Critical Success Factors for Electronic Manufacturing Services
(PanPac 2016 Conference Paper)

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Discussion Agenda

- Introduction
- Key Characteristics of a Successful Partner
- Conclusions
- Q & A
New and Emerging Technologies in Electronics

![Diagram showing computing growth drivers over time, 1960–2020E.](image)

- **1960s**: Mainframe with 1MM+ Units
- **1970s**: Minicomputer with 10MM+ Units
- **1980s**: PC with 100MM+ Units / Users
- **1990s**: Desktop Internet
- **2000s**: Mobile Internet
- **2010s–2020**: More than just phones, including:
  - iPad
  - Smartphone
  - Kindle
  - Tablet
  - MP3
  - Cell phone / PDA
  - Car Electronics
  - GPS, ABS, AV
  - Mobile Video
  - Home Entertainment
  - Games
  - Wireless Home Appliances

Source: 2009 Estimates Morgan Stanley
EMS’s Ability to Influence Design

Early Manufacturing involvement is critical to Performance (cost, schedule, risk)

The ability to influence a product is greatest during its early life design stages while the cost to change a product increases dramatically as its life progresses.
Product Phases

Convergence Focus
• Communication
• Component Technology
• Process Management
• Relationships

Developed in parallel with integrated product development process.
Key Characteristics for Determining a Good Supplier

- Fundamental skills and characteristics
- Quality
- Technology competence (VOC)
- NPI
- Specification compliance
- Service
- Other Considerations
Prerequisite Fundamental Skills and Characteristics

- Vision
- Core values
- Company viability
- Environment
- Security
- Language and communication skills
- Does the company’s prime business align with the work at hand?
Supplier Incidents (OSHA/Industry News/Other)

- Suicide attempts
- 150 employees jump off roof/balcony
- Waste Treatment/EPA violations
- Labor violation laws
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- Impact to company image and product perception by the customer.
- Impact to quality.
- The constant turnover will impact the skill base and technical depth.
Quality

- Competency and experience of the workforce.
- Product durability and reliability.
- Simplicity of operation.
- Value add proposition
- Breadth of Industry Knowledge
Dr. Joseph Juran Farewell Tour on Quality; Visit To Rochester, MN

- Ford Motor Company
  - 420 Employees in Accounts Payable

- Japanese Auto Maker
  - 7 Employees in Accounts Payable

Anyone can make a complicated process that works; It takes a good engineer to make a simple process and still work.
Quality Management System (QMS) for Performance Excellence

ISO/Malcolm Baldridge/Other certifications as a means to certify Company QMS system.
KANO ANALYSIS/VOICE OF THE CUSTOMER FOR EMS - 2015

Product/Service Performance

Satisfaction

Dissatisfaction

Product/Service Performance
Must Be’s; Expected Factors

- Must meet SOW reqmts (schedule/FPY quality/cost)
- Compliant to Industry Process/Quality Stds (IPC/J-STD/EIA/others)
- Site ISO/QMS certified
- DFM/DFT Analysis
- ICT & Fly probe test development
- Global Supply Chain Support (Self sufficient)
- Environmental compliance with verification/tracking methodologies
- Failure Analysis and lab support
Primary Satisfiers; Desired Factors

- Must Be’s Factors +
- ODM Design capability
- DF Supply/DF Reliability
- EMC/Agency Approval Testing
- R & D for new process/materials/equipment
- Functional Test Development
- Internal technology roadmap readiness – mapping and execution
- Higher level system/sub-system vertical integration
- Advanced inspection & X-ray
- Industry collaborations for new technology’s in advance of product pick-up.
Delighters; Excitement Factors

- Primary Desired Factors +
- Design for Assembly using software simulation analysis
- Design for Optimized Acquisition cost using software validations
- Full turnkey solutions (complete design + manufacture systems)
- Global solutions for design/mfg. with virtual transparency
- Automated mechanical assembly and Test (PCBA)
Voice of the Customer

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(Excitement Factors)
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- Reliability Validation and ORT self sufficiency

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(Desired Factors)
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New Product Introduction

- Yield (First Pass, Rolled) Management
- Cycle time Tracking/Efficiency improvements (Design/Process)
- Cost (Design improvements)
- Overhead (Equipment/Resources for optimized balancing)
- DfM, DfT, DfA, DfX DfS, DfR...
- Technology capabilities/advanced R&D
- Process Development & Rework
Compliance to Specifications

- IPC
- JEDEC
- EIA
- ANSI
- Customer Specifications
- Company QMS, Internal Documentation
- Other (Consortia, Published Papers, Best of breed, Emerging)
Critical Factors for Successful Services

- On time deliveries
- Delivery lead time
- Response to shifts in demand
- Ability to modify product
- Technical support
- After sales support
Intangible Factors

- Do employees go through motions without understanding the importance of what they do?
- Are employees encouraged to ask questions and suggest process improvements?
- Is every employee treated with respect?
- Are employees shown the fails which result from doing the task incorrectly?
- Do employees recognize that they perform an integral function of the entire manufacturing operation.
- Lessons Learnt capture & Improvement discipline.
Summary

- Communication skills:
  - Between the OEM and EMS.
  - Within the manufacturing site
  - Understanding of requirements

- Core Values – Vision
- Self assess: technology and process readiness to ship product to external customers.
- Ability to meet NPI launch schedule with Reliable Hardware and/or Code
- $ Cost and reputation impacts when defects are discovered in a client environment.
- Pressure to ship prematurely despite knowing there are some potential risks: Balance schedule vs Quality of Product
- Escaped Defects highlight gaps between the development and manufacturing validations/simulations.
- Commitment to excellence for products produced by OEM/EMS, JDM, ODM partners.
Thank You! – Questions?

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- Speaker bio

Larry Pymento has been in the PCBA Industry with over 25 years of experience supporting product platforms across PC, Tablets and High End Server Systems. As a Senior Technical Staff Member at IBM he was responsible for New Technology/Product Introductions, RoHS implementation strategy/execution and a core member of the Lead free Corporate Team. Most recently he was a Consultant engineer for Lenovo USA responsible for Qualification Business transformation & Design for Excellence. He serves as V.P. of Technical Operations for the SMTA Carolina’s Chapter.

He holds degrees in M.S.E.E. (NYU-Poly, New York), M.S. Mfg. Systems Eng. (Rensselaer Polytechnic University, New York), Certificate in Project Management (G.W. University) and is a Certified Master Black Belt in both DFSS and LSS.