

**T**his article outlines both a process and key decision factors for locating electronic component manufacturing plants. The article has two main objectives. The first is to enhance the prospects of finding the optimal location on your next site search. The second is to maximize efficiency as you go about siting your firm's next assembly or manufacturing facility. The commentary that follows is based on the author's 26 years experience in the corporate location field.

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# Global Location Strategy for

## Electronics Component Manufacturing/Assembly

### The Process

#### Overview

The diagram in Figure 1 illustrates a four phase decision-making procedure that applies to nearly all facility location projects. Specific elements of the process (eg, weight on various location factors) change depending upon a particular company's situation. But the systematic approach outlined in Figure 1 should be followed to reach a logical, defensible decision on industrial site searches. The four phases are:

1. Pre-analysis (creating the study's building blocks such as delimiting the new facility's operating requirements)
  - Selecting candidate countries
  - Identifying areas within each country
  - Creating the final shortlist (perhaps 3 to 5 areas)
2. Location screening
  - Assessing, in-depth, the viability of each finalist location
  - Determining the best long range match between:
    - An area's locational assets
    - The company's most critical needs
3. Location evaluation/selection
  - Usually negotiating for real estate and incentives in 2 or more locations
  - Integrating real estate/incentives into the big picture (ie, total operating environment)
  - Selecting the best property in an attractive location (in one of the finalist locations that emerged as the top choice in the third phase)
4. Securing a property (site and/or building) in the chosen location

It should be stressed that the entire process is likely to require 6 to 8 months. Then another 8 to 12 months could be needed for construction. These timelines assume a light

industrial operation (eg, electronic components). The timeline would be extended by at least 25% for a more complex operation, such as semiconductors.

To guide you through a future plant location challenge, the following observations are offered for each phase of the process. We begin with laying the groundwork for the study.

#### Phase One: The Building Blocks

This initial phase requires pulling together a project team and reaching agreement on the following:

1. Rationale for the new facility, eg,
  - Cost reduction/containment, especially labor
  - Market penetration (a specific country, trading block, or continent)
  - Risk aversion/disruption minimization (spreading production capabilities to protect against forces such as political/social upheaval, strikes, severe weather, drastic change in exchange rates)
  - Demand by a customer to be physically located nearby (possibly for minimizing transport time costs or jointly working on product

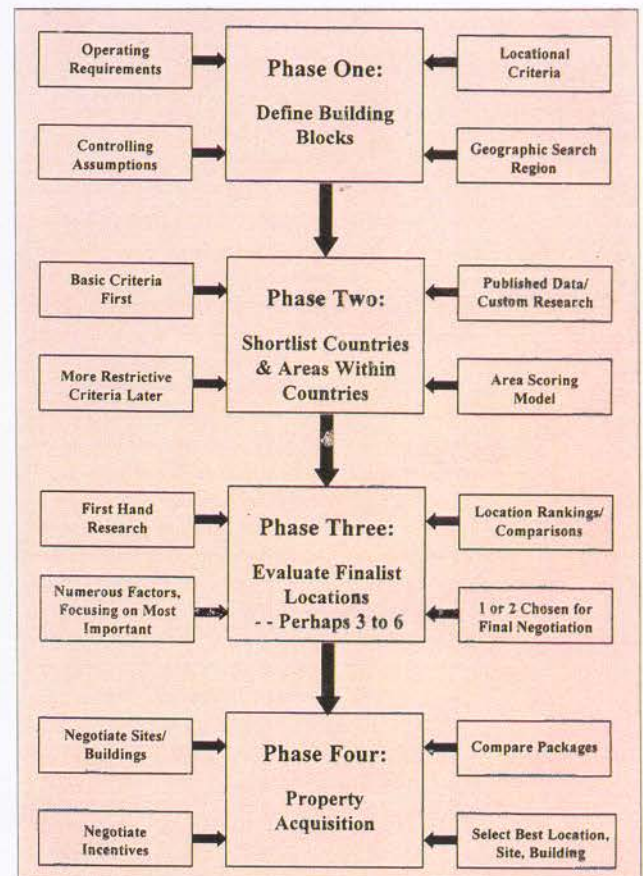


Figure 1. Four-phase location/site selection process.



- development/new application)
- Specific products to be manufactured or assembled in the new facility
  - Primary operating requirements
    - Pro-forma cost-of-goods-sold statement for the new operation (helps to place locational cost differences into balanced perspective)
    - Maximum acceptable hourly wages, including benefits
    - Standard benefits the company will offer
    - Unionization concerns
    - Training requirements
    - Staffing model
      - Direct labor
      - Indirect labor
      - Sales/general/administrative
      - Local hires vs transferees
      - Employment by shift
      - Seasonal staffing needs
    - Capital investment
      - New facility
      - Machinery and equipment
      - Software
    - Project financing (eg, cash or

- third party lending)
- Company concerns/policy on:
    - Taxation, especially practices regarding foreign companies
    - Profit repatriation
    - Import duties
    - Locating in an export processing zone
    - Restrictions on property ownership
      - Restrictions on business ownership
    - Necessity of entering into a joint venture alliance (in part due to business ownership limits or the fact that a JV is the only practical choice to "make it happen" in a certain country)
    - Exchange rates
      - Actual
      - Trends
      - Stability
    - Profit repatriation
  - Intellectual property
    - Patents
    - Proprietary processes
  - Customer locations
  - Vendor locations

- Transportation
  - Small package
  - Air cargo
  - Truck
  - Air access (for company personnel, visitors)
- Inventory levels
- Occupancy
  - Building size and dimensions
  - Site size
  - Preference for own vs lease
- Support services (that must be within a reasonable drive)
- Utilities
  - Electric power (especially the need for reliability)
  - Telecommunication (especially the need for reliability)
  - Natural gas
  - Water
  - Sewer
- Environmental
  - Emissions
  - Hazardous waste
  - Company policy regarding environmental conformance (eg, follow regulations of country where firm is headquartered or adhere to local mandates)
    - Initially
    - Future

- Volume
- Headcount
- Space
- Deal-breakers that would eliminate any country, eg:
  - Unstable government
  - Frequent public sector strikes, especially transportation
  - Heavy unionization
  - Restrictive labor law especially for termination, layoffs, and closing

#### 9. Locational criteria (See panel)

#### 10. Project timeline

#### 11. Rules of disclosure/confidentiality

12. A multi-discipline project team will be necessary. An operations executive should lead the team. Internal staff and perhaps outside advisors will comprise the team. The following disciplines should be represented:

- Operations
- Human resources
- Real estate
- Tax/finance
- Legal
- Freight/distribution
- Architectural/engineering
- Environmental
- Disaster recovery
- Possibly:
  - Product design
  - Marketing/sales
  - Purchasing

Once these building blocks are established, the location identification process can be launched. The first task is to uncover the most promising candidates as noted below.

#### Phase Two: Location Screening

The geographic search region will have been identified in the first phase. In this phase the initial challenge is to screen countries so that a handful of top contenders emerges. In the beginning, conduct basic research to eliminate countries on factors of greatest importance. These might include the following:

- Minimum wage
- Literacy rate
- Exchange rate
- Political stability
- Signatories to international conventions (eg, trade, human rights, intellectual property)

Unfortunately, there are not many sources of uniform information to compare one country against another. But there are a number of organiza-

- Deadline for becoming operational
  - When
    - Testing phase
    - Full production
  - Why the deadline
  - Any flexibility in the deadline

5. At present, does the locational configuration of major competitors give them a notable advantage (eg, costs, labor availability/stability, customer service)

6. Importance and key dimensions of an exit strategy (eg, short-term lease, general purpose building, avoiding commitments to local/national governments)

7. Any existing location(s) that should be carried through the analysis for benchmarking purposes

- Controlling assumptions, eg,
  - Geographic regions or countries that should be automatically eliminated (eg, high costs, historical instability, inaccessibility, etc)
  - Geographic regions or countries that logically should comprise the study universe
  - Likelihood of hiring foreign nationals to run the new operation
  - Maximum size for study purposes

#### 9. Locational criteria panel

Category (note: there will be specific factors under each category)	Relative Importance (1 least important, 10 most important)
Business operating costs	
Labor availability	
Experience	
Entry level	
Labor quality (eg, literacy)	
Presence of an electronics industry	
Electronics specific training resources	
Presence of university offering electrical engineering	
Unionization	
Workplace/employment regulations	
Transport strike propensity	
Exchange rates	
Political stability	
Profit repatriation	
Tax practices	
Intellectual property protection	
Import duties	
Presence of a specific trading bloc	
Catastrophic risk	
Transportation service	
Locally available support services	
Quality of life	
Language/social/religious customs	
Utilities	
Capacity	
Reliability	
Available buildings	
Construction/permit approval time	
Environmental	



tions that produce information necessary for this first round of screening. Such bodies include:

- United Nations
- The World Bank
- Country/investment guides produced by Federal Departments of Commerce or Foreign Affairs
- International business publications (eg. The Economist, Financial Times, Christian Science Monitor)
- Investment guides produced by the country in question and obtained from the nearest Embassy or Consulate
- "Doing Business In..." guides prepared by international accounting firms
- Private firms specializing in areas such as business customs or political risk analysis
- Nonprofit organizations who keep data on numerous countries (eg. ECA in London, which is a group of multi-national companies that track labor and living conditions issues, predominantly for expatriates)

To discover these and additional data sources, a search of the Internet is highly advisable. It would also be a good idea to ask other electronics companies who operate facilities in multiple countries.

At the outset, set up a matrix of major locational criteria and candidate countries. Note which countries failed the test on basic criteria such as those described above.

Further research needs to be conducted on the countries surviving the first cut. Here, additional and more restrictive criteria are applied. These might include average weighted labor costs (minimum or minimum +25% coupled with mandated and customary benefits), historical records of transport strikes, political risk rating, application of intellectual property rights, record on human rights abuses, number of foreign companies (your country of origin), roster of major electronics companies (possibly 100 or more employees) in the country, air service levels, small package delivery times to key destinations, restrictions on business ownership, etc.

The same data sources mentioned earlier would be tapped, but they would be studied in greater depth. Additionally, it would be advisable to

reach out to and confer with experts in each country. These could include telephone interviews with economic development agencies, trade desks of foreign embassies, foreign consulate staff, university professors, accounting firms, export/import brokers, and business contacts at companies that operate facilities in the targeted countries.

Continue with the matrix comparisons. Utilizing weighted scores, identify the most potentially suitable countries (probably 4 to 6). The matrix might look something like Table 1.

The second task is to identify sub-regions within each country that can satisfy the company's prime requirements. At this juncture it is worthwhile to do the following:

1. Send a succinct questionnaire to the country's lead economic development agency asking them to recommend areas satisfying your particular requirements. Give them a summary profile of your project. You might then ask them for both qualified areas and specific data (on each area) such as:

- Infrastructure/access
- Unionization
- Average starting wage rates
  - Entry level labor
  - Skilled/production
  - Electronics technicians
  - Supervisory
- Business support services
- Fully serviced industrial parks
- Presence of other foreign companies in light manufacturing and assembly
- Economic development incentives
- Expert processing zone or free trade zone
- Educational resources, including vocation/technical training
- Presence of unions, especially among local manufacturers
- Record of strikes
  - Manufacturing
  - Transportation
- Possible incentives applicable to your project

2. Identify a business executive from your country that recently lived (or currently lives) in the targeted country to seek opinions on issues such as:

- Actual business conditions
- Treatment of foreign countries
- Workforce dynamics

**Table 1.**

Factor	Relative Importance	Country Rating eg. A,B,C,D,E,F...
Payroll costs		
Political climate		
Labor legislation		
Unionization		
Trade barriers		
Labor quality		
Access		
Disruption threat		
Intellectual property		
Comfort level (is your company likely to fit in?)		
<b>Total rating</b>		

- Political climate
- Areas of the country best suited for your business
- Working through the bureaucracy
- Key dos and don'ts in the country

You may also want to hold similar conversations with any customers or suppliers that have a presence in the particular country.

A matrix comparison of all areas is again suggested. This will usually lead to a tiering of candidate locations (eg. best bets, solid contenders, and problematic areas). Prepare a brief, presentation style report highlighting the two stage screening results. Share the report with the project team. Then, relying mostly on the matrices to explain selection rationale, facilitate dialogue on your recommendations. The objective is to reach concurrence on several finalist locations which should be earmarked for comprehensive evaluation.

### Phase Three: Location Evaluation

This phase necessitates an extensive analysis of business operating conditions in the finalist locations (usually 3 to 5). The principal research input will be field investigation (or visitations) in each area. These can be arranged by each country's lead economic development agency.

Before scheduling fieldwork, review background material on each area supplied by the economic development entity. Then decide who you would like to interview when you visit the area. Also, contemplate what you would like to see on a physical tour of the location in question. Some pointers for conducting field investigations, which will require at least 3 days per area, follow.

1. Interview several electronics and/or other light manufacturers to learn of their recent operating experiences and outlook for future conditions.

2. After you interview company executives, tour their facilities

3. Interview other pertinent organizations, such as:

- National electronics industry association
- Local business associations
- In-country offices of international accounting houses, legal firms, and banks
- Industrial real estate brokers (or chartered surveyors)
- Expatriate association for your country (if one exists)
- Utility representatives
- Ministries of Labor, Transportation, Taxation, and others as appropriate
- The local economic development office
- Engineering program director from the nearest university
- Representatives from vocational schools with electronics programs
- Suppliers to the electronics industry
- Transportation representatives

Next, have the economic development agency take you on a tour of the area. It will be important to look at available sites and buildings so that you can start focusing on the properties best suited for your operation. If this is a developing country, the only viable option could be in special economic zones. Often these are the only places with reliable infrastructures.

In your conversations with local manufacturers be sure to ask them the fully loaded wage rate necessary to attract qualified labor. Also inquire



**Table 2. Representative Countries**

Latin/South America	Asia	Eastern Europe
Barbados	Bangladesh	Bulgaria
Bolivia	China	Estonia
Brazil	India	Romania
Costa Rica	Pakistan	Turkey
Dominican Republic	Philippines	
Grenada	Thailand	<b>Central Europe</b>
Haiti	Vietnam	Czech Republic
Honduras		Greece
Mexico	<b>Western Europe</b>	Hungary
Panama	Ireland	Poland
Paraguay	Northern Ireland	Slovakia
Trinidad and Tobago	Portugal	Slovenia
	Scotland	
<b>Africa</b>	Spain	
Botswana	Wales	
Egypt		
South Africa		
Swaziland		
Morocco		

about human resource practices, recruiting methods, and cultural uniqueness of workers (especially as it affects your ability to staff operations according to your production schedules). In addition, discuss the biggest risks to running a business in the area.

At this time you should also ask the economic development agency for a formal incentives package. Beware of any restrictions they try to impose that limit your future flexibility (eg, downsizing or closing operations).

Before leaving, establish a communications process with the economic development agency. Due to time differences, this is usually best accomplished by electronic mail and faxes.

Now comes the task of distilling and analyzing field generated research. We find that preparing a structured report, comparing each area, is the best way to go. Elements of the report might include:

- Executive summary
  - Area comparisons on the most critical factors
  - Area rankings, utilizing a factor weighting/location scoring model
    - + Business costs
    - + Operating conditions
    - + Political climate
    - + Overall risk
    - + Bottom line weighted score
- Area summary write-ups
- Matrix summary of employer interviews
- Statistical profile of each area (eg, population, labor force, wages,

electronics employers, recently announced new facilities, tax rates, transportation services, etc)

- Summary of the incentives package

Present results to the project team. Then agree on two or perhaps three areas for conducting final real estate and incentives negotiations.

#### **Phase Four: Site Selection**

As a first step, it is a good idea to expand the project team to include local resources. These could involve legal counsel, real estate broker, property developer, architect, accountant and if a joint venture is required, a local business partner.

Then, working through the local economic development agency, secure initial proposals regarding real estate properties. Target those that seemed most appropriate from the tour you conducted in Phase Three. Review initial submissions and shortlist properties to a manageable number (perhaps 2 or 3 per area).

Your local team of experts should then begin examining each offer. Then your lead negotiator, operating under your direction, should begin obtaining final offers.

Relative to incentives, seek to expand upon the initial package. Then get written commitments from the economic development agency. Continue dialogue until a final offer is secured. Be sure that the real estate broker, accountant, and attorney review the package. Subsequently,

have your internal staff conduct a similar examination.

As real estate and incentives negotiations draw to a close, other issues will require a due diligence review. These include taxation, legal, workplace, transportation service, etc.

As with locations, it is a good idea to compare sites/buildings in a matrix format, using factor weightings and property scores. Among other considerations, be sure that your final real estate deal allows you the flexibility called for in the exit strategy. The same applies to your incentives package.

Prepare a brief report summarizing outcome of real estate and incentives negotiations. Recommend a specific site/building. Indicate if there are any red flags on other issues (eg, permits, labor law, and utility service). Also, be certain that you comply with any business ethics laws your country might have concerning how you operate in a foreign land.

When everything is in order, secure the approval of your executive management. Then finalize the documents with the local economic development agency and landlord.

The process is now complete. You now enter into the construction or implementation phase. For these activities it is prudent to have a full-time project manager who will be on site in the new location.

### **Illustrative Locations**

Simply to demonstrate the range of options that a contract electronics manufacturer might consider, we have prepared a list of representative countries that could hold promise for the industry. The list is by no means comprehensive nor an endorsement for any country. Rather, it is intended to show the diverse global locational possibilities for electronics manufacturers. Countries appearing below assume the overriding locational variable is labor cost/supply.

If a contract electronics manufacturer needs a physical presence in North America, Mexico would offer a low cost option. It is part of the NAFTA trade pact. The Caribbean Basin also offers some possibilities as there are special tariff arrangements between the US and those countries.

The US and Canada are higher cost

but have extensive skilled labor and technology resources. In the US, there are major cost differences among metro areas and counties. For example, starting wage rates for electronics assemblers can range between \$6.50 to \$9.00 an hour. In Puerto Rico (where no tariffs would apply for shipping to/from the US) lower wage levels prevail.

Canada is also interesting. Costs are noticeably lower vis-à-vis the US, due to both surplus labor conditions and exchange rates. As in the US, wage levels can vary dramatically between Canadian provinces.

### **Parting Thoughts**

The above defined process is indeed involved. While it is time-consuming, following the process becomes essential for arriving at the right location decision involving a major strategic investment for your company.

You want to earn a maximum return on that investment. If a systematic decision-making process is not adhered to you run a real risk of location damaging rather than fully supporting your business objectives. And while the process does require focus and considerable resources, it is far less demanding than the alternative hit-or-miss approach. That usually consumes far more time and often results in moving to an unsuitable, or at least flawed, location.

Contract manufacturers who approach facilities location in a measured way will definitely gain a competitive advantage. Hopefully, the suggestions set forth in this article will produce this strategic advantage from your next site search.

### **BIOGRAPHY**

**DENNIS J. DONOVAN** is a 26-year veteran of the corporate location industry. His firm, The Wadley-Donovan Group (WDG), specializes exclusively in advising companies on where to locate office and industrial operations. Since 1975, WDG's clientele have included numerous electronics producers. The firm's global consulting practice is run from its Morristown, NJ headquarters.