Re-Shoring or Near-Shoring Concepts Should be Strongly Considered when the OEM's Goal is To Deliver Optimum Balance between Landed Cost and Time to Market

Brian Graham, Kimball Electronics

The old tactic of outsourcing to a low cost geography simply to deliver lowest cost direct and indirect labor was never a panacea supply chain solution. In fact, when evaluating solutions for lower volume and higher mix products typically found in the medical, industrial and public safety segments of the OEM market, IL & DL costs are only one subset of the total cost to land the product and service the ultimate customer. In this paper, there will be examination of what actual cost components should be included in a landed cost analysis, the soft costs that an OEM should consider to deliver outstanding performance in quality, logistics and delivery management of the supply chain solution. A detailed comparison using a "case study" will be presented to demonstrate a total landed cost option versus one that is focused on IL/DL cost. In addition, near-shoring options have developed over recent years initially for consumer oriented products such as cellular phones and printers with the goal of optimization of landed cost in the end use market. There will be shared a few case studies which demonstrate an optimum approach for total landed cost, ease of communication and avoidance of the typical issues that make an outsourcing only approach problematic. These include: different language and culture, long distances and different time zones, investing time and effort on establishing trust and the complexity these elements contribute to the development of long term relationships between an OEM and EMS partner. In summary, Near-shoring, when developed in partnership between the OEM and EMS provider can be a marketing differentiator for those clients who wish to set themselves apart by servicing their customers in the market close to "home".

Case Study: Medical Product Company (MPC) changes strategy – Simple Model for evaluating off-shore manufacturing.

Background:

MPC a growing mainstream medical product company brings on new Vice President (VP) of Supply Chain Management (SCM) with proven track record in reducing cost of Electronic Manufacturing Services (EMS). In first quarter of their tenure, the VP delivers the following message to the Incumbent EMS companies: "Reduce costs or face losing the "lucrative" High mix Low volume Printed Circuit Board Assembly (PCBA) business to a low cost region." The SCM group of MPC selected potential suppliers and the Request for Quotation (RFQ) is sent out to several companies including the Incumbent.
In Table 1 below, are the details of the basic model MPC employed for the evaluation.

Table 1: MPC PCBA Landed Cost Model

Part Number	Bill Of Material (BOM) cost (US$)	BOM markup	Value add	Total Manufacturing (MFG) cost	Logistics	Landed Cost
XYZ						
ABC						

In addition to the model MPC sent with the RFQ were the following instructions: "The quote should be formatted with your best price using Incoterms of Ex-works. MPC will evaluate the submitted proposals using a landed cost model you may include logistics costs, however MPCs will substitute costs from our preferred logistics suppliers."

Undisclosed to the Incumbents and potential new suppliers were the following facts:

1) All products will be converted to be Restriction of Hazardous Substances (RoHS) Directive compliant by the industry mandated date (June 2014).

2) The supply chain was complicated with several suppliers that were single sourced, some suppliers with very high Part per Million (PPM) defect rate, and several parts on last time buy/obsolete/special prep/sourced through brokers.

4) MPC believes supplier collaboration only belongs in the development phase of a product's life cycle and all production relationships with the EMS to be black and white strictly to the letter of the contract.

5) MPC would offer the winning bidders a contract with very one sided terms, including a clause which forbid changing the manufacturing process once products were approved through a strict validation/qualification build. Suppliers must use a supplier process change request (SPCR) post qualification approval.

6) There will be a constant push down of responsibility from MPC to the EMS for material liability such as excess and obsolete inventory (E&O), pass through warranty support and resolution of quality issues with the suppliers that MPC mandates the EMS must use.

After their analysis MPC determined that they would split the EMS spend with 40% going to a new EMS in SE Asia; another 40% going to a new factory of one of the existing EMS also in SE Asia, and the balance (20%) to stay in North America with the same EMS. The VP declared an annual savings of $2,500,000 in EMS spend and kicked off the transfer of product to the low cost regions.

Upon launch plan acceptance the supply chain management (SCM) organization and supplier quality engineering team (SQE) at MPC submitted the incremental budget outlined in Table 2 below, to support the 24 month process of transfer (no ROHS conversion costs):

Table 2: SCM and SQE Incremental budget for implementation at Low Cost Region

Project #	Qualification	Travel	Headcount North America	Sales General and Administration	Over Time Cost	Engineering Change Order Cost	Total
1	$20000	$20000	2	$200000	$30000	$15000	$285000
2	$30000	$40000	1	$100000	$15000	$7500	$192500
3	$40000	$80000	2	$200000	$30000	$15000	$365000
Total	$90000	$140000	5	$500000	$75000	$37500	$842,500

The EMS companies submitted the incremental ROHS conversion cost and carrying cost on the excess material ($3,000,000) due to supplier Minimum Order Quantity (MOQ), Purchase Price Variance (PPV) for the last time buy, broker buy and counterfeit testing costs in an end of year roll up are shown in Table 3 below.

Table 3: EMS Supplier budget for RoHS conversion and qualification for Low Cost Region Implementation

Project #	ROHS (# of assemblies at cost per assembly)	Excess Inventory carrying cost	PPV last time buy	PPV Broker buy	Counterfeit testing cost	Total
1	15 @ 2500 ea. = $37500	$78000	$15000	$30000	$3000	$163500
2	15 @ 2500 ea. =$37500	$78000	$15000	$30000	$3000	$163500
3	5 @ 5000 ea. = $25000	$39000	$7500	$15000	$1500	$88000
Total	$100000	$195000	$37500	$75000	$7500	$415,000

While all the companies in this case study are staffed by professional PM and SQE personnel, there are soft support costs involved which will fall on the NA MPC and EMS professionals to execute. Consider the simple list which will not be considered for monetizing:

- Cultural differences and language/lost in translation communication challenges – resulting in extra time to implement transfer.
- Time spent after normal business hours spent on conference calls to Asia or North America – evenings and early mornings will be scheduled with frequent status calls and updates.
- ECO implementation just takes longer especially when complex requirements like traceability are required.
- HMLV is not an easy transition into SE Asia unless the EMS there already has perfected this process. MPC should review the project schedule to assure time for the SE Asia EMS to continuously improve cycle time until they equal the operational performance level of the veteran NA EMS HMLV process.

- Is MPC's IP really protected? If there is a breach what is the remedy?

- S & OP process is not in sync between the MPC and the EMS companies – MPC is unable to maintain a fixed or frozen fence – MPC demands late changes and is not willing to accept true liability costs. "EMS is damaging the relationship by playing hardball when it comes to collecting contract specified costs of excess."

- Lead time just went up 4 weeks for MPC using sea freight and air freight is getting more expensive each year from SE Asia. What is the real cost of safety stock and is the EMS covering it?

- How does MPC commit to an order inside lead-time? Load and Chase as they have no BI tools in position as of yet. The cost of a lost order could be calculated…

What is the next generation cost model going to include? Or should MPC simply calculate a payback period to see when the cost savings would pay for itself? Let us take a few more data points into consideration and calculate the payback period.

First, the VP wants to get the savings as soon as possible, however the implementation team will need a full 24 months to transfer the products and complete the RoHS conversions all the way through validation. The $2,500,000 annual projected savings will occur at the following rate: 25% at the end of each 6 month window. Assuming that the costs are mostly project based and the post implementation annual recurring cost for supporting the South East (SE) Asia EMS is $500,000. The payback period will be right around 18 months. See Chart 1 below for a visual image of the breakeven point. The real annual savings in year two will be $1,625,000; for year three and beyond the savings will be $2,000,000.

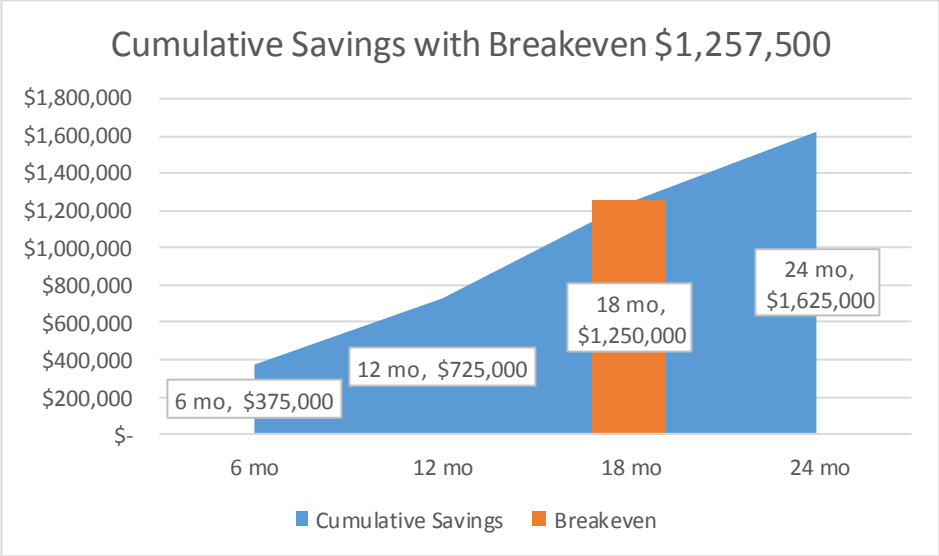


Chart 1: Breakeven point shown on Cumulative Savings Graph

This confirms the old adage that "there is no such thing as a free lunch."

Conclusion: a careful analysis of outsourcing options should include detailed savings, hard and soft costs of implementation when determining the relative fit for the organization. The author recognizes many companies use a specific ROI method with a threshold rate when evaluating options for outsourcing. The choice of the Payback period tool in the case study is the author's personal favorite!

Near-shoring Case study: Distribution in multiple regions of the world – is near-shoring a good option?

Data Product Company (DPC) a leading supplier of personal storage devices for retail consumption requires their new product to be shipped to distribution centers in North America (NA), Europe the Middle East (EME) and Asia Pacific (APAC). Annual volume forecast (total rolled up volume annually 10,000,000 units equally spread) will allow for one of two options –

a) Build product 100% in low cost region and ship around the world, or
b) Establish three regional solutions and near-shore shipping methods. Table 4 below shows the basic cost model.

Table 4: Low Cost Region Model for DPC or Option a)

Part Number	Bill of Material (BOM)	BOM Markup	Value Add	Total Manufacturing (MFG) Cost	Ave Logistics/unit single location for all regions	Landed Cost
NA	$15	10%	$6	$22.5	$5	$27.5
EME	$16	10%	$4	$21.6	$6	$27.6
APAC	$14	10%	$3	$18.4	$8	$26.4

Without a near shoring option DPC would have chosen the APAC solution. In Table 5 below, is the near shoring solution cost model for option b):

Table 5: Near shoring model for DPC or Option b)

Part Number	BOM	BOM markup	Value add	Total MFG Cost	Logistics/unit Near shore	Landed Cost
NA	$15	10%	$6	$22.5	$3	$25.5
EME	$16	10%	$4	$21.6	$4	$25.6
APAC	$14	10%	$3	$18.4	$3	$21.4

The significant savings of the near shoring model ($2, $2 and $5 per unit respectively) made the near shoring model very attractive. However let us look at the costs and implementation.

There are four major commodities with this product – metals, plastics, PCBA and power supply. One minor commodity is the in-region packaging (with proper language, electronic users license agreement (EULA), etc. for each of the three regions) which also is a consideration. After review with the engineering and marketing team the specifications are finalized and the EMS partner sent out competitive bid requests to a listing of preferred suppliers in each of the three regions. Acceptable responses were received and processed confirming the budgeted pricing or in some cases with a slight variance +/- which are accepted by DPC.

The three facilities kicked off their validation and qualification builds and submitted to PDC for testing. After approval, POs were issued to the major vendors and production began with PCBA as the only commodity manufactured in a region outside of the near-shoring factory. This was a low cost strategy as the shipping cost from SE Asia for the small electronic component of the product was within the budget.

In this case study, the near shoring solution did in fact deliver the published advantages of greater ability to support increases in demand, rapid restocking of inventory in the retail and online retailers, lower landed cost and a healthier bottom line for the product, than a standalone low cost supply. There are some challenges that will potentially remain. Those include:

A) Disconnected Sales and Operation Plan (S & OP) process between the customer DPC and the EMS provider – further disconnected S & OP process between the EMS provider and the rest of the supply chain…

   Result – increase in excess and obsolete inventory (E&O); Lost Sales & Lost Opportunities
B) Inability to leverage end to end visibility of the supply chain - can either DPC and EMS provider do a what-if within their Enterprise Resource Planning (ERP) systems that adds value – can one of the two companies use it to correctly commit what the supply chain can deliver?

C) Can DPC and EMS provider drive a cultural change to eliminate software spread sheets as the primary Supply Chain modeling tool? Simulation, collaboration and analytics together will be more effective than any spreadsheet software tool on its own.

D) Supply chain risk – identify it; assess it, prioritize it; quantify it; mitigate it – then implement and TEST business continuity plans with the suppliers in the supply chain.

Measure the performance of the solution using Quality, Cost and On-time delivery. These should be easy to measure and of course be relevant to the business model. For DPC Quality could be measured as PPM with a low goal of <100; Cost could be measured as % reduction in each of the four main commodities quarter over quarter, with a goal of 1% reduction per each commodity group, and On-time delivery could be measured as either % or # of stock out per quarter. The goal is 100% or 0 respectively.

Conclusions

In almost all cases there are options for near shoring which when implemented to a high level of regionalization in the local supply chain can provide better end to end service and a more responsive solution for the ultimate consumer at a fair profit margin to the OEM and EMS provider.

Re-shoring or Near-shoring Concepts Should be Strongly Considered When the Oem's Goal is to Deliver Optimum Balance Between Landed Cost and Time to Market

Brian Graham, BDM, Kimball Electronics, Inc.

February 24, 2015

The Question is: Who wins when OEM and EMS partner to deliver a Near-shoring solution?

Answer: The Customer, OEM and EMS Partner!

Case Study

Medical Product Company (MPC) changes strategy – Simple Model for evaluating off-shore manufacturing.


RESUME

Super Deluxe Landed Cost Evaluation Model

Part Number	Bill Of Material (BOM) cost (US$)	BOM markup	Value add	Total Manufacturing (MFG) cost	Logistics	Landed Cost
XYZ						
ABC						

Incoterms 2010 from Wikipedia

EXW – Ex Works (named place)
The seller makes the goods available at his/her premises. This term places the maximum obligation on the buyer and minimum obligations on the seller. The Ex Works term is often used when making an initial quotation for the sale of goods without any costs included.

EXW means that a buyer incurs the risks for bringing the goods to their final destination.

The seller does not load the goods on collecting vehicles and does not clear them for export. If the seller does load the goods, he does so at buyer's risk and cost. If parties wish seller to be responsible for the loading of the goods on departure and to bear the risk and all costs of such loading, this must be made clear by adding explicit wording to this effect in the contract of sale.
The buyer arranges the pickup of the freight from the supplier's designated ship site, owns the in-transit freight, and is responsible for clearing the goods through Customs. The buyer is responsible for completing all the export documentation. Cost of goods sold transfers from the seller to the buyer.

The **Restriction of Hazardous Substances Directive** 2002/95/EC, **(RoHS 1)**, short for **Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment**, was adopted in February 2003 by the European Union.

Commodity	Good	Bad or Ugly	History
Transformers		X	Delamination PPM > 10,000
Semiconductors	X		Demonstrated Quality
Capacitors	X		Demonstrated Quality
Proprietary Device		X	Last time buy 1-2012
Single Sourced Devices		X	214 individual MPNs
PCB		X	NA sourced $$
Through Hole IC		X	Special step to form into SMD

Minimum Order Quantity – Impact

- High Mix with Low Volume PCBA
- Quarterly Demand 100 pcs to 500 pcs
- Many components are used across models
- MPC plans to move higher volume models to Low Cost Geography
- Most devices have MOQ of 5,000

- Result is Supply Chain designed Excess…

Flexibility – see the Contract!

- By the way what can the EMS do to expedite…

Supplier Process Change Request

- Never, Never, Never Change
- Without written approval and lots of validation testing

"Supplier should absorb as much of the liability as possible"

MPC's SCM & SQE Incremental budget for implementation at Low Cost Region

Project #	Qualification	Travel	Headcount Increase NA	SG&A	Over Time Cost	ECO Cost	Total
1	$20000	$20000	2	$200000	$30000	$15000	$285000
2	$30000	$40000	1	$100000	$15000	$7500	$192500
3	$40000	$80000	2	$200000	$30000	$15000	$365000
Total	$90000	$140000	5	$500000	$75000	$37500	**$842,500**

Three things are Certain:

1) Death

2) Taxes

3) Pay the Piper when you have to implement a low cost geography solution!

EMS Supplier budget for RoHS conversion & qualification for Low Cost Region Implementation

Project #	ROHs (# of assemblies at cost per assembly)	Excess Inventory carrying cost	PPV last time buy	PPV Broker buy	Counterfeit testing cost	Total
1	15 @ 2500 ea. = $37500	$78000	$15000	$30000	$3000	$163500
2	15 @ 2500 ea. =$37500	$78000	$15000	$30000	$3000	$163500
3	5 @ 5000 ea. = $25000	$39000	$7500	$15000	$1500	$88000
Total	$100000	$195000	$37500	$75000	$7500	**$415,000**

Conflict resources are natural resources extracted in a conflict zone and sold to perpetuate the fighting.[1] There is both anecdotal and statistical evidence that belligerent accessibility to precious commodities can prolong conflicts (a "resource curse"). **OEM must audit for and report usage of Conflict mineral resources - Traceability** is a requirement of Section 1502 of the Dodd–Frank Wall Street Reform and Consumer Protection Act.

For some Medial Products **component level traceability** requires the contract manufacture to manage the inbound material including retaining **certificates of conformance** from the approved component manufacturer AND have a system for **identifying the batch or lot number used on any one PCBA**

Description	HIGH VOLUME	HIGH MIX LOW VOLUME = HMLV
Annual Volume	Tens of thousands to millions	Hundreds to a few thousand
Number of builds per year	Many to continuous	One to twelve or more
Number of change overs	Very few	Daily or many times per day
Manufacture focus	Line speed - highest volume achievable. Low variation in assembly - dedicated	Rapid change over & flexibility for large variation in assembly type

Can you protect your Intellectual Property???

At what cost in a low cost region??

How to verify IP is protected??

MPC Sales and Operations Plan VS Material availability

Business Intelligence (BI) tools – Run by Planning Specialists!!

What if –or-

What on earth!!

Lessons Learned:

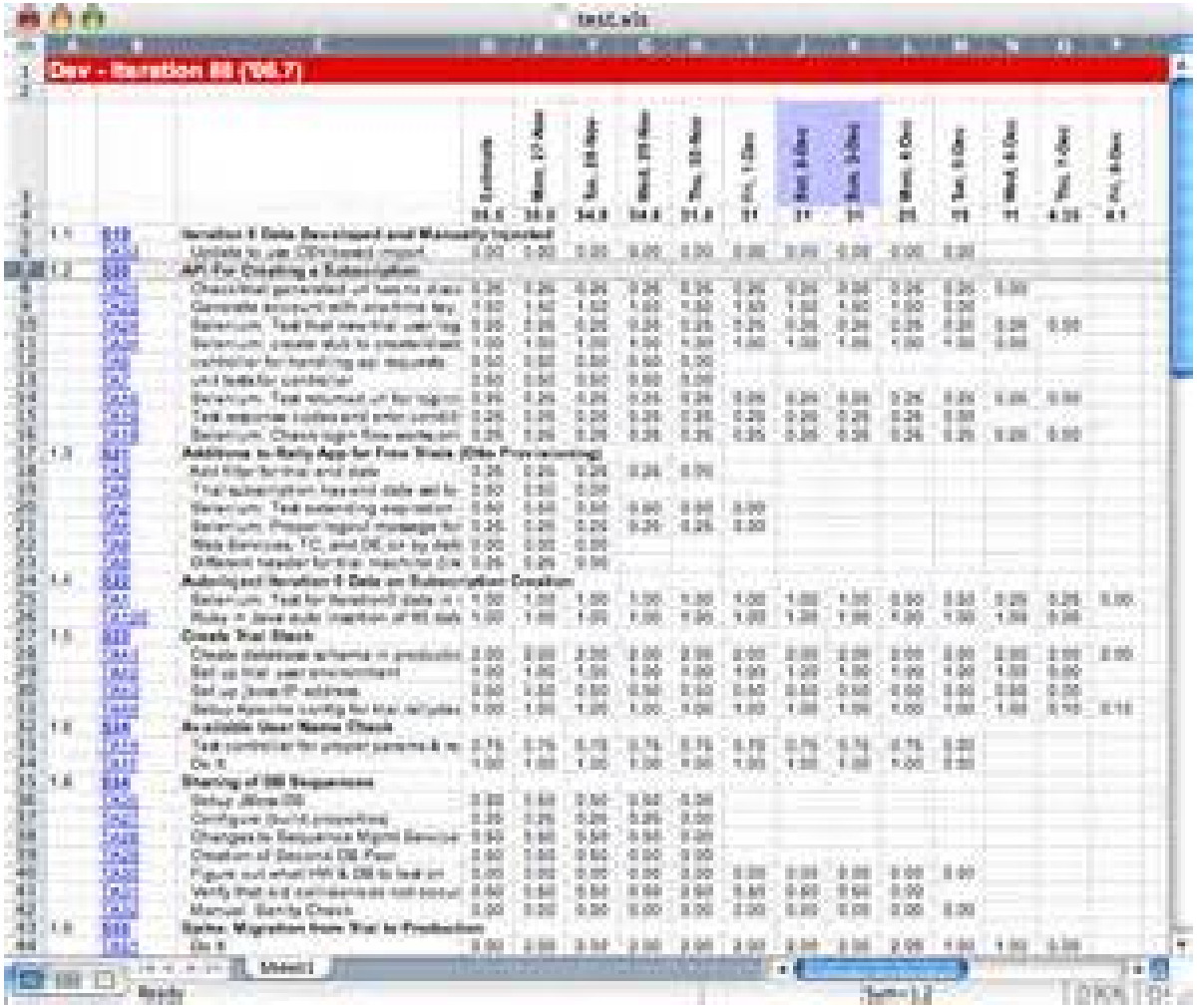
Can you easily run the supply chain analysis to check available to promise???

Safety stock of PCBA or of Components

Who bears the cost??

Real return on investment of BI tools

A More Detailed Landed Cost Model???

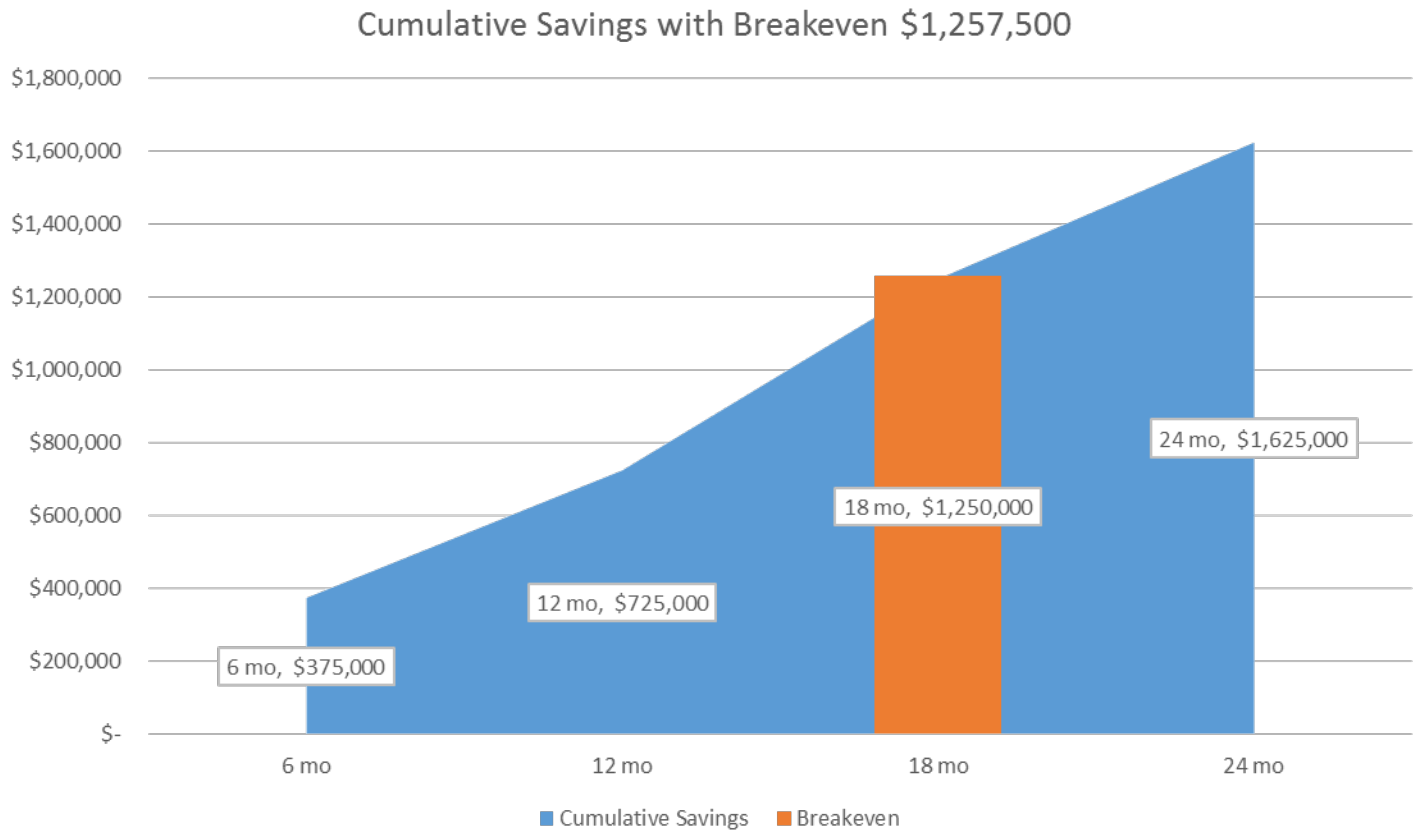


Item	6 Months	12 Months	18 Months	24 Months	30 Months
MPC SCM	-$125,000	-$125,000	-$125,000	-$335,000	-$132,500
EMS TOW	-$125,000	-$125,000	-$125,000	-$40,000	0
SAVINGS	$625,000	$625,000	$625,000	$625,000	$625,000
TOTAL	$375,000	$375,000	$375,000	$375,000	$492,500
Cumulative	$375,000	$750,000	$1,125,000	$1,500,000	$1,992,500

Break even

Total Cost to Implement $1,257,500

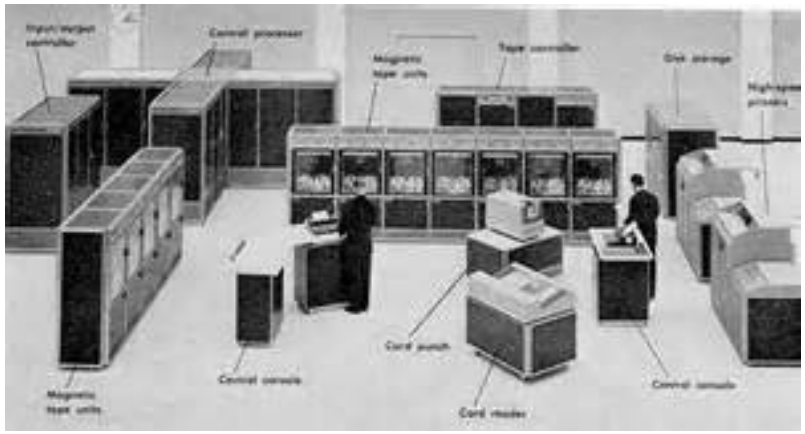
Annual Maintenance cost $500,000
NET Annual Savings $2,000,000


Cumulative Savings with Breakeven $1,257,500
$1,800,000
$1,600,000
$1,400,000
$1,200,000
$1,000,000
$800,000
$600,000
$400,000
$200,000
$-
6 mo
12 mo
18 mo
24 mo
6 mo, $375,000
12 mo, $725,000
18 mo, $1,250,000
24 mo, $1,625,000
Cumulative Savings
Breakeven

- Review detailed requirements in SOW
- Factor Hard and Soft costs of implementation to show realistic savings
  - For both EMS and OEM
- Check the breakeven point
- Agree to a fair two way MSA

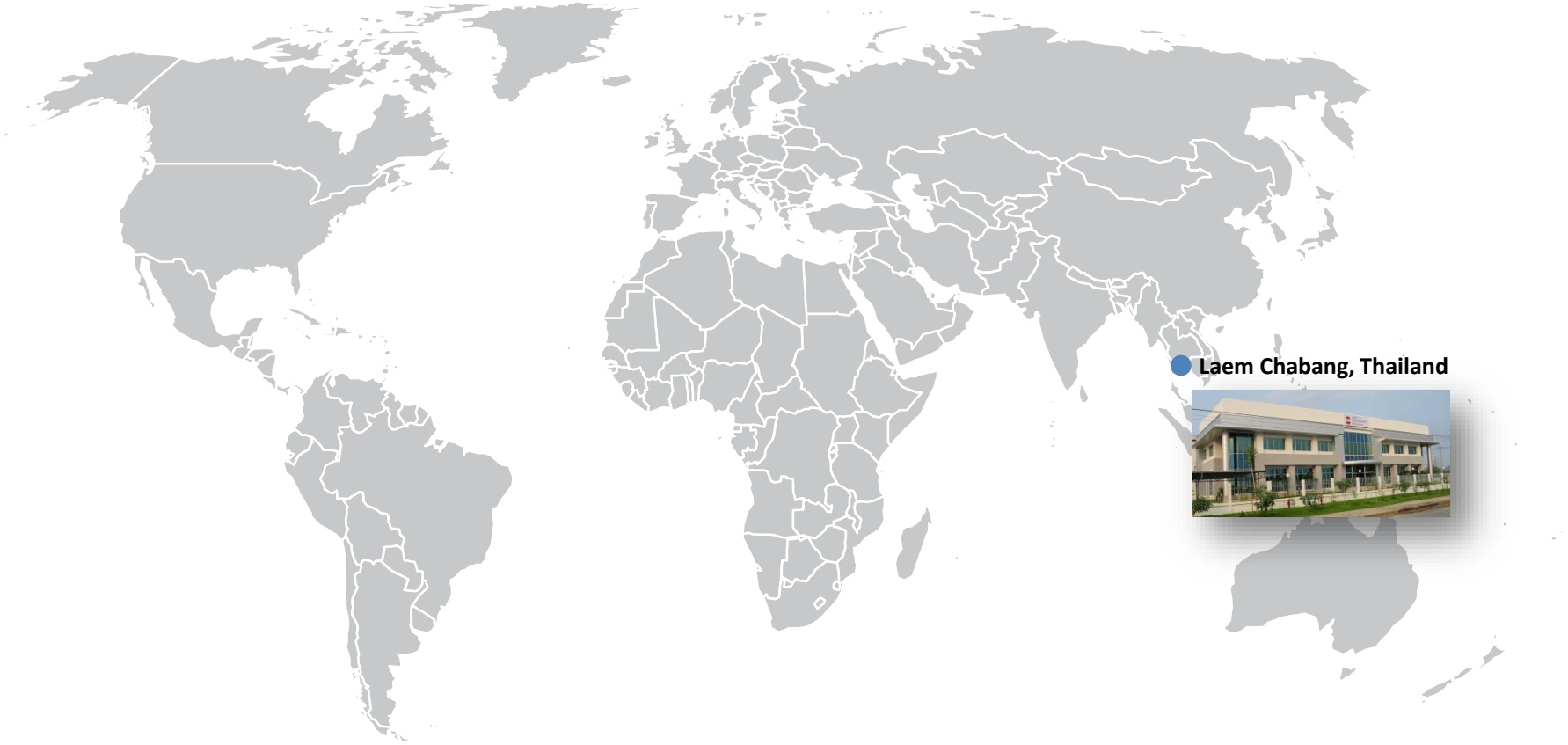
The End!!

Case Study Two: Distribution in multiple regions of the world – is near-shoring a good option ?

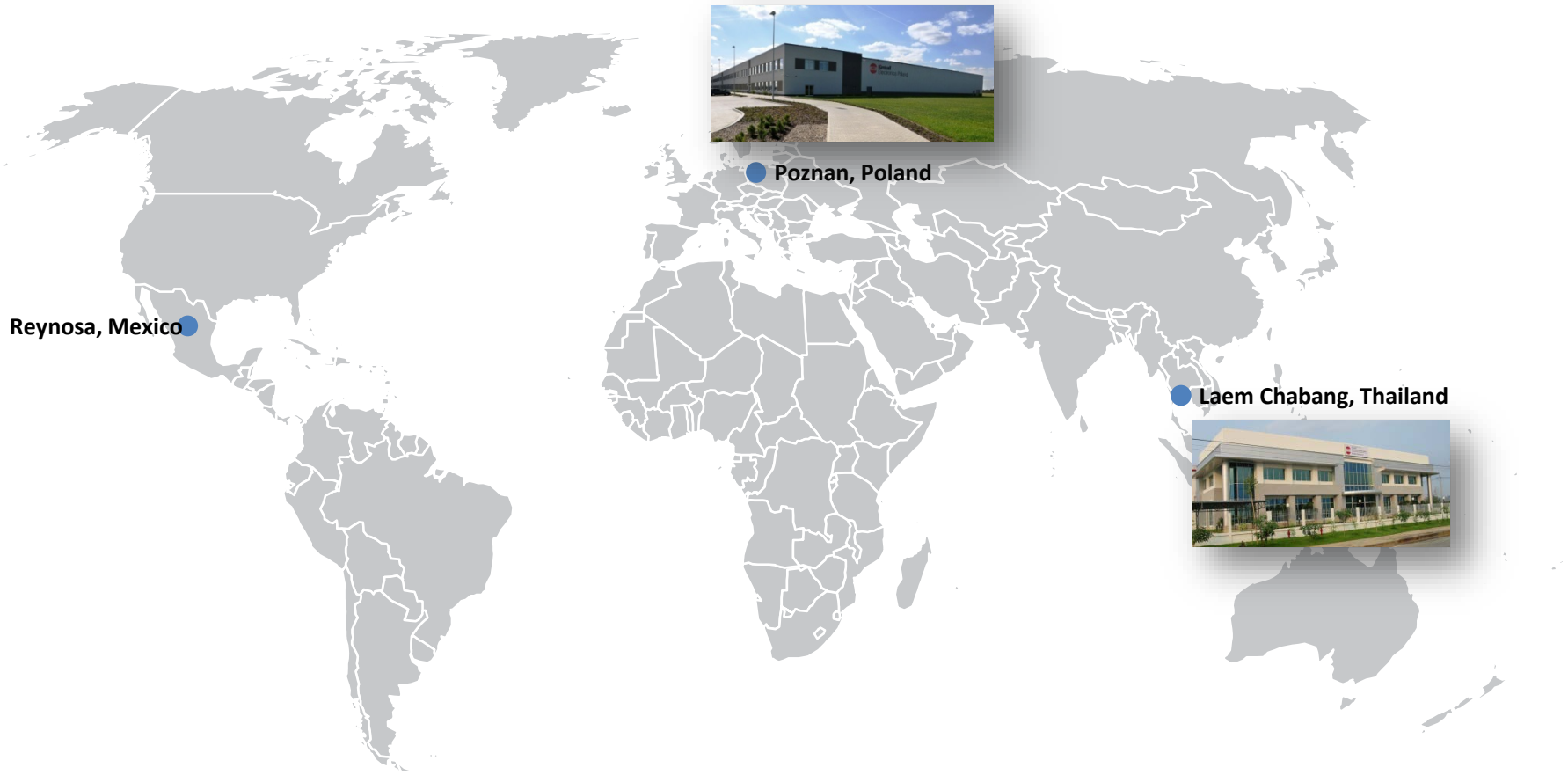


DPC analysis of Low cost Geography or Near Shore options!

One low cost manufacturing location and ship around the globe, or…..



Points of Distribution based decision – Near Shoring!!!



Low Cost Region Model for DPC

Disty Center Location	Bill of Material (BOM)	BOM Markup	Value Add	Total Manufacturing (MFG) Cost	Ave Logistics/unit single location for all regions	Landed Cost
NA (Mexico)	$15	10%	$6	$22.5	$5	$27.5
EME (Poland)	$16	10%	$4	$21.6	$6	$27.6
APAC (Nanjing)	$14	10%	$3	$18.4	$8	$26.4

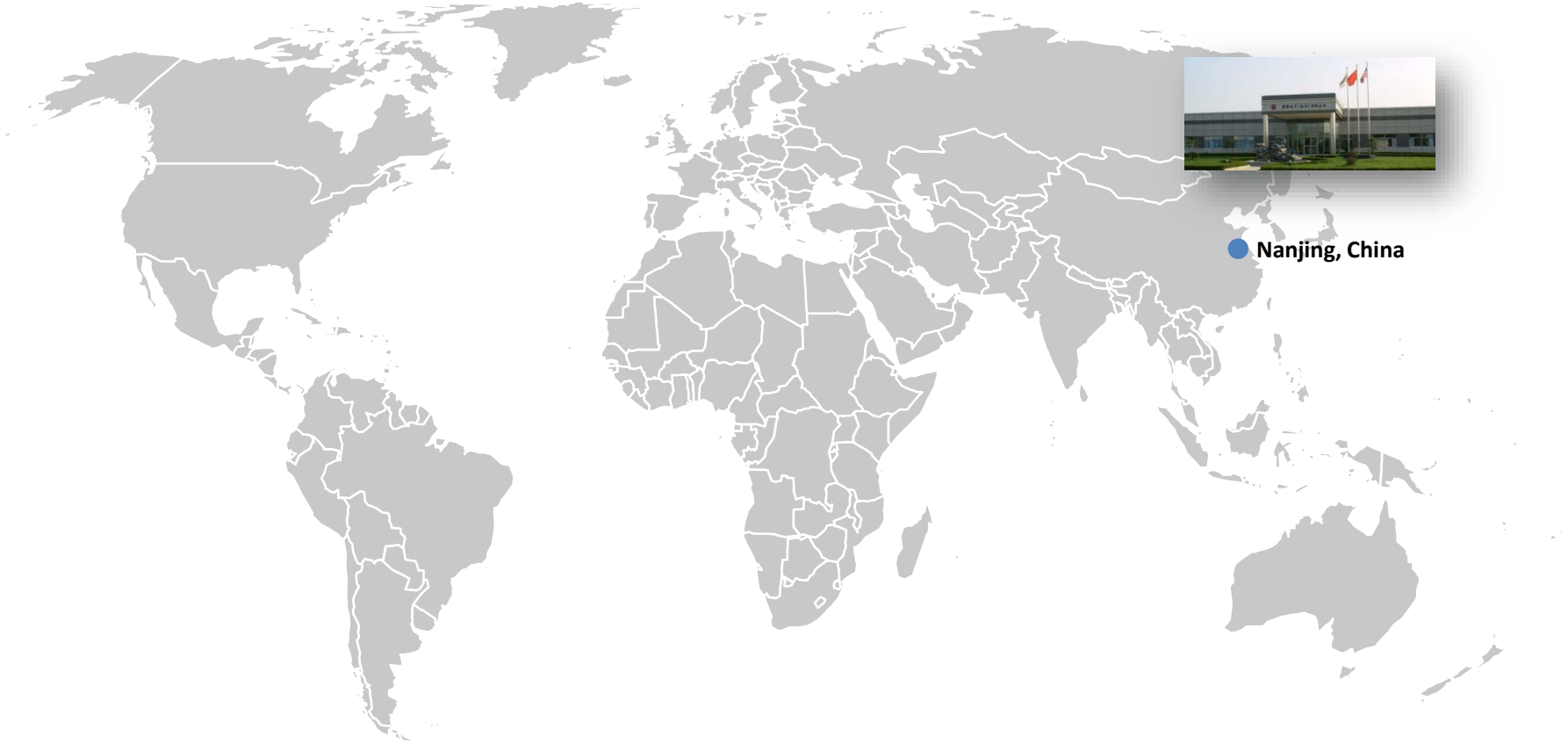
Near shoring model for DPC

Disty Center Location	BOM	BOM markup	Value add	Total MFG Cost	Logistics/unit Near shore	Landed Cost
NA	$15	10%	$6	$22.5	$3	$25.5
EME	$16	10%	$4	$21.6	$4	$25.6
APAC	$14	10%	$3	$18.4	$3	$21.4

We have a Winner!!!!

Disty Center Location	Low Cost Geography	Near Shore	Near Shore Savings per Unit
NA	$27.50	$25.50	$2.00
EME	$27.60	$25.60	$2.00
APAC	$26.40	$21.40	$5.00

Time to Pay the Piper Again


Nanjing, China

Business Intelligence (BI) tools – Run by Planning Specialists!!

What if –or-

What on earth!!

Lessons Learned:

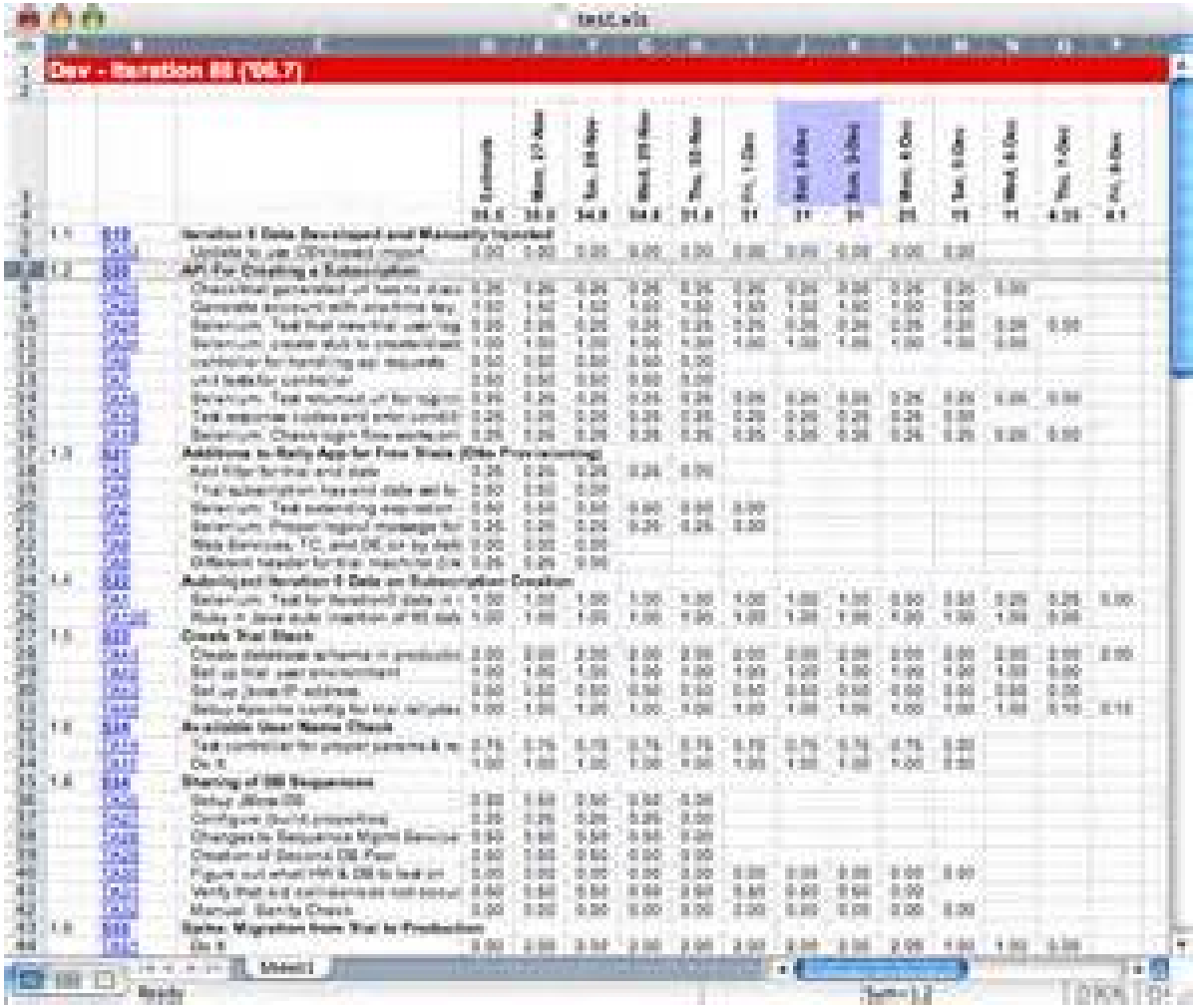
Can you easily run the supply chain to check availability???

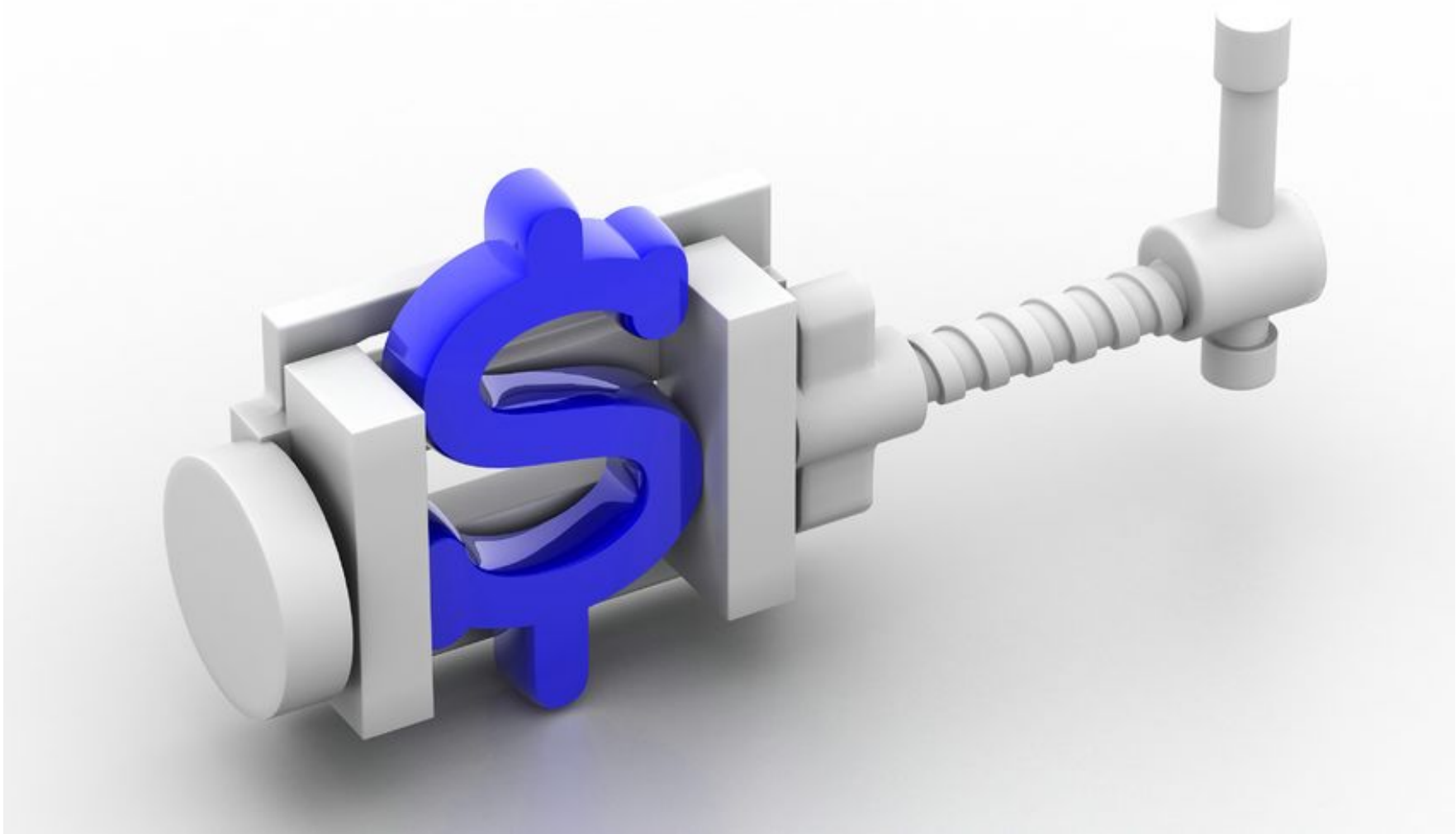
Safety stock of PCBA or of Components

Who bears the cost??

Real return on investment of BI tools

Better Supply Chain Modeling Tool than this???





Simulation, collaboration and analytics = Victory over spread sheet modeling

Supply chain risk – identify it; assess it, prioritize it; quantify it; mitigate it – then implement and TEST business continuity plans with your Key suppliers

KPI Summary

- Quality Incoming 
- Delivery Performance 
- Cost Performance 

- Adequate volume for Near Shore solution to provide financial return
- Regional Suppliers for key commodities
- Run S&OP with BI tools
  - Simulate, Collaborate and Use Analytics
- Test Business Continuity Plans
- Deploy Q, C & D Metrics

Thank You Very Much!

Questions???