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## What Is Economic "Intensity"? A Quotient of Values (I.Q.)

Mason Gaffney

### **Labor-intensity**

A "labor-intensive" industry, firm, operation, or land-use is one where most of the output is imputable to labor. Examples: clothing manufacture; raising fresh-market tomatoes and other fruits and vegetables; recycling old auto parts. "Manufacturing" (which means "making with hands") is, on the whole, much more labor-intensive than mining. Refining is more labor-intensive than mining, but less than manufacturing.

Farming is highly variable, depending on the land and the crop. As a rough rule, labor-intensity rises as you move "downstream" from extractive industry to retail and personal service. Thus, range cattle (mostly for breeding) is land-using; so is cash-grain farming. Feeding the grain to two-year-olds is a separate industry, the Midwestern feeder industry, that is more labor-using; slaughter and packing are still more labor-using; retailing, cooking, and serving meat are more labor-using yet. The upstream-downstream rule is only rough because preparing and serving food may occur on land of high unit value, using cheap labor, as in a Manhattan restaurant. There, land rent still takes a high share of the value-added. As a general trend, though, intensity of land use rises as you move downstream.

### **Output as "value-added"**

When we talk about "downstream" operations like retailing it makes a great difference whether we define output to mean gross sales, or gross sales less raw materials purchased wholesale. The latter meaning is "value-added." I use "output" and "product" to mean "value-added." Thus, a retailer might pay out 8% of sales as rent, but 8% of sales might be 50% of value-added by retailing, depending on turnover and markup.

Once you get this idea it is simple; but you'd be amazed how many people never do get it.

### **Land-intensity**

It means land-using, which is the opposite of "labor-intensity," above. Watch the words carefully, or you'll get things backwards. "Land-intensity" does NOT mean land in intensive use; it means the opposite. En garde: be alert!

Self-service gasoline retailing nowadays is quite land-using. "Land-using" means that a high share of value-added is owing to the big high-priced site with apron at a key corner or interchange. Labor input is minimized; capital improvements cost less than the land, even when the improvements are new, which most of the time they are not.

"Full-service" lanes are of course more labor-using; and the old-time gas station was truly a "service station" (and was quite properly called one). It was much more labor-using than so-called full service today. Remember the scene from *Back to the Future*, with Michael J. Fox and Christopher Lloyd, when they pull into an old-time service station and attendants swarm all over the car? It was exaggerated for effect—what do you expect from Hollywood?—but that's the way it was then. (There was little payroll tax, and no minimum wage enforced, which could be the difference.) It's what kids did then for spare change, instead of sponging.

"Land-intensive" could easily confuse you, or anyone. "Intensive" by itself means a lot of people and stuff crowded on a little land, but "land-intensive" in economics means the reverse, a lot of land combined with a little labor and capital. Thus "land-intensive" means the opposite of "intensive land use." "Intensive use of land" means light on land, heavy on labor and capital; yet it could easily be read to mean just the opposite. That can be very confusing, which I will avoid. Words can be tricky. Many writers add confusion by carelessly saying "land-intensive" to mean intensive use of land, i.e., land-saving.<sup>1</sup> **To avoid ambiguity and confusion, I write "land-using" and "labor-saving" (or "sparing"),** rather than "land-intensive."

These terms are consistent with themselves, and unambiguous. "X-using" means heavy on X, whatever X is. "Y-sparing" or "Y-saving" means light use of Y, whatever Y is. "Intensive" by itself, unqualified, retains the colloquial geographical meaning: intensive use of land, i.e., land-sparing, and labor-using and capital-using. "Extensive" by itself means the opposite.

Another useful expression—another way of saying the same things—is "high-cost land." This does not mean that the land itself costs a lot. Rather, it means that producing a product there entails high costs of non-land inputs. Thus, producing copper from low-grade ore requires a lot of costs (other than the rent of land) to extract a given amount of copper from a ton of ore. High-grade ore means low cost of production, and vice versa.

### Quantification by value

Another big difference between economic terminology and common talk is that economists quantify things by value, so "a lot of land" means a lot of land value, which could be contained in a very small area (in the right place in Tokyo you must pay \$1 million for just 100 square feet).<sup>2</sup>

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<sup>1</sup>Words often get reversed this way. Thus, to "ravel" means to come unwoven, and many—even Webster's—say "unravel" to mean the same as ravel. "Inflammable" originally meant "not flammable," but got confused with "inflamm," so many use inflammable to mean flammable (to be clearly understood, say "nonflammable"; never say "inflammable"). "I could care less" means, idiomatically, "I could not care less"—a nasty trap for those learning English as a second language. "Did you not shoot JFK?" idiomatically means "Did you shoot JFK?" so an answer of yes, which literally means "I did not shoot JFK," would be taken as a confession and land you in big trouble. (Don't bandy words with the law, its minions care little for linguistics, semantics, or humor!)

<sup>2</sup>You also get used to measuring inputs per unit of time, so land is measured by annual value (called

As you get used to economics, one step at a time, you gradually learn to measure inputs by value, which indicates their capacity to render service. This comes especially hard with land, which we are so used to measuring by area. In economics, though, a three-story building is an intensive use of cheap land, and the use is capital-using; but the same building on dear land is land-using. Got it? If not, think hard until you do get it.

In traditional geographic terms an "extensive" use of land is one that consumes a lot of acreage—it is vast. Economically, though, it depends on the value. If the land is good and the holding is vast, then the use is economically "land-using," meaning the factor mix is rich on land. So what we have been taught to call "extensive" farming because it spreads out is economically "land-intensive" because it uses lots of good land, with little land and capital per acre. As I said earlier, ***to avoid confusion I write "land-using" instead of "land-intensive."***

If a vast spread of land is worthless then the mix is not land-using, but land-saving,<sup>3</sup> and labor-using and capital-using. Economics is a new ballgame, you just have to get used to the lingo, like learning to read musical notes. In economics, ***measure things by their value content.***<sup>4</sup>

### **The Intensity Quotient (I.Q.)**

Intensity varies inversely with the share of output that is imputable to land. If the land share is low the use is intensive. ***Think of intensity as a ratio or quotient: non-land inputs/output.*** As a mnemonic, call this the Intensity Quotient, or "I.Q."

Any use of worthless (no-rent) land is economically intensive (land-saving), or high-I.Q., even though it may cover 5,000 acres. Costs of production eat up all the yields, leaving no surplus. The share imputed to land is zero: that makes the use "intensive." On no-rent land, any use is "intensive."

However, many apparently low-yielding operations are actually land-using, or low-I.Q. Low yields/acre do not make land worthless, or just-barely economic, or anywhere near it, when costs/acre are even lower. Common examples of the last are barley in the San Joaquin Valley; wheat in eastern Washington; and range cattle almost anywhere: half or more of the gross yield is a return to land.

The case is more obvious when we observe underuse of high-valued land. In central city parking lots, over 90% of the gross yield goes to land.

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"ground rent" or site rent or just rent), not sale price. You measure the capital input roughly as building value times the interest rate, plus a little more for depreciation (we will be learning how to figure that amount exactly).

<sup>3</sup>You may also say "land-sparing."

<sup>4</sup>To make it worse, don't be surprised when a lot of writers on economics fail to follow the rule you just learned. Few economic writers ever learned to hew conscientiously to one definition for a term. This allows for a lot of fudging. I am sorry to have to tell you about this, but it happens all the time: keep your eyes open for it.

Test: lower the price of the product by 20% or so, permanently, and a land use of low-I.Q. will not be changed. This is where the I.Q. measure opens our eyes to what we might otherwise miss. The tendency of our simple thoughts is to equate low-yielding land with barely economic land; but what counts is the ratio or *quotient* of yield-value to costs/acre. Thus, avocados on steep slopes near Fallbrook are barely economic (high-I.Q.) in spite of high gross yields/acre, because of high costs/acre to lift water up there, and work on steep slopes. Range cattle, by contrast, yield little per acre yet are comfortably above the cut-off grade. They have low I.Q., because of even lower costs/acre.

Recap: edge land is land having a high *ratio* of non-land costs to yields. It does not mean just low yields per acre. Yields may actually be high, per acre. **Watch the ratio.**

### **Values that grow and shrink over time**

In economics, you also get used to the fact that capital depreciates, so the same three-story building shrinks as it ages, and when it is very old it is practically no capital at all. The carcass remains, but the economic value has fled. It is like an empty milk carton in the fridge: the same on the outside, with the same footprint (space need), but lacking value on the inside.

The services of very old buildings are not capital-using, no matter how high the building. If on valuable land, they are land-using. If on cheap land, as in the center of a slum, they are labor-using: the gross rent just covers current expenses of service, maintenance, and repair. Anyone who ever nursed an old car can relate to that. See paper on "The Fallacy of Fixed Proportions."

At the same time, the land under the building may grow in value and become more economic land, just as though the site were stretching out to include more acres. This often occurs while the building shrinks in value, and becomes less capital. Fewer people understand that, which is why those few who do understand, and choose to profit by it, make so much money on the rise of land values, while the rest of us slave from nine to five.

The capital-intensity of a land use, over time, depends not just on the initial cost, but how often the capital is replaced, and how fast it depreciates (loses value). A \$100k building may be more capital-using than a \$200k building, over time, if the \$100k building is replaced three times during the life of the \$200k building. The details of this call for some capital theory, developed later in the course.

### **Inner and outer edges**

Every land-use has an inner extensive edge and an outer extensive edge (cf. the paper on "Ecotones"). Land at the inner edge is normally worth more. The "inner extensive edge" for wheat is the best wheat land, yet it is on the edge of being lost, why? It is so good for wheat that it is too good for wheat, because corn will pay more. Acres in wheat at the inner edge yield more

wheat per acre, and yet are less labor-using and less capital-using, because land rent takes a larger share of the product. They are used at a lower I.Q., and yet are more vulnerable to change of use because they are on an edge, or ecotone. Got that? It's subtle, so if you catch on you are gaining good insight into economics.

Substitute the words "citrus" for wheat and “housing” for corn and you have a good understanding of the economic dynamics of the countryside surrounding Riverside, CA. The inner edge for citrus is the outer edge for housing. Substitute "housing" for wheat and "commerce" for corn, and you understand the inner city, where the inner edge for housing is the outer edge for commerce.

### **Effects of changes in prices and costs**

The value of understanding intensity is that it helps us predict the results of changes in price of the product, and cost of variable inputs. Test: what happens to residual rent if the value of output drops by 10%? Intensive uses (high-I.Q.) are wiped out; land-using uses (low-I.Q.) survive.

Example: barley in Tulare County is land-using and labor-sparing, yielding a large rent cushion. Tomatoes in the same area are labor-using. With fresh-market tomatoes, the return to land may be only 5% of the gross, year in and year out, and therefore is highly sensitive to prices and costs. It is "leveraged" by the high ratio of other costs to gross sales.

This is why the work of people like César Chávez is so frustrating. When and if he succeeded in organizing farmworkers and raising their wage rates, working conditions, and fringe benefits, their employers still had the choice of changing their land use from labor-using (high-I.Q.) to labor-saving (low-I.Q.). The effect on farm labor is the same as a lockout, while the landowner goes right on collecting rent from the low-intensity, labor-saving use, with its low I.Q.

### **Does the theory of diminishing returns apply to world population?**

Malthus thought so, and gave his name to the corresponding theory, which is what started people calling economics "the dismal science." Growing population pressing on fixed world resources would lead to a dismal life for the "working classes," said Malthus. Mill and others saw diminishing returns to capital likewise forcing down the marginal productivity of capital towards zero.

Those ideas entail the "fallacy of composition"—overgeneralizing from one part to the whole. As population rises, all the world need do is switch from uses of low I.Q. to uses of high I.Q., to raise yields and make jobs. There is great scope for this in response to small changes in rents and wage rates. Too, growing population and capital generate synergistic interactions which increase the capacity of fixed land to absorb labor and capital in productive occupations. Finally, a little rise of land rent, and fall of wage rates, suppresses labor-saving technology and fosters land-

saving technology. Capital is highly malleable, and so are inventors and investors. They respond to incentives.

Should a practical, busy, profit-seeking manager lift his eyes from his accounts and nose from the grindstone long enough to be concerned with such broad social questions? What's the percentage in it? Peters and Waterman studied dozens of outstandingly successful companies and found that each one develops its own philosophy and approach to business that includes always an analysis and interpretation of the world outside the firm. The company's role in the world depends on what the world is really like. Followers look to leaders to help them interpret the world: where did we come from, where are we going? So, yes, the successful manager must be able to have a realistic and mature interpretation of the world. Her understanding of basic economic principles should help a lot.®