

Identifying Important Regional Industries: A Quantitative Approach

Introduction

The Need for a Quantitative Approach

Every region must periodically assess its most important industries in order to ensure that policy priorities are aligned with the realities and needs of the region's economy. However, determining which regional industries are important can be challenging, since the definition of "important" is not always agreed upon by regional stakeholders. To avoid resorting to multiple surveys or word-of-mouth evidence, hard data is a necessary component of this planning process. Quantitative methods are also much faster and cheaper than qualitative methods, and also less prone to be affected by political pressures.

This is not to say that there is no place for qualitative methods. Rather, quantitative methods should identify the most promising opportunities so that qualitative approaches can be more focused and less costly.

Moreover, the numbers don't usually speak for themselves. In order to make them useful, they must be transformed into specific metrics whose meanings and limitations are clearly understood. This document is intended to provide a starting point for regional planners to understand and apply such metrics.

Industry vs. Business Perspective

Identifying important regional *industries* is not the same thing as identifying important regional *businesses*, but it is just as important, if not more so. Why? Why shouldn't planners focus solely on the region's top employers?

Retaining and supporting specific businesses is necessary, but it embodies a limited perspective. Recent research indicates that regions ought to focus equally on creating clusters of *industries* (types of businesses) that complement and strengthen one another. In this way, the region creates a better competitive advantage and a stronger supportive environment for businesses in those clusters. It also means that inter-industry spending keeps more money in the region, which fosters greater job and income formation than a similar number of businesses that are not as closely related.

So, by giving proper attention to industries, regional decision-makers can create sustainable development plans that do not rely as much on a handful of large employers.

Establishing the Purpose of the Research

Before trying to identify important industries, planners must decide what their goal is. Are they trying to support and retain existing industries? Invest in emerging industries? Recruit additional industries? Increase the regional workforce supply for existing industries?

Once the goal is established, planners can choose appropriate metrics (see "**Choose appropriate metrics**" below).

Key Concept: Basic vs. Non-Basic Industries

Some of the discussion in this document involves "basic" and "non-basic" industries. Basic industries are those which depend on income from outside the region, thus bringing money into the region. Non-basic industries are those which generally sell to residents or businesses already in the region. Economic development theory emphasizes the importance of basic industries as the "pillars" of a region's economy,

having much more importance than non-basic industries, which are generally assumed to naturally follow basic industries. Note that many industries are partially basic and partially non-basic.

A Note on Industry Detail

The term “industry” can refer to a category of businesses at a low or high level of detail. At low detail, standard industries are defined by 2-digit NAICS (North American Industrial Classification System) codes; they include broad categories like Agriculture, Forestry, Fishing, & Hunting; Manufacturing; Professional & Business Services; Trade, Transportation, & Utilities; and so on. At higher levels of detail, they are defined by 3- to 6-digit NAICS codes. One example of a 6-digit NAICS industry is “336112: Light Truck and Utility Vehicle Manufacturing.”

In this document, we use the term *industry* to refer to industries at any level of detail. Normally, it is useful to rank regional industries at both low (2-digit) and high (3- to 5-digit) levels of detail. This is because a broad sector like Manufacturing may not rank highly overall, but a specific manufacturing industry may show strong performance.

Outline of the Basic Approach

The basic approach can be outlined in 4 basic steps:

1. Choose appropriate metrics according to your research goal.
2. Gather data and calculate the measures by sector and specific industry.
3. Translate the metrics into an identification of the region’s key established and emerging industries, along with the trends in each.
4. Create action steps to address weaknesses and capitalize on strengths and opportunities facing the region’s key established and emerging industries.

Best Practices for Quantitatively Identifying Important Industries

1. Choose appropriate metrics

Defining industry importance quantitatively is not a simple matter. We can start by asking, “What makes an industry important?” We can then choose different measures of importance depending on our goal. The following table summarizes important metrics for various goals:

Goal	Important Metrics
Identify industries with strong workforce demand.	Large recent/projected total job growth. Supplement with industry staffing pattern.
Identify key existing industries to support & retain.	LQ >> 1.0, multipliers >> 1.0, non-trivial number of total jobs, acceptable earnings per worker, positive growth. (“>>” means “significantly greater than.”)
Identify emerging industries that could take on increased importance.	Strong % growth, rising LQ, positive competitiveness effect.
Identify key existing industries that are faltering.	LQ >> 1.0, declining LQ, multipliers >>

	1.0, non-trivial total jobs, negative growth, low or negative competitiveness effect.
Identify potential industries to recruit.	Produces outputs that rank highly as missing regional industry inputs; national multiplier >> 1.0. Confirmed by survey-based investigation.

1. **Total Jobs.** Clearly, industries that provide large numbers of jobs are important, but this measure is limited in several ways: it has no time component (see Job Growth), it does not distinguish between basic and non-basic industries (see Location Quotient and Multipliers), offers no comparison with a larger area or the nation, and gives no idea of the quality of jobs in the industry (in terms of earnings). Total jobs by industry is a merely useful starting point, required for calculation of more useful metrics.
2. **Earnings per Worker (EPW).** EPW is total earnings (wages/salaries, benefits, owners' profits, etc.) in an industry, divided by the number of workers (both full- and part-time). A low EPW indicates either that the industry's jobs don't pay very well, or that there is a high number of part-time jobs in the industry. Clearly, for both workforce and economic development purposes, a region should concentrate investments on jobs that will pay family-sustaining wages and increase regional per capita income.
3. **Total and Percentage Job Growth.** Industries with significant recent and projected job growth are important. Workforce development experts in particular need to know where the region's "hot jobs" are in order to fill labor demand, while economic development experts need to profile the region's fastest-growing industries in order to support future growth and recruit complementary industries.
4. **Shift Share.** Shift share analysis helps planners determine whether regional industry growth is unique to the region, or just a symptom of national trends. It uses a comparison of regional industry growth to national industry and overall growth. By combining total national growth (all industries) with industry-specific national growth, we get an "expected" growth figure for the regional industry. From an economic development perspective, industries with unique regional growth are potentially more important than those with average growth. From a workforce perspective, total growth is probably more important than shift share. For details on calculating shift share, see "2. Gather the data and calculate the metrics" below.
5. **Location Quotient.** Location quotient is a measure of regional industry concentration or specialization. It compares the relative size of the industry at the regional and national levels. For example, if an industry accounts for 1% of regional jobs but only 0.5% of national jobs, then the industry has a location quotient in the region of $1 \div 0.5 = 2.0$. This means it is twice as important in the regional economy as it is in the national economy. So, an LQ near 1.0 means that the industry has an average relative importance in the region. From an economic development perspective, high-LQ industries should be top priorities since they almost always represent "basic" industries (see below). From a workforce development perspective, it is important that the region focus on providing highly skilled workers for its basic industries, because that is where human capital investment is likely to have the largest overall return to the economy.
6. **Multipliers and Contribution to Economic Base.** The economic base of a region consists of its "basic" industries—those dependent on income from outside the region. There are many ways of determining economic base, including (1) simple assumption (assuming certain industries are always basic to some degree), (2) location quotients (LQs > 1.0 indicate basic industries), and (3) using input-output models to see which industries' export sales have the largest multiplier effect.

“Multipliers” are numbers that indicate how increased jobs or sales in one industry create more jobs or sales throughout the regional economy.

7. **Missing Regional Input Industries.** Sometimes an industry is *potentially* important to a regional economy, but does not have a strong enough presence in the region. For example, many regional industries might require commercial printing services, but existing commercial printing services in the region cannot meet the required demand, so the industries purchase these services elsewhere. If it is feasible and cost-effective to increase the in-region availability of commercial printing services, then more money would remain in the region rather than “leaking” out, contributing to economic growth.

2. Gather the data and calculate the metrics

1. **Finding basic jobs and earnings data.** Total jobs, growth, and earnings can be gleaned from several sources, including the Regional Economic Information System (REIS; Bureau of Economic Analysis), The Quarterly Census of Employment and Wages (QCEW; Bureau of Labor Statistics), and Local Employment Dynamics (LED; Census Bureau).¹ Growth and earnings per worker can be easily calculated from these numbers. Projections are available for national industries, while most states produce statewide 10-year industry projections. Some states also produce sub-state regional projections. It is also possible to purchase integrated databases and analysis tools from private companies to avoid the time spent collecting data from dozens of sources.
2. **Calculating shift share metrics.** Shift share analysis of a regional industry can yield a “competitiveness effect” (C), sometimes called the “shift component” or “shift change.”
 - a. The formula is $C = G - (N + I)$, where:
 - i. G is the regional industry’s total job growth over a given timeframe.
 - ii. N is the “national growth component,” sometimes called the “share change” (total regional industry jobs at the beginning of the timeframe multiplied by the growth rate of the entire national economy over the whole timeframe).
 - iii. I is the “industry mix component,” sometimes called the “mix change” (the total regional industry jobs at the beginning of the timeframe multiplied by the difference between the national growth rate of the industry and the overall national growth rate).
 - iv. (N + I) could be called the “expected” regional job change in the industry. We could also write the equation as $G = C + N + I$.

b. So the expanded formula is
$$C = (R' - R) - \left\{ R \left[\frac{N'}{N} - 1 \right] + R \left[\left(\frac{I'}{I} - 1 \right) - \left(\frac{N'}{N} - 1 \right) \right] \right\}$$

which can be simplified to $C = R' - R \left(\frac{I'}{I} \right)$ if you do not care about the values of the

specific components. R and R' are regional industry jobs at the beginning and end of the timeframe respectively, N and N' are total national jobs (all industries) at the beginning and end of the timeframe, and I and I' are the national industry-only jobs at the beginning and end of the timeframe.

¹ For the most complete data on detailed industries, you may want to add in classes of workers not included in QCEW, like the self-employed (Census, Nonemployer Statistics), private railroad workers (US Railroad Retirement Board), and others. However, QCEW does cover about 98% of U.S. jobs.

3. **Calculating location quotient.** The location quotient of an industry at a given time can be

calculated simply as $L = \left[\frac{\left(\frac{R_i}{R} \right)}{\left(\frac{N_i}{N} \right)} \right]$, where R_i and N_i are the industry-only jobs in the region and

nation respectively, and R and N are the total jobs in the regional and national economies respectively. Once annual LQs are known, % change in LQ over a given timeframe is easy.

4. **Calculating multipliers.** Finding multipliers for regional industries requires specialized models and processes as well as large amounts of data. There is thus no reason to reinvent the wheel and compute them from scratch. Serviceable national-scale and regional multipliers are available in the RIMS II model, available from the U.S. Bureau of Economic Analysis for a nominal fee. A few private companies use much more advanced methods and additional data to estimate regional multipliers; the two most widely-used and affordable models are created by the Minnesota IMPLAN Group and Economic Modeling Specialists Inc. (EMSI). EMSI's Economic Impact tool also includes built-in, customizable economic base analysis reports.
5. **Estimating economic base.** As we covered earlier, there are several ways to identify a region's economic base, including simple assumption, location quotient, and use of an input-output model. The last method is the most accurate and rigorous. An input-output model will include data about each industry's exports—e.g., how much of its sales are to regional or non-regional entities. Using the relationship between jobs and sales in the industry, we can estimate how many of its jobs depend on exports. This number is combined with the industry's jobs multiplier to estimate the industry's share in the region's economic base in terms of jobs. The industry's non-export-dependent jobs would then be allocated to other industries.
6. **Finding missing input industries.** This is another process that requires a specialized regional model. Identifying these industries starts with data about how various industries buy goods and services from each other. This includes industry "inputs" or goods/services they require to operate, and industry "outputs" or goods/services they produce and sell. All regional industries are examined, and their total input needs are compared to the total matching outputs produced in the region. We can thus calculate the biggest "gaps" in regional industry input needs.

3. Interpret the metrics

1. Interpreting total jobs:
- First, some types of jobs depend on other, more basic jobs. In many regional economies, the retail and food services industries provide large numbers of jobs, but these industries mostly circulate money already in the region (and often cause money to "leak" out of the region), rather than bringing money into the region (see **Location Quotient** and **Basic Industries** below). This is the difference between "basic" and "non-basic" industries. Without basic industries that bring money into the region from outside, it is impossible for a regional economy to exist. These regional export industries may not rank highly in terms of total jobs, but they are actually more important.
 - Second, high-employment industries may be in decline. If that is the case, the economy needs to restructure itself to replace these jobs. Thus job growth figures must supplement total job figures (see below).
 - Third, emerging industries may not yet provide large numbers of jobs, but because they are growing fast, they are important focus areas so the region can plan for future growth. This is another reason to supplement total job figures with growth figures.
 - Total jobs should also ideally be balanced by industry productivity figures, but these are generally unavailable at the regional level.

2. Interpreting growth:
 - a. If other metrics indicate that an industry is important but it shows either stagnation or decline, then the region needs to determine what is causing it and how to transform it into future growth.
 - b. An important and mature industry may show steady but not high growth. This does not necessarily detract from its importance. It may still be an important basic industry, and its workforce demand may still be strong due to replacement jobs. Comparing the industry's regional growth rate to the national rate can help determine whether the region needs to take action (see **Shift Share** below).
 - c. Total job growth indicates hot spots of workforce demand, but percent growth may catch some emerging industries that do not yet have high-ranking total growth. To convert industry growth to occupation growth, use a regional "staffing pattern." This will reveal the types of jobs required in fast-growing industries. Then use regional occupation data to get a clearer picture of total occupational growth.
 - d. As with total jobs, total growth does not take into account whether an industry is basic or non-basic. For example, the health care industry may be growing quickly, but its growth may be simply a function of the region's population growth, which is due to the jobs and ripple effects created by other industries.
3. Interpreting shift share:
 - a. If a regional industry growth rate significantly outstrips the expected rate (i.e., there is a significant competitiveness effect), then it is safe to assume that the region holds some competitive advantage in that industry. The underlying causes of this advantage must be identified so that it can be supported and enhanced.
 - b. If the regional rate approximately equals the expected rate, then the industry is merely following national trends—its growth is average. If the region wishes to become more competitive in that industry, it must find ways to exceed the average.
 - c. If the regional rate lags behind the expected rate, then the regional industry faces some disadvantage that keeps it below the average growth, and it is losing national market share. If other metrics identify the industry as important, then planners must find ways to ensure that the industry at least keeps up with national trends.
4. Interpreting location quotient:
 - a. High location quotient (LQ) industries (LQ significantly greater than 1.0) are usually, but not always, *basic* industries (also known as *traded* or *export-oriented* industries). They are also industries in which the region has a competitive advantage, as indicated by the regional economy's specialization in those industries. This interpretation of LQ should be supported by the multiplier analysis (below).
 - b. Low LQ industries (LQ significantly lower than 1.0) have a below-average share of the regional economy. They are likely not important basic industries.
 - c. Industries with a growing LQ are growing at a relatively faster rate regionally than nationally. The industry is becoming even more important to the region, gaining national market share.
 - d. Industries with a declining LQ are growing at a slower rate regionally than nationally. They are growing less and less important to the regional economy.
 - e. The importance of LQ is reduced if the industry provides very few total jobs or low earnings per worker.
5. Interpreting multipliers and economic base:

- a. Industries are vital to the existence of the regional economy if they have (1) a nontrivial number of jobs, (2) a relatively high multiplier, and (3) a large percentage of their sales to entities outside the region. You may even be able to identify a handful of specific large employers that account for most of the region's economic base.
 - b. Monitor recent and projected growth trends in these industries, since job gains or losses in them will have significant effects elsewhere in the economy.
 - c. If these industries provide low earnings per worker (or have a smaller earnings multiplier than jobs multiplier), investigate the reasons for this. The region may want to diversify the economy by adding basic industries that provide better earnings.
6. Interpreting input gaps:
- a. The significance of input gaps depends on assumptions about how much of their inputs that industries will buy in-region versus outside the region. Cost of the inputs is the biggest factor.
 - b. Accordingly, it may not be cost-effective or feasible for a certain gap-filling industry to locate in the region. For example, key raw materials may not be located close by, or regional labor may be too expensive, or economies of scale may not make the venture profitable.
 - c. Some firms may have specialized input needs not captured by the model, which uses average data for the whole industry.
 - d. Because of these issues, it is advisable to use the data as a starting point for further survey-based investigation.

4. Create action steps based on the findings

These methods allow important industries to be divided into several groups, such as "industries needing a skilled workforce," "key retention industries," "emerging basic industries," "potential industries to recruit," and so on.

Planners should organize and present the data to regional stakeholders, including representatives from local industry, education, government, workforce development, and economic development. Trends present in the data should be confirmed and/or elaborated on.

A draft of action steps can then be created for each group of key industries. Initially, these steps should involve further investigation of the specific industries and contact with representatives from regional businesses in those industries. Once supplemental qualitative information is obtained, action steps can become more specific and customized for each industry's needs, always keeping in mind the larger regional perspective.

A Final Note: Data Challenges

The primary obstacle facing regional researchers is the absence or incompleteness of regional data, compared to the wide variety of detailed data available at the national and state levels. One specific problem for detailed industry data is the presence of *Suppressions*. Suppressions, often marked in databases with a (D), are numbers that the government cannot disclose in order to comply with confidentiality regulations that prohibit publishing statistics that could be linked to a specific individual or business. Often these policies will lead government data analysts to suppress additional data in order to avoid allowing easy calculation of the original suppressed number(s).

One solution is to decrease the geographic or industry detail. For example, see if data are available for a whole metro area rather than one county in the metro area. Or, use 3-digit NAICS industry codes instead of 4 or 5-digit NAICS codes. This often allows researchers to get more numbers, but those numbers are often not as useful as more detailed ones. Another solution is to use a data source designed for regional

use, such as the Census Bureau's Local Employment Dynamics (LED), which attempts to provide more detailed data while adding statistical "noise" to protect confidentiality. LED is an improvement on previous systems, but still contains suppressions.

Finally, it is possible to purchase specially-processed datasets that are based on the official public data but also use sophisticated estimation techniques with multiple data sources to fill in the suppressed data points.

References & Further Reading

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About EMSI

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