

Principles of Economic and Workforce Development

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This paper:

- This paper takes a systems thinking perspective that is necessary for understanding the dynamically complex challenges that face our organizations, our community, and our society.
- A systems thinking perspective is non-traditional, but absolutely vital if we are to successfully address issues related to workforce and economic development. Our society is in trouble; we need this.
- Some of the views expressed here are counter to accepted beliefs. I do my best to explain my reasoning. That said, new data and influences that I've overlooked can change the views expressed here.
- See the comprehensive model of [Workforce Dynamics](#) for an understanding of the workforce system.

What is systems thinking?

Systems thinking is about examining the "structure" of the system in order to understand its "behavior." "Structure" means the feedback loops in the system ... positive and negative (known as reinforcing and balancing). Unless we understand these feedbacks we really don't know what policies to adopt or what actions to take to change the system's behavior in order to experience different "patterns of events" and "events."

Nothing grows (or declines) without a reinforcing feedback. And nothing grows forever, there's always a balancing feedback that will (eventually) limit growth.

Balancing feedbacks also provide systems stability. Long-lived systems have an overwhelming number balancing feedbacks that make the system stable ... and resist change. Even when we want to improve behavior, these balancing loops will "rise up" to oppose change. This is why "change" is so difficult. So we'd better understand the balancing loops or change initiatives will fail.

With systems thinking we expand the boundary of the system until we can identify structures that internal to the system create observed behaviors. The structure is a theory of the system for comparison against the data of reality. This is the scientific method applied to social systems. Note that "data" is more than numbers in a database; it includes our "mental models" that determine how we humans interact with and influence the system (soft data).

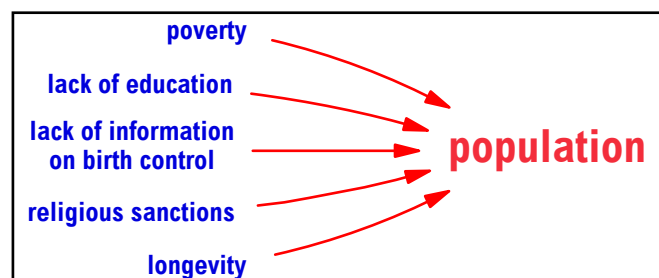
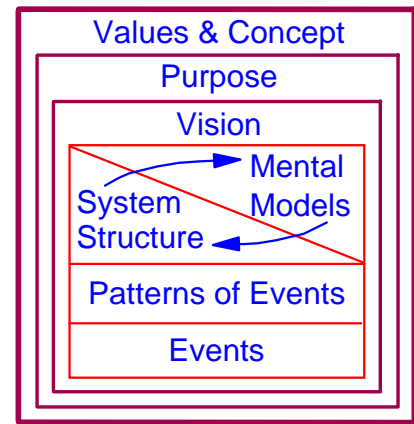
If we implement policies and actions that we believe should act on the structure to produce the desired change, and it does not, then we've either got some work to do on the theory (model) or we need to examine the validity of the data. It's just like science; it's social science.

Organizations and our society go through cycles of performance, faltering and even failing because we don't appropriately describe and think about structures and policies. This makes it difficult to respond to changes, such as those accompanying growth or evolving external conditions.

Often, it's difficult to even learn; because there's a long delay between our actions and the effects of our actions and because we don't realize we're suffering the consequences of our own actions. We either never get the feedback that our own decisions produced the unwanted results, or the feedback is so delayed we are not able to link the causes of the results back to our own decisions. This produces great pain and loss.

"Problems" that are dynamically complex have multiple feedbacks with long delays and often display counterintuitive behavior. Actually, such problems are "messes," problems so interrelated that we cannot do just one thing. It's like pushing on a balloon; when we push on one spot, it bulges elsewhere.

Systems thinking is about understanding feedback. One of the [Fundamental Sources of Conflict](#) is that we tend to use "factor thinking" in situations where we need "operational thinking." See the diagram and right and that on the next page showing the difference. Operational thinking is a necessary [skill for learning](#) in dynamically complex situations.



How a local economy works (or any economy, really)

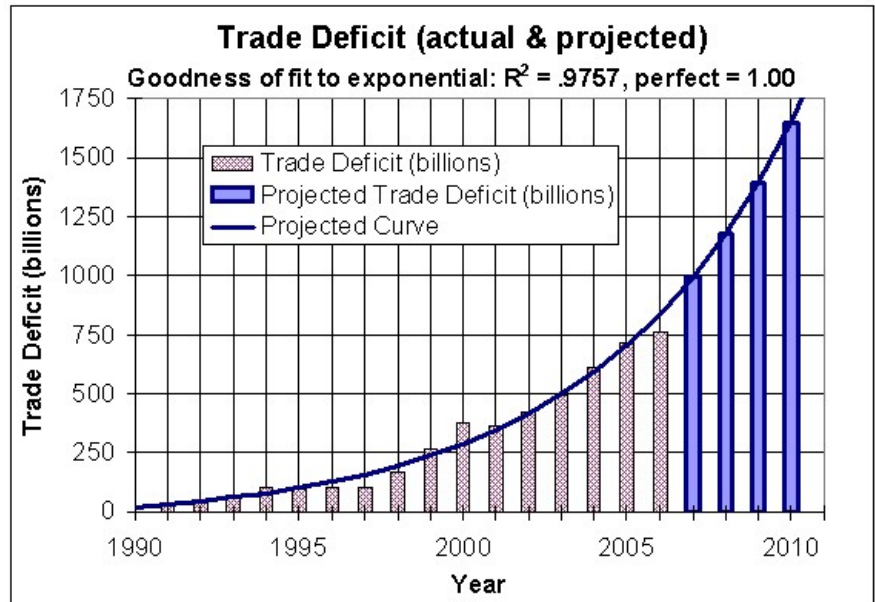
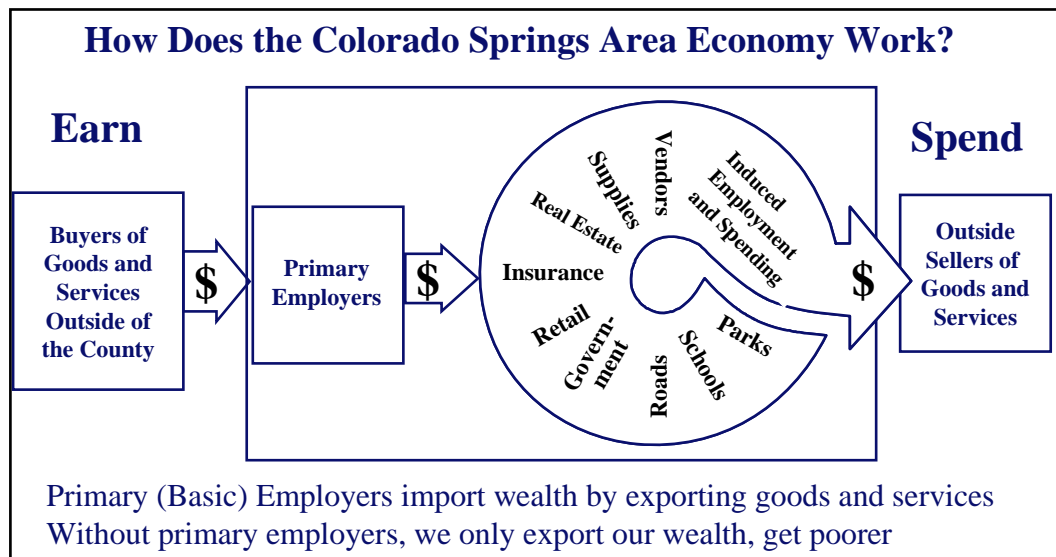
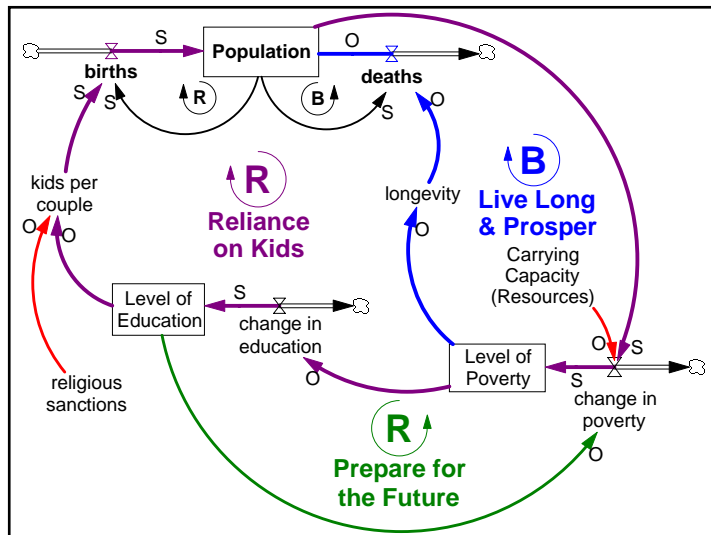
The diagram below is a model of “How Does the Colorado Springs Area Economy Work” from a 2003 EDC presentation by Rocky Scott, then president of the Colorado Springs EDC. He regularly included this slide in his PowerPoint presentations to educate his audience on the importance of the EDC’s emphasis on attracting what are known as “primary” employers and the importance of circulating and recirculating dollars within the community.

It’s an important model.

It shows that employers that sell to outside the region bring dollars into the community that are circulated and recirculated many times. The model shows that these dollars are eventually used to purchase goods and services from outside the region.

Most people seem to understand that this model conveys an important understanding of the Colorado Springs economy and policies needed to improve it. I’ve not heard anyone challenge it.

This model is as valid for a state or national economy as it is for Colorado Springs. Since 1990 the increase is almost a perfect exponential as shown in the figure. Exponential increases are explosions. Explosions do not end well. That’s why the current national economic situation is so dangerous. This explosion, like a real explosion, is leaving devastation in its wake.

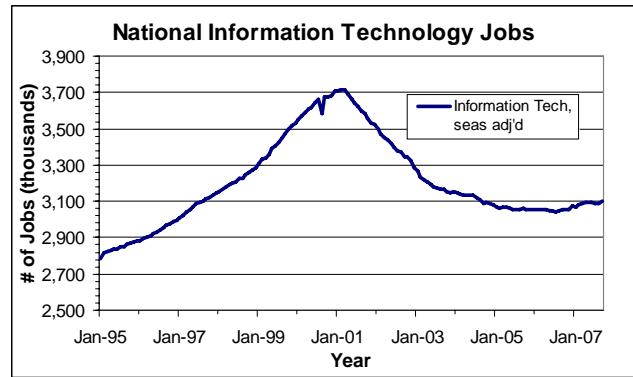


However, I encounter many, even economists, who appear to not truly comprehend its implications as they are not all that concerned about the U.S. trade deficit. The trend in the U.S. trade deficit is a threat to the U.S. economy, just as a similar deficit would be to the Colorado Springs economy. Exponential increases are unsustainable. It seems ridiculous to say it because it's so obvious: What's unsustainable cannot be sustained. Colorado Springs must somehow cope with its effects.

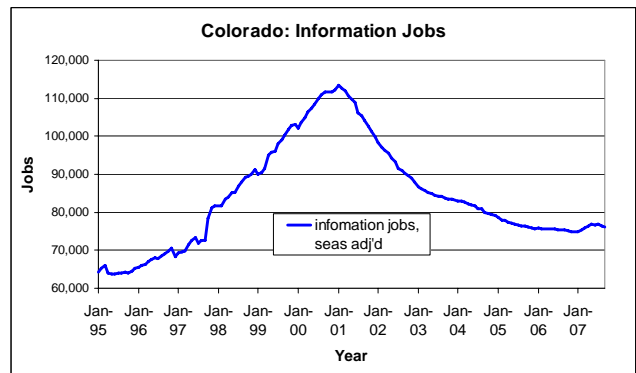
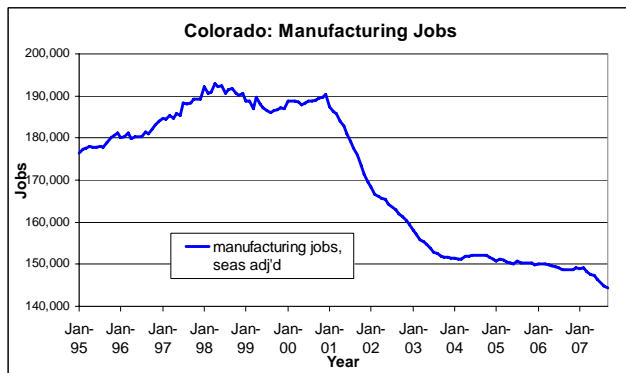
What is the National, Colorado, and Colorado Springs Jobs Status?

The loss of manufacturing companies and jobs and the accompanying decline in the production of exportable goods is the local, state and national equivalent of the loss of primary employers. The increasing U.S. trade deficit, the gap between imports and exports, is a result of a lack of primary employers and not “earning” enough dollars from outside the country.

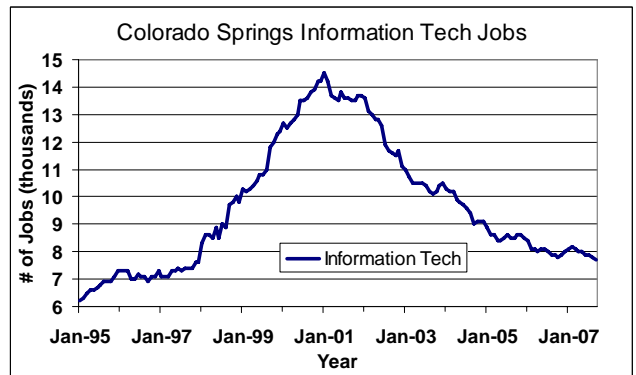
The national picture:



The Colorado picture:



The Colorado Springs picture:



Here are some job gains and losses in Colorado as of September 2007 since January 2001:

Lost	Gained
- 46,000 Manufacturing	+ 44,700 Education & Health
- 37,400 Info Technology	+ 36,300 Government
- 3,700 Construction	+ 25,200 Leisure & Hospitality
- 3,000 Wholesale Trade	+ 14,700 Financial Activities
	+ 13,200 Nat Resources & Mining
	+ 3,700 Retail Trade

This national "trade" deficit is important because it relates to the economic environment in which Colorado Springs exists and has enormously affected jobs in Colorado Springs more than in Colorado or the nation. This not meant to be pessimistic, but realistic about what we're experiencing.

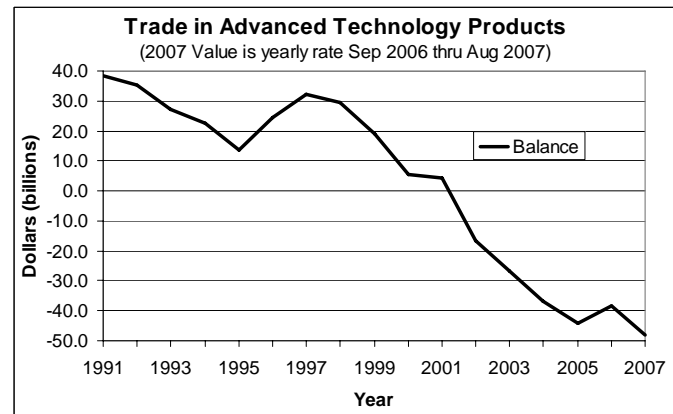
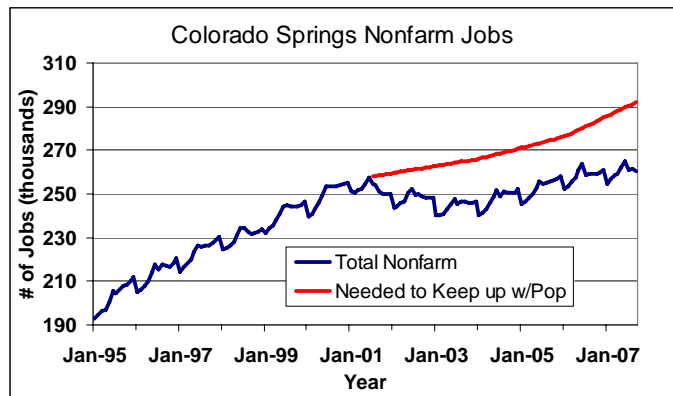
The nation has lost 3.65 million manufacturing jobs nationally since the March 1998 peak, 20.7%. Colorado has lost 48,500 jobs since the April 1998 peak, 25.1%. Colorado Springs has lost 10,000 jobs since the January 2001 peak, 37.5%. Those were better-than-average paying jobs.

It's not just manufacturing jobs that have been lost. The nation lost 630,000 IT jobs since the March 2001 peak, 16.6%. Colorado's lost 37,400 IT jobs, 33%. Colorado Springs lost 6,800 IT jobs, 46.9%!

People retrained for those IT jobs when they lost their manufacturing jobs. For what are they to "reskill" now? How often will such "reskilling" be required?

The population of Colorado Springs has grown, but jobs have not kept pace.

More important, the U.S. is rapidly losing not just low-value-added, simple manufacturing jobs. The "trade" balance in Advanced Technology Products (ATP) has gone from a \$40 billion surplus in 1991 to a \$48 billion deficit now. More education and training are not necessarily "the answer" when high-tech jobs are also disappearing. We need economic development for those who are trained but have lost their jobs.



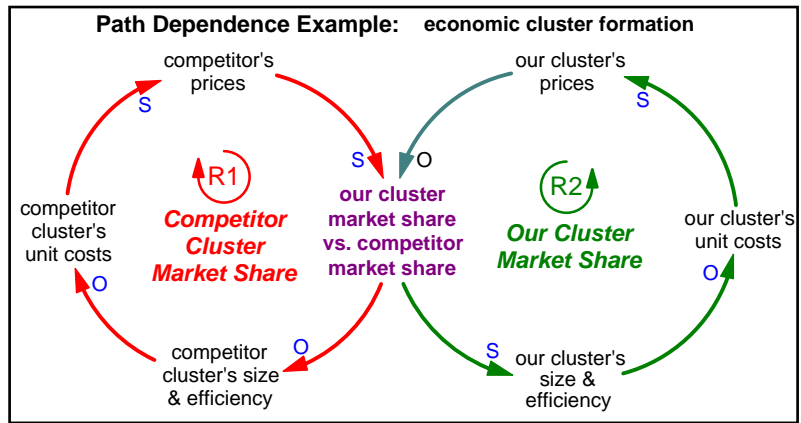
Economic Clusters

Paul Krugman has explained the essential feedback nature of economic clusters in describing the formation and evolution of industrial clusters.¹

The whole process of industrialization within the United States was marked by ... small accidents leading to the establishment of one or two persistent centers of production. ... What is important ... here is ... not the initial accident but the nature of the cumulative process that allows such accidents to have large and longlasting effects. ... there is a circularity that tends to keep a geographic cluster in existence once it is established.

¹ Krugman, P., "Location and Competition: Notes on Economic Geography." In Rumelt, Schendel, & Teece, *Fundamental Issues in Strategy - A Research Agenda*, Harvard Business School Press, 1994

The circularity to which he refers is a positive (reinforcing) feedback that results in exponential growth of a cluster in one location, instead of another location. Once a cluster in one region "gets ahead" of another cluster in composite attractiveness by having a more efficient ecology of suppliers, customers and similar companies, it will continue to get even more ahead. This is the growth side of the "path dependence" structure shown in the figure. This is also known as the systems thinking "Success to the Successful" archetype.



The other side of the coin, the dark side of this structure, is that, if for some reason a cluster becomes less attractive overall than another cluster, it suffers exponential decline, instead of growth.

Note that many clusters were not "accidents" at all; rather they were initially government supported (e.g., silicon valley), subsidized and protected until they achieved the economies of scope and scale that they enjoy today. Therefore, many clusters are not located where they are because of the free market theory of "comparative advantage" and many are now losing ground.

So what do we do to promote the formation of economic clusters? We promote the feedbacks needed by the clusters we wish to foster. On the next page is a simplified model showing a few of these feedbacks. Here is a description of these basic feedback loops:²

R1: Cluster Coverage - The greater the "region cluster attractiveness", the more other cluster companies will locate and/or expand in the region, especially with the EDC focusing its attraction efforts on missing cluster components. This increases "cluster industry efficiency" and further increases "region cluster attractiveness".

R2: Cluster Size - The greater the "region cluster attractiveness", the larger the "cluster size" and the greater the "economies of scale" that increase "cluster industry efficiency" and increase "region cluster attractiveness".

R3: Cluster Education Coverage - the greater the "cluster size", the more cluster-specific educational resources will be developed to increase the number of employees with cluster-specific education to further increase "region cluster attractiveness".

B12: Delayed Infrastructure Demands Limit Growth - The greater the cluster size, the greater

the population load on the infrastructure: more traffic, crowded schools, and inadequate public transportation. This reduces "region overall attractiveness to employees" and limits the number of employees available.

R8: Invest in Infrastructure - To address the infrastructure backlog, taxes can be used for "infrastructure investment" and allow continued growth.

Systems Thinking Language Notes

S: Influence in the **S**ame direction

O: Influence in the **O**pposite direction

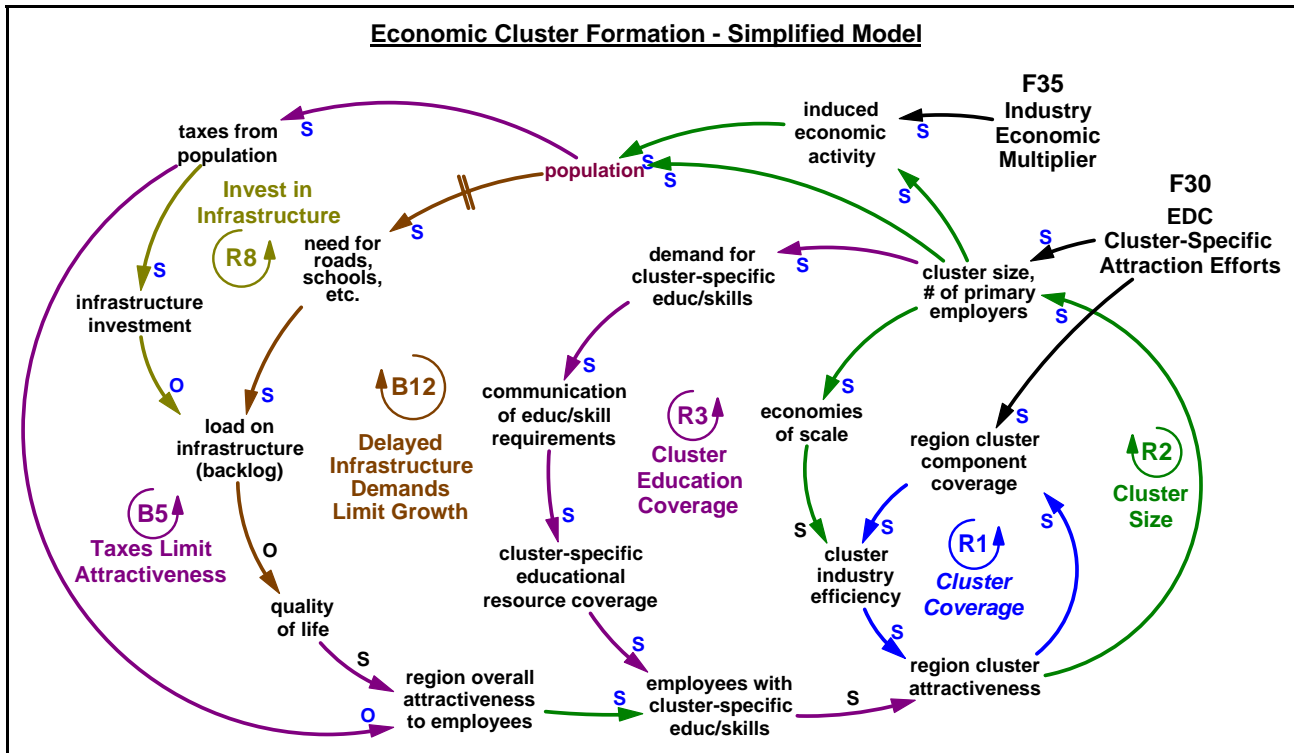
R: Reinforcing Loop (positive feedback): action is increasing or decreasing (i.e., a virtuous or vicious cycle)

B: Balancing Loop (negative feedback): action is goal-seeking (e.g., a thermostat)

Definition: "region cluster component coverage": the extent to which a cluster is a "complete ecology of companies;" i.e., it contains the suppliers, customers and like companies needed to support an efficient, ef-

² These selected loops illustrate a major systems point made by Jay Forrester, when he wrote, "There are no utopias in social systems." R1, R2, & R3 are feedbacks that promote growth in cluster size, but nothing grows forever. The increased infrastructure load creates a feedback, B12, that limits growth. This can be overcome by taxes for infrastructure, but taxes are unpopular and this again limits growth. It's a Gilda Radnor world: "There's always something."

B5: Taxes Limit Attractiveness - However, the greater the “taxes from population” the less the “region overall attractiveness to employees” and limits the number of employees available.



Here is an example of the operation of clusters.

What do you think? Would economic clusters be more likely to form and grow when gas prices are low or when gas prices are high? See the answer in the footnote below. Please think how you'd answer before you read it. Often, if we're told the answer before we think about it, we think, "That's obvious," even though we'd have gotten it wrong.³

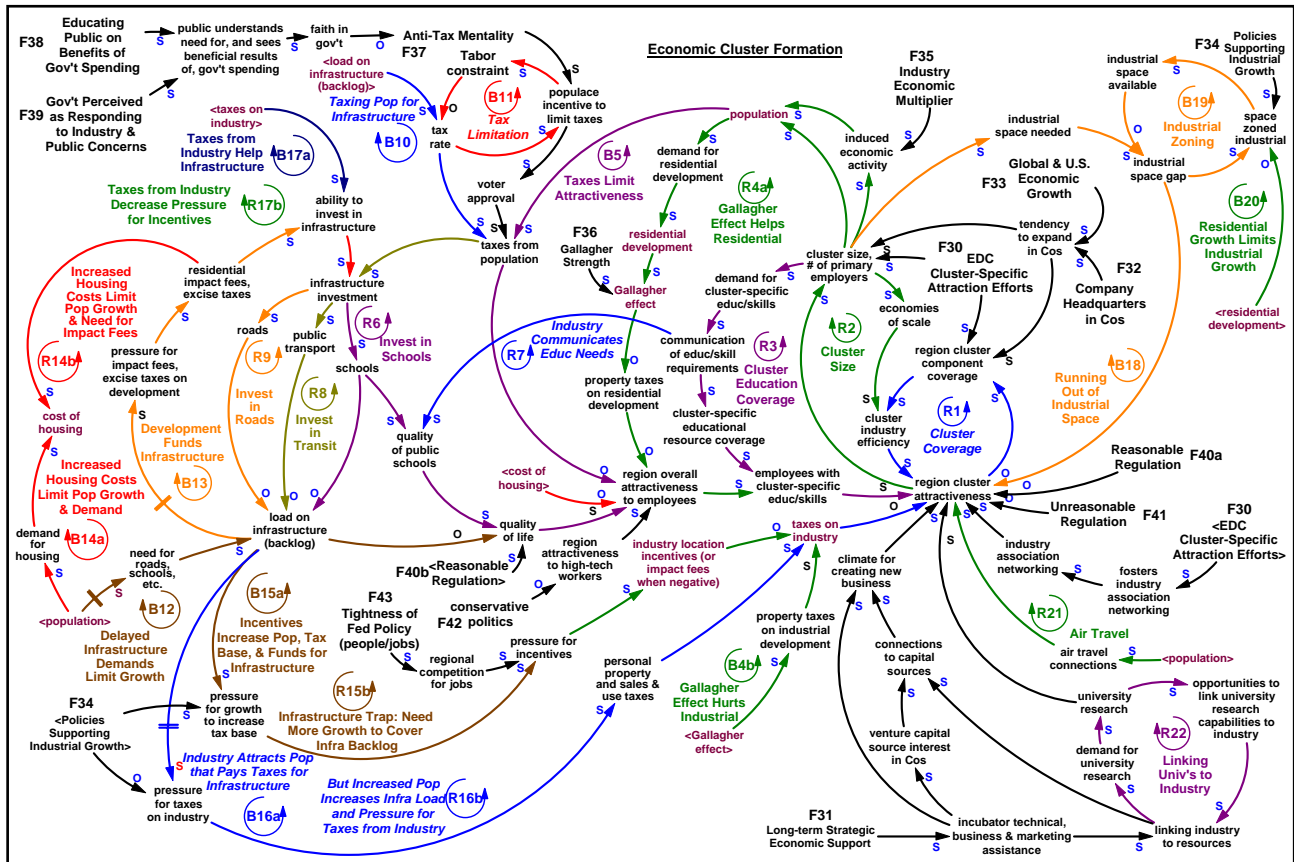
The answer is important for thinking about future economic development, especially as gas prices are likely to keep rising.

The diagram below shows a complex electronics cluster causal loop diagram that shows driving forces as well as feedback loops.

Granted this is complex, but I've developed a [well-defined path](#) to go from causal loops and driving forces to policies and actions to address the driving forces and foster the favorable operation of the feedback loops that are important for specific clusters. This path makes systems thinking practical. It's also described briefly in [Workforce Dynamics](#).⁴

³ I found the answer to be counterintuitive and almost everyone I ask gets it wrong. Economic clusters form more strongly when gas prices are low. That's because it's cheaper to do production in a centralized place and ship the products. As gas and energy prices increase, larger economic clusters that produce goods that incur transportation costs will shrink and more regional clusters will grow.

⁴ Promoting "societal networking" is also important in promoting cluster growth. This is developing a dense web of relationships within a community that allows companies to network with each other and share non-proprietary best practices. This is described in my paper on "A Systems Thinking Perspective on Manufacturing & Trade Policy" on my website. I developed a causal loop model showing the feedback loops necessary to promote societal networking with a CITTI board member. It shows the feedbacks for the formation and growth of high technology companies. The diagram was not specific to what CITTI was actually doing, but about the different feedback loops that could foster the growth in the effectiveness of CITTI's mission.



Growth

Policies related to urban growth are controversial. That's because the dynamics of growth is a systems "mess." It turns out that growth proponents and opponents are both right and wrong. I raise this because the growth dilemma has a lot to do with the idea of "creating jobs" and understanding the dynamics of growth is important for thinking about workforce and economic development policy.

Briefly, here's what's happening and why there's a dilemma.

Both sides are logical. One uses "individual logic," the other "collective logic." Individual logic: "Do what's logical for me." Collective logic: "Do what's logical for the whole." Some believe that doing what's logical for the individual is always logical for the whole. But it's not true.

In many situations, individually logical actions are collectively irrational and we fall prey to the "Fallacy of Composition": acting as if what's true for a part is true for the whole. Growth is a prime example of a situation in which we must look at the whole to see how the system itself is creating the observed behavior; examining the parts without looking at the whole won't do it.

Individual logic: To compete with other regions for jobs, we must cut taxes and regulations, otherwise jobs will go elsewhere. And it's true; regions compete for jobs because there are always more people needing jobs than jobs: what I call "real unemployment" is over 12%; see the data at [Unemployment: Official, Effective, Real](#).

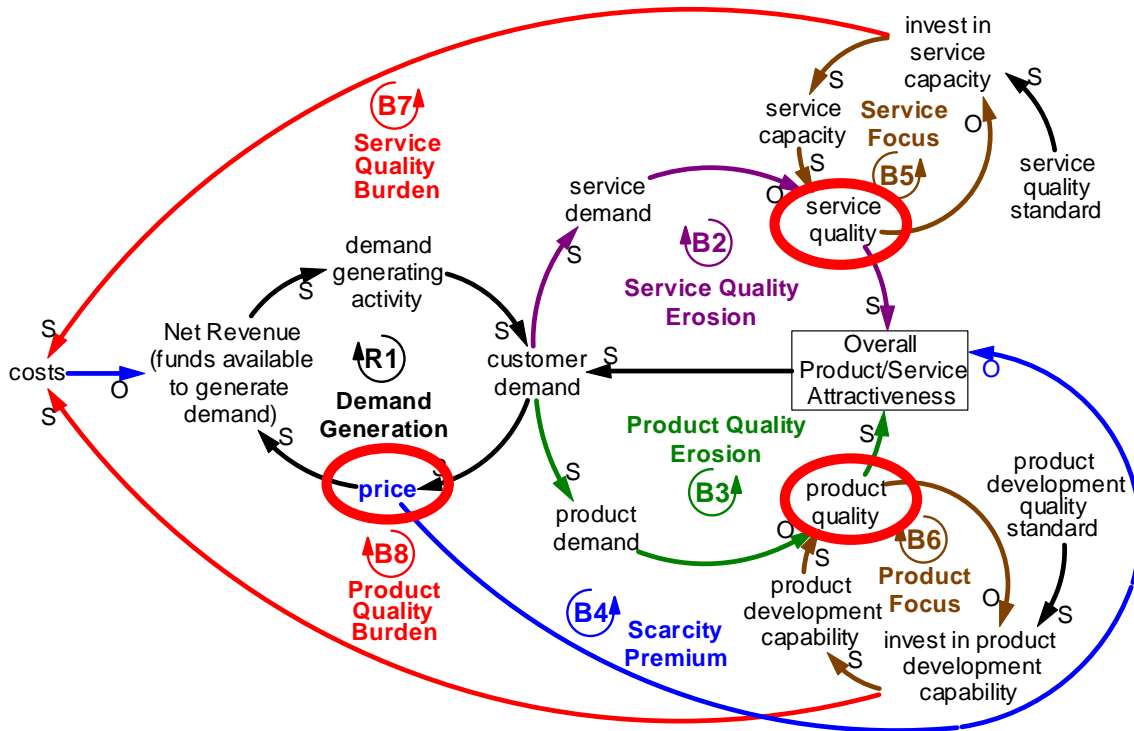
Collective logic: When regions compete like this, it creates infrastructure backlogs and an increasing burden on the public to pay for the long-term costs of growth. And it's true; this is happening not just in Colorado Springs, but in the nation as a whole: the [ASCE has estimated](#) the

nation's five-year backlog at \$1.6 trillion. There's a cost: Each year Americans spend 8 billion hours stuck in traffic; lost productivity cost \$43 - \$168B.⁵

Across the nation we're caught in a trap: We often forced to compete with other regions. On the other hand, taxes cover short-term, but not long-term, costs. So we need even more growth for more taxes (that taxes do produces over the short-term). But no one can sell at a loss and make it up in volume. Doing what feels better short-term, but makes things worse long-term, is called "addiction." Competition between regions is individually logical and collectively irrational.

So what to do?

Realize individual regions can't escape. This is because of a dynamic is called "The Attractiveness Principle." What's true for business is true for regions of the country. Here's the structure:



Circled in red are three variables: price, service quality, and product quality. No business can be best at all three. This is why the business literature stresses that it's important that each business must have a unique "value proposition." If a business attempts to be more attractive on all dimensions, it will be overwhelmed on at least one of the dimensions (note: attractive doesn't mean "prettier"; it means the net composite of features that attract).

This same principle applies to regions. No region can be all things to all people. And a corollary of the "The Attractiveness Principle" is: Given free migration, no place can long remain more attractive than any other place. This means Colorado Springs will eventually become no more attractive than the least attractive region of the nation (and eventually the world).⁶

⁵ From *Business Dynamics, Systems Thinking for a Complex World* by John Sterman, Irwin/McGraw-Hill, 2000. [John Sterman](#) is Director, MIT System Dynamics Group.

⁶ I was depressed for three weeks after reading about this in an issue of *The System Dynamics Review*. It really points out the intractability of some problems (messes) and how we really are all in this together.

Anything we do to increase the attractiveness of the region may work for a time, but it eventually attracts more people who overwhelm the improvement. Programs aimed at improving regional quality of life can succeed long-term only if they raise average quality of life for the whole nation. That's really important. Please, read that sentence again.

It's because of this that regions must think in terms of "how to become unattractive" ... "strategic unattractiveness." Regions must determine what they're willing to give up to preserve what they truly value. That very idea is itself unattractive.

Only action at the national level will suffice to resolve this dilemma. We must, as a nation, declare a national "tax war" cease fire. We must fully internalize costs so prices fully capture the marginal costs of growth to allow "the market" to correctly value choices. We'll know costs are fully internalized when infrastructure backlogs stop growing without taxes to pay for new infrastructure. We must base competition between regions on quality of life.

This is beginning to be realized at the federal level. Art Rolnick, an economist at the Federal Reserve Bank of Minneapolis, points out that [Congress Should End the Economic War Among the States](#). His recommendation? Invest in [Early Childhood Development on a Large Scale](#) for a better return on investment.

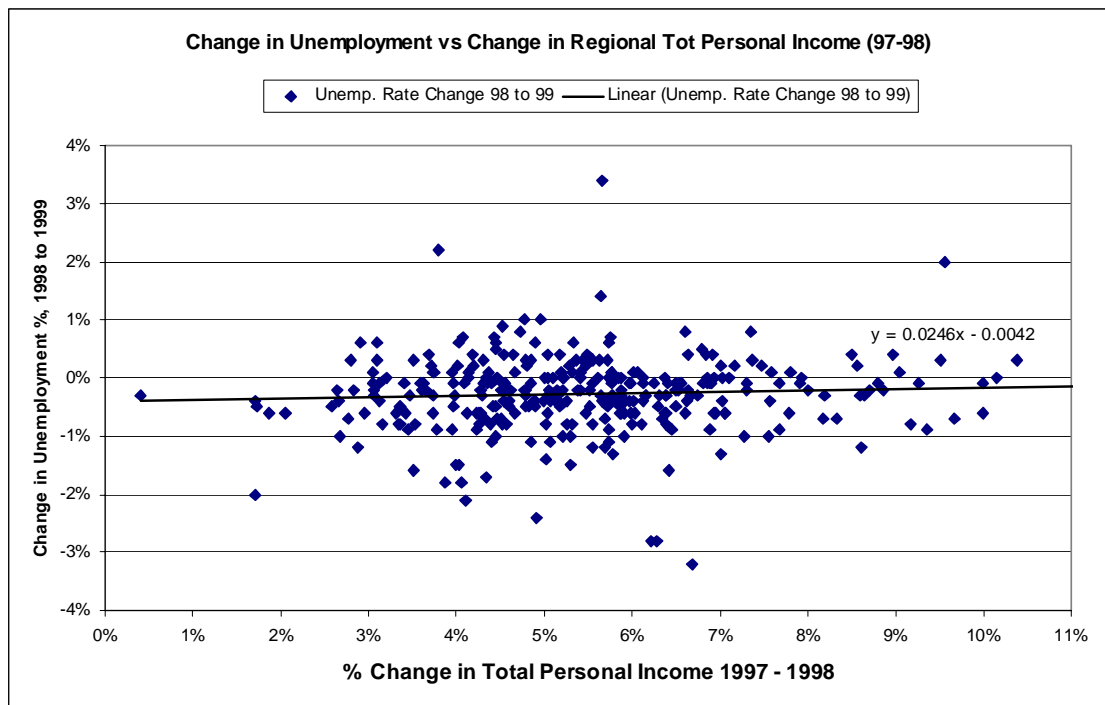
It's a reality fact of life: "There is no utopia in social systems."

I raise this growth dilemma, not simply to depress the reader, but as a prime example of how we're trapped in the systems in which we exist. It's a major consideration in addressing our regions workforce and economic development challenges.

"Creating Jobs"

The Attractiveness Principle structure and the tax competition between regions has enormous impacts on workforce development.

Because there are always more people than there are jobs, the tax competition between regions does not "create jobs." it simply shifts jobs among regions. It creates higher growth in some regions and lower growth in others. Regional growth does not affect unemployment for the nation as a whole; that's fixed at the federal level.



I realize this is contrary to what's generally believed. I didn't believe it until I plotted many graphs like the one above. It shows that regions with higher growth do not on average have greater reductions in unemployment.

It shows that higher growth rates in Metropolitan Statistical Areas between 1997 and 1998 did not produce a more positive change in employment between 1998 and 1999. The reason is that people who are out of work in one region move to higher-growth regions.

Because there are only so many jobs and only so much economic growth allowed, companies can say, "Give us a deal, or we'll go elsewhere." This competition among regions creates a "musical chairs" effect in that the "added value" of any one region is zero. Companies can demand concessions, just as a sports team demands that a city build a tax-payer-funded stadium, if it wants the team to move there.⁷

So when jobs shift from one area of the country to another because of "economic development" there is churning as people move across the country to follow those jobs, but no more total jobs are created. This zero-sum game competition between regions hurts all regions.

There is a parallel between what happens to regions and to people. Because there are more people than jobs, the added value of any one person is also zero. Employers can say, "Some are going to be without a job, so take the job at this wage or someone else will." This is why wages are stagnant at the bottom, and why many regions impose a minimum wage.⁸

So there's an important analogy between taxes and wages. Taxes can be considered "regional wages" that allow regions to maintain a certain quality of life, just as wages allow people to maintain a certain quality of life. Regions have infrastructure backlogs for the same reason that many people do not make a living wage.

What to do?

For problems, root causes are independent and separable; we can divide and conquer. But with messes like these, the root causes are feedback processes (feedback loops) that interact and often produce surprising, counterintuitive results.

We must realize that the challenge of economic and workforce development is not a problem to be solved, but a dynamically complex "mess" of interdependent problems to be managed as best we can. The "Attractiveness Principle" is operative.

Policies for Workforce and Economic Development

Here are example policies, based on what's reviewed above, to promote regional workforce and economic development:

- Foster the growth and attraction of companies that are primary employers, both large and small (per EDC diagram).
- Foster the growth and attraction of companies that will tend to buy locally and recirculate dollars within the community (per EDC diagram).
- Discourage the growth and attraction of companies that are not primary employers and do not buy locally (per EDC diagram). This is the other side of this coin of the two previous points.

⁷ In the book, *Co-opetition* by Brandenberger and Nalebuff, they call this "sacking the cities."

⁸ Many say that a minimum wage interferes in the "free market" for labor, but they ignore the Federal Reserve's prior interference at a national level: if they perceive unemployment to be too low, they raise interest rates to "cool the economy." There is no free market for labor.

These companies are Wal-Mart-like "import companies" that send their funds to company headquarters every night; they are the polar opposite of primary employers.

Note: These first three bullets are key. An emphasis on primary employers and employers who will spend their income within the community is much more important than the number of jobs. With this emphasis, whatever the community's size, it will prosper.

- Assist companies in reducing turnover because the costs of turnover are enormous. A greater appreciation of this will make companies more efficient and allow them to increase wages that will also increase dollar circulation and recirculation within the community
- Put a greater emphasis on the growth of companies that are already here to a greater extent than on attracting new companies, especially when they compete for the same employees. Companies already here are often quite annoyed when they are put in competition with a similar company that's attracted by incentives they don't get. We need cooperation for developing economic clusters; animosity does not help.
- Pay particular attention to the needs of companies headquartered here, because companies headquartered elsewhere are very reticent to share information and best practices. Companies close subsidiaries before they close their headquarters.
- If attracted companies do compete for scarce employees, develop a plan fill those jobs by, if possible, supplementing the training and skills of current residents who have lost their jobs.
- Foster the attraction of companies that will hire current residents who have lost their jobs.
- Energy costs will continue to increase. Foster increasing the energy efficiency of companies to reduce costs and make the region more competitive.
- If there is a current industry presence and the region has advantages, foster the growth of regional industry clusters that are vulnerable to higher energy and transportation costs. Such regional clusters should be able to grow as more national, centrally-located clusters shrink. If transportation costs are high, manufacturers (low-tech & high-tech) can be regional suppliers and can provide jobs for military and other spouses.
- With transportation costs rising, encourage marketing tourism within the state rather than focusing on attracting tourism from other states.
- Foster all methods to reduce regional transportation costs ... telecommuting (attract companies that support telecommuting to reduce infrastructure load), mass transportation, and safe lanes for bikers (to also help increase tourism).
- Attract companies that develop more efficient use of water. All else being equal, do not attract companies that require lots of water. Support development that requires less use of water.
- Global warming is also a dynamically complex problem. For that reason, it is difficult to understand and easy target for obfuscation. Even so, global warming is real and energy costs are rising. Therefore regions should foster the attraction of companies that provide sources of sustainable and fossil-fuel-independent energy. With the number of sunny days in Colorado, especially in Pueblo, solar and wind power can be important resources to foster.
- The understanding I've developed indicates the exponentially-increasing trade deficit will cause fall in the value of the dollar and a hyperinflationary depression in the U.S. economy within years. This means the region must focus on critical industries to make it regionally sustainable. Of greatest importance will be water-efficient agriculture, ranching, and energy.