>
</tbody>
</table>

1. What do these numbers mean? (how were they likely obtained)?
2. What would you do about it?
A first look at how market data influence procurement strategy

Please look at the data to the right to answer the following questions:
1. What effect has procurement had on value-for-money in copper wire purchases?
2. Is procurement distorting domestic markets for supplying copper wire?

We can do as many examples as you want/need....
Assessing your performance

Use the graph to answer the following questions:

1. does compliance with procurement regulations hurt getting procurements done?
2. why is the govt awarding fewer contracts?
3. what might explain these data?
4. what data can we collect to test the hypotheses we just talked about?

CAN = contract award notices
CN = contract notices

Figure 4: Number of CNs and CANs published by EU MS in the OJ/TED in 2007-2011

Source: DG MARKT, based on OJ/TED data
Assessing your own performance

- Which depts are good and poor performers?
- What do the following data mean for public procurement policies?
  - Mean = 83%
  - Median = 72%
  - St dev = 15%
- On the bottom chart, which worker is better
  - dotted as lower mean but higher st. dev
  - why?
What we have found about your intuition

- Variance kills strategy-making
- Reasons
  - even if bad level, can form policies to address
  - variance prevents even putting policies in place
  - can’t predict or explain what causes procurement decisions
- We talk about 6-sigma
Testing your hypotheses

You think that as your office increases its work, it is saving the government more money.

Does the data show this?

Correlation coefficients
- number/savings = -0.70
- value/savings = -0.04

What is probability of no relationship?

Scatter chart more effective than line/bar for relationships
Thinking in terms of risks and returns

- Allocation of staff time like any investment
  - risk
  - return
- Way agency uses various procurement methods also affects Agency’s risk and return
- What do the data in the chart tell us?
- What is the implication for the PPO director?
Quantifying Risks and Returns

Ave Procure.   Prob of loss in project values

<table>
<thead>
<tr>
<th>Procure Type</th>
<th>Probability</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ports</td>
<td>8%</td>
<td>$40m</td>
</tr>
<tr>
<td>Environ.</td>
<td>14%</td>
<td>$7m</td>
</tr>
</tbody>
</table>

What is the expected loss in these two procurement types?
By type of procedure?

Formula for expected cost/benefit

Expected value = probability * Value
Testing your theories

You have implemented a new policy which you think will increase value-for-money savings

Consider the graph...

Does the new policy achieve its goal?

We learn how to do this (t-test and regression) in the next session
You’ve made all these great observations...so what?
You need to draft an executive order which translates your findings into action
Regulation answers:
- who
- what
- where
- when
- why
- how

Strategy isn’t some BSing blah, blah... it’s action on big things
Example

and data just joined the Open Source.

9.5. Work as a Procurement Professional in Private Companies. In order to encourage highly competent and highly trained procurement officials to advance in Serbia’s low wage regime, the FPO shall encourage participation in companies if and only if the person

a) becomes a member of the Executive or Supervisory Board or other managing authority of the legal person by appointment of the PPO Director;\[50\]

b) the person obtains the written consent of his or her Manager;\[51\]

c) the civil servant does not receive presents of any kind related to procurement activities in either the government or private sector;\[52\]

d) submit in writing to his or her manager any private interests that he or she may have in a public procurement, and

e) adheres to the conflict of interest and anti-corruption provisions in the Public Procurement Law.\[53\]

Section 10: Required Training for PPO staff

10.1. Requirement for Training Certification. Any PPO official engaged in public procurement training must have a valid Certification in the Training of Public Procurement in Serbia by 15 December 2015.\[54\]

10.2. Minimum training requirement. All staff above the rank of Clerk must have a valid Advanced Certification in Public Procurement by 15 December 2016 or as soon as effective.

data told us how many authorisations needed (who), where, when, how.

we identified this risk after looking at incidence of corruption and probability of fraud indicators.

Data told us:

a) costs of training
b) preferred deadline
c) benefits of training
Second Session of the Day
Why Should You Know How to Make Graphs and Conduct Analysis?

- First instinct is to delegate learning about Excel to subordinates
- Second instinct is to wait for app or hire software provider
- Five reasons why you can't do this
  - You need to know what their analysis means
  - Can't trust your staff
  - Need to clean up analysis for your own use
  - Useful skills in your post-PPA life
  - Industry dominated by BS-ers....
  - People don't read anymore (when was last time you actually read something?)
What we will cover in this tutorial

- Calculating means, medians, standard deviations
- Calculating changes over time and ratios
- Making graphs
  - time series
  - ratio analysis
- Reading your graphs
- Basic statistics (if we have time)
  - correlation
  - regression
We will practice 2-3 graphs before moving on....
What we will cover in the hypothesis testing tutorial

- How to think about regression
- putting the data into Excel
- running your first regression
- interpreting the data
- making policies based on those data
What is regression and how to use it?

You **HYPOTHESIZE** (after looking at data) that restricted procedures are costing value-for-money losses.

**General 5 steps we will do together**

1. Form a specific question (answers the 5 Ws)
2. Turn your question into a diagram
3. Go get data about each “box” in your diagram
4. Run the regression
5. Interpret it (as we have shown) after consulting professional

*similar to profit formula: social revenue – procurement costs*
How to read what others do

Does advertising procurement notices help reduce costs of procurement in River State?

Don’t reinvent the wheel. On the internet, you can find numerous studies.

But they use a special language which you need to know how to read....
Third Session of the Day
For our case study, remember:

<table>
<thead>
<tr>
<th>Question</th>
<th>Play with the data graphs basic stats we covered</th>
<th>Think through implications</th>
<th>What regulation do you draft?</th>
</tr>
</thead>
<tbody>
<tr>
<td>who</td>
<td></td>
<td></td>
<td>who</td>
</tr>
<tr>
<td>what</td>
<td></td>
<td></td>
<td>what</td>
</tr>
<tr>
<td>where</td>
<td></td>
<td></td>
<td>where</td>
</tr>
<tr>
<td>when</td>
<td></td>
<td></td>
<td>when</td>
</tr>
<tr>
<td>why</td>
<td></td>
<td></td>
<td>why</td>
</tr>
<tr>
<td>how</td>
<td></td>
<td></td>
<td>how</td>
</tr>
</tbody>
</table>

If we run over-time, we may delete this third session. I really want you to develop the basic skills by answering all the questions you give me during our Socratic method sessions....