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Outsourcing Strategy: What Regions Best Fit Your Product?

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By Curtis Campbell

There is no one size fits all solution for best outsourcing region. Outsourcing strategies that made sense in 2019, may not make sense in 2022 due to rising costs and logistics bottlenecks. While current component constraints make changing electronics manufacturing services (EMS) providers immediately a non-starter, many OEM teams are beginning to evaluate their outsourcing strategy as a whole. The dynamics that make a specific region the best fit may have changed. This whitepaper looks at North America and Asia in terms of regional advantages and disadvantages focusing on:

- Product development considerations
- Product margin sensitivity
- Demand variation and scalability
- End market or customer final assembly location.

Product Development Considerations

The current materials constraints have slowed product development activities at many companies. In-house engineering teams have been re-deployed in alternate component identification and/or redesign strategies to mitigate constrained components where possible. That said, as component constraints ease, a slowdown in product development activity may translate to a bottleneck in new product design activity as engineering teams pivot to catch up with projects that have been on hold. Outsourcing strategy should consider this possibility, as EMS providers with product development engineering teams may be able to help fill resource gaps or offer proprietary software or hardware licensing solutions that reduce overall development time. Similarly, these EMS engineering teams may be able to support the current need for alternate component identification or redesign if there are existing resource challenges.

From a regional perspective, shared language and similar time zones can be beneficial when an EMS company is helping to fill gaps in a product development effort. This is less of an issue with design for manufacturability/testability or test engineering support, as those support resources are routinely provided at a distance. When product development engineering support is provided by an EMS company it is always important to define design ownership ahead of the project. While licensing proprietary hardware or designs can save time and engineering cost, they may also represent golden handcuffs in terms of where the product is manufactured.

SigmaTron International operates facilities in the U.S., Mexico, China and Vietnam. Its teams support the gamut of onshore, nearshore and offshore manufacturing relationships equally well. The U.S., Mexico

and China facilities all have strong in-house technical teams who routinely deal with technically challenging products plus a U.S.-based design engineering group capable of filling gaps in its customers' product development teams. The Vietnam facility has less specialized test support in-house, so its team draws on resources from both SigmaTron's China facility and U.S. design engineering group to address any product or test technical challenges that go beyond in-house capabilities.

When SigmaTron's team is not involved in the product development process, the new product introduction (NPI) process starts with the receipt of CAD files from the customer, along with the BOM and AVL. If DFX and product lifecycle management (PLM) activities have not been performed earlier in the process, they are performed during NPI. This well-defined process helps reduce the need for its OEM customers to have to dedicate significant internal engineering resources to the NPI process.

Other issues that can potentially impact production cost are also evaluated as the process flow is designed. This focus on developing the most efficient process flow is particularly beneficial for highly regulated products, such as medical devices, where there may be limitations on process changes once the product is in production.

Once the process flow is approved, SigmaTron's use of leading edge software enables machine programming to be done using the CAD data. This cuts time and ensures accuracy.

Product and process validation is done based on customer requirements. Any issues discovered during NPI and pre-production runs are documented and provided to the customer. The result is that defect opportunities are eliminated wherever possible, improving first pass yields and eliminating non-value added activity. The process is designed to convey information in an easy to analyze and make decisions upon format.

The result is a strong technical support process regardless of facility location. SigmaTron's ability to flex its engineering resources virtually also helps ensure that communication activities and critical meetings can be structured in a way that is convenient to the customer's team.

Product Margin Sensitivity

The logistics chaos of the last two years has taught sourcing teams the value of a lowest total cost of ownership (TCO) approach to determining the best build site. A low labor cost is meaningless when freight cost triples overnight. Figuring out TCO has become almost as complex as solving Rubric's Cube. There are multiple dimensions beyond labor cost to consider including:

- Logistics cost and time to the end market
- Material availability within the end market
- Warehousing expense if higher inventory levels must be carried

- Manufacturing capacity within the region
- Tariffs
- Ability for the OEM team to access the EMS provider's team.

Margin sensitive products are typically best built in low cost labor markets. That said, it is important to understand total cost of ownership, in calculating which low cost labor market makes the most sense. Most regions in Asia are lower cost than U.S. manufacturing. However, China and Mexico were at labor cost parity pre-U.S.-China tariffs. A nearshore solution in Mexico is logistically simpler than an offshore solution in China when the largest end market is in North America. While there is currently discussion of elimination of U.S.-China tariffs, which may make this point moot, the combination of Mexico's Maquiladora Program and the USMCA trade agreement for raw material import/finished goods export mitigates tariffs on components with China origins. Vietnam offers a lower cost than either Mexico or China, however, availability of experienced engineering resources may not be as good as those found in more industrially mature regions. SigmaTron's ability to pull engineering resources globally, counterbalances this in its Vietnam facility. In deciding on the best option, it is important to consider annual volumes, availability of necessary resources, proximity to needed supply chain and logistics complexity, in addition to labor cost, in calculating total cost.

Demand Variation and Scalability

High volume products with predictable demand are relatively easy to outsource anywhere in the world. However, many sourcing projects have a mix of products with low-to-medium volumes and some demand variability. It is often assumed that the economies of scale in component sourcing associated with high runners will drive cost savings in the variable demand product, or that the size of the total project will drive some level of price discounting at the EMS provider. This isn't always the case. Lower volumes have more line changeovers and don't always have component commonality with the higher volume product. If the EMS provider doesn't value lower volume, higher mix product there may be late deliveries or expedited shipping charges. There may also be quality issues associated with product configuration errors. Yet, segregating high volume and lower volume, less predictable production may result in higher pricing for the less attractive products in the mix.

Mexico, which now competes on service as well as price, offers both lower labor cost and logistics simplicity for variable demand product. This can provide the best option for accessing a lower cost labor market while maintaining logistics simplicity. Given the increases in freight costs, it more important than ever to consider the landed cost of the product rather than just assembly cost.

When dealing with a mix of high volume and variable demand product there are two strategies that can lower the cost of the lower volume product. If dealing with an EMS provider in Asia for the high volume product and a North American solution for the higher mix product, consider moving some of the high

volume spend to the North American EMS provider to see if the combined volume will lower costs on the higher mix product. The downside to this multiple supplier strategy is that it doesn't leverage material spend or scheduling among the programs to the degree possible with a single supplier. When dealing with a single multinational supplier, it may be possible segregate the programs geographically while still leveraging the cost benefits of the total project.

SigmaTron focuses on a scalable solution approach and offers customers the ability to build different product lines in different facilities when their requirements don't fit a single facility option. Forecasting and production layout are optimized for those projects. For example, SigmaTron's facility in Elk Grove Village, IL has a box build area that has been optimized for smaller volume box build production enabling unrelated products to share the efficiencies and economies of scale of a standardized work cell arrangement, even though project volumes don't justify a dedicated work cell. Workstations are designed for easy changeover and a dedicated team supports the area, ensuring correct materials are stocked point of use as needed and everything is in place to support the products being built that day. Conversely, SigmaTron's facilities in China and Vietnam have been optimized for high volume production. Its facilities in Mexico support both medium and high volume production. U.S. facilities support a range of project volumes, as well.

End Market or Customer Final Assembly Location

The longer it takes for a product to transit from a factory to its final assembly or end market location; the more inventory is tied up in that transit pipeline and the more vulnerable the pipeline is to supply chain disruption. The shortage of transportation capacity and increased freight costs and lead-times in the current market are currently demonstrating the worst case scenario for extended supply chains. If the end market is global, factors such as preferred supply base, labor market cost and proximity of the manufacturing location to shipping hubs may be the determining factor in preferred manufacturing location. If the end market is limited to a specific region, manufacturing within that region reduces inventory requirements, transportation costs and overall time from the factory to distribution.

Additionally, in countries with local content preferences, a choice to manufacture in the end market may improve sales or eliminate tariffs. That said, it is also important understand that some countries have separate permitting processes for product manufactured for in-country vs exported. In evaluating EMS providers in countries with these policies, it is important to determine whether they have completed the processes necessary to build product for sale in-country or are only permitted to manufacture product for export.

SigmaTron's facilities in China and Mexico regularly support customers selling into those countries as well as customers whose products ship to other regions. In some cases, the facilities are building subassemblies to supply customer final assembly facilities within the same country.

Regionalization strategies can also be adjusted to supply multiple end markets. For example, corporate headquarters in fast food and fast casual restaurants dictate menu items and the equipment needed to support those items by region. Franchisees have choices in equipment configuration and a timeframe in which they need to buy it, but typically they are ordering small quantities. SigmaTron has helped one industrial food manufacturer address this challenge by manufacturing their products in Elk Grove Village, IL; Suzhou, PRC; and Acuna, Mexico to provide manufacturing local to each end market.

Common components are sourced centrally via SigmaTron's purchasing organization and shipped to each facility. In the event demand is increasing in a specific region, these shipments can be redirected to the area of high demand. Regionally-specific components related to power and language-specific control overlays are sourced regionally.

SigmaTron's test engineering team has developed a standard test set capable of testing all product configurations and shipped test sets to all facilities.

The result is that the customer has the standardization benefits and purchasing power of working with global manufacturer, yet a localized, configure-to-order (CTO) solution to support end markets where their customers are ordering small quantities of CTO product and want short lead-times. The localized solution eliminates the logistics pipeline that would be necessary if all products were built in a single location. Local sourcing of regionally-specific parts reduces logistics lead-time.

The best outsourcing strategies align contract manufacturing resources with internal resources in a way that minimizes duplication of effort, process time and cost. Working with an EMS provider with multiple facility options improves the ability to optimally align both companies' resources.

SigmaTron is able provide a tailored solution for its customers that can be as limited as PCBA manufacturing and as complex as system integration, fulfillment to end market and repair depot support. The Company also has engineering resources able to support product development activities.

SigmaTron's support resources can be flexed among facilities, so choosing a facility in a lower cost region with minimal overhead does not translate to a loss of expertise. This leveraging of expertise helps keep staff overhead at reasonable levels while ensuring that customers have access to the right level of expertise, regardless of the facility they choose. Real-time systems and supply chain management expertise rounds out SigmaTron's ability to support a regionally diverse range of customer outsourcing preferences.

The best regional outsourcing strategy may change over time, particularly when the cost assumptions that drove the original decision have changed dramatically. Choosing an EMS provider capable of supporting evolving requirements provides flexibility without sacrificing process continuity. It can also

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provide detailed cost comparison visibility when shifting manufacturing to a different region is under consideration.

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