

Developing Sustainable Business Clusters in the Eugene

Area:

An Economic Analysis

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Introduction

Debate over the issue of sustainable business has recently been sparked on an international level, as the world faces ever-worsening environmental conditions and it becomes more evident that traditional methods of economic production may eventually reach a point where they are no longer practical. This sentiment is echoed in Eugene and Lane County, where specifically the issue of sustainable business clusters has been a recent area of interest. In April of 2005, Eugene Mayor Kitty Piercy set forth the Sustainable Business Initiative (SBI) to tackle this issue and develop a city plan of action for the coming years. The Mayor has made this one of her top priorities, and as such, has invested heavily in the issue. The stated end goal of the SBI is to “Make Eugene one of the nation’s most sustainable mid-sized communities by 2020.” Given the significance, magnitude, longevity, and emphasis that has been placed upon this initiative and issue as a whole, one can see how adopting a practical, effective, and mutually agreeable approach right from the start is beneficial, if not essential. Aiding in the development of this approach is the primary goal of this project.

Upon conducting our research and analysis, it became clear that our results and methodology would not follow that of traditional econometric analysis. This is due predominantly to the lack of digestible data with which we can form a statistical proof or correlation. Furthermore, our review of the literature on the subject turned up no documented results of the existence of an ideal sustainable business cluster, as well as the fact that most research points to the phenomenon of a cluster being more or less of a random or accidental event. This led us to adopt a more segmented analytical approach to the various topics surrounding the overall issue. Our aim is to evaluate each topic

separately and then form a general informed conclusion, which ties the various topics together. In particular, our last section examines the specific recommendations of the SBI for the private and non-profit sectors from an economics perspective.

Sustainable Business Initiative

The SBI and the community support and sentiment for it is one of the principal driving forces behind the objectives of this research paper. Although the SBI takes a broader approach, such as addressing issues of social equity and quality, as well as tackling larger environmental issues not directly tied in with business clusters, it still serves as the base of what we wish to expand upon and hopefully improve. Given that the SBI is the local government's flagship project for this issue, any recommendations and results achieved in our research paper will benefit (in terms of the likeliness that they will be considered) by being in a similar context to what has already been laid out. Although not a typical literature source, an overview and understanding of their methods and procedures is key, as any report given will likely be funneled through them.

The primary staff for the SBI is the Resource Innovations program at the University of Oregon, "a research collaboration between the Resource Innovation Group and the University of Oregon Institute for a Sustainable Environment. The Resource Innovation Group is an independent non-profit organization. The mission of Resource Innovations is to help government, business, and communities adopt sustainability based thinking, policies, and programs."¹ They are responsible for setting the agenda, implementing the research, and formulating recommendations for the SBI. Their main

¹ Resource innovations. (April 18, 2007). *Mission and Background History*. Accessed May 10, 2007, from <http://cwch.uoregon.edu/>

body is comprised of a 16-member task force whose aim is primarily to gather information based on community input. This is done through surveys and roundtable discussions. The term for this particular methodology is known as “Appreciative Inquiry.” “Appreciative inquiry emphasizes helping people bring new ideas and desires into being rather than problem solving, which aims at making problems go away.”² An advantage of this approach is that it gets to the heart of what people in the community actually want instead of trying to dictate it to them. A disadvantage is that the information collected is likely to be very broad and might not gravitate towards a practical solution. People's opinions probably don't take into account larger limitations to what is actually possible, nor do they consider actual numerical consequences of suggested courses of action. Instead, a more indirect approach of data analysis would be favorable for our purposes, not only because it will likely produce more digestible information for analysis, but also because such direct methods of data collection are out of the scope of our current capabilities.

The final report of the Sustainable Business Initiative was completed in June of 2006. The report includes background information on the SBI's purpose and composition; a description of its definition of, and motivation for sustainable business; and finally recommendations to the city of Eugene, the local private sector, and other local governments and institutions. Although the methodology employed by the SBI primarily consists of Appreciative Inquiry methods, they supplement their findings with economic theory. For example, Harvard Economist Michael Porter's “Diamond of Competitive Advantage,” discussed later in the literature review, was used by the task

² SBI Task force. (August, 2006). *SBI Final Report*.
http://ri.uoregon.edu/publicationspress/Final_SBI_Report_081406.pdf

force as the model for business and job development. How exactly this was used, besides as a general guiding background, was not clear from the report. Another reoccurring term, not necessarily based on economic theory however, is that of the Triple Bottom Line. This is an ever increasingly popular term that has emerged out of the expanding field of sustainability. It refers to the process by which sustainable growth must simultaneously satisfy 3 categories:

1. Economic: Development must be profitable and firms financially viable.
2. Social: Development must account for paying employees a living wage, generating affordable housing and health care, and improving labor equity.
3. Environmental: Development must not consume or degrade environmental resources in any manner which is not renewable and continuous.

Although this concept is well inclusive of the realistic aspects of society, it is quite broad and is difficult to use as a rubric for judging the success or merit of sustainability, as contradictions are certain to arise. For example, if a given measure of sustainability were to satisfy 2 of the categories, but not the third, would that measure not be considered?

All in all, the final report included 22 separate recommendations ranging from very broad and open-ended, “11. Form partnerships,” to explicitly defined “7. Adopt goal and develop strategy to achieve zero waste by 2020.”³ The report lays out several good strategies for government policy such as adopting the practice of using sustainability criteria to evaluate all city government spending on projects. This is quite similar to the benefit-cost analysis that the federal government has included as mandatory in evaluating its spending projects. The report also lists non-

³ IBID

governmental recommendations to the private sector, such as forming a networking association of related firms in order to pool resources and accomplish more than any single firm could do on its own. This specific recommendation will be discussed in further detail later in the paper.

Methodology

The first step in this process is to provide some background information and to clear up some of the confusions surrounding the issue. Namely, the definition and significance of the terms ‘sustainable’ and ‘cluster,’ as different groups have adopted different interpretations, usually based upon their respective agendas. This will be elaborated upon in later sections of the paper. We begin by discussing the application of various definitions of the term ‘sustainable business’ and the implication each definition has. Next we continue with a review of the literature on industry clustering, followed by that on sustainable industries. We will then come up with a working list of what we deem to be a sustainable business or industry for the purposes of this research paper and why. From there, we will provide further analytical discussion on topics including: Classifying sustainable industries, estimating the clustering potential of sustainable industries, the negative aspects of clustering, the role of government in this process, the comparative advantages that Eugene has to offer, and finally, a review of the specific SBI Final Report recommendations to the local private and non-profit sectors.

Definition of Sustainability

When dealing with the issue of sustainability it is important to define exactly what we are talking about. Sustainability has become somewhat of a modern buzzword and various groups use it in different contexts to mean different things. For example, a business leader may use the word to refer to the long-term profitability of a given company, whereas a politician may use the same word to refer to the health and longevity of the local environment. In general, we have 3 separate definitions:

Narrow definition: Businesses that have a net positive, or net zero overall effect on environment. Their existence enhances or at least holds constant the overall quality of the environment.

Medium definition: Businesses that use more environmentally friendly practices than businesses producing goods of the same class. This is a relative definition, and the business may in fact do overall damage to the environment.

Broad definition: Businesses that care about the environment and introduce some sustainable practices. This could include any business that has implemented some form of a recognized sustainable practice.

For the purposes of this paper, we will be adopting the medium definition of the term.

Our ultimate list of sustainable businesses may not exclusively meet this definition, but it will be used as the guide for deriving the list.

Literature Review

Clusters

Over the last 20 years the interest in business clusters has skyrocketed. A large variety of authors have contributed to the development of the theoretical understanding of clustering as a new phenomenon. As the literature concerning this issue is very broad, this review won't try to cover all of it. The main aim is to make a general overview of academic achievements in the area of interest. Most of this overview is based on the article "Making Sense of Clusters" by Joseph Cortright,⁴ which gives a great summary of academic works on clusters.

The most famous definition of clusters was probably given by Business School Professor Michael Porter (1990): "Clusters are geographic concentrations of interconnected companies and institutions in a particular field" (Cortright, 2005). But there are a number of different interpretations. One of most popular alternatives was presented by Rosenfeld (2002, see Cortright): "A spatially limited critical mass (that is sufficient to attract specialized services, resources, and suppliers) of companies that have some systemic relationships to one another based on complementarities or similarities" (Cortright, 2005) Overall clusters seem to be a broad and complicated concept. But even though there is still argument about the perfect definition of clusters most scholars can agree on major cluster characteristics. Cortright summarizes it in the following way: "...businesses that are closer to one another have advantages that are not available to businesses that are further away" (Cortright, 2005).

⁴ Cortright, Joseph. (2006) *Making Sense of Clusters: Regional Competitiveness and Economic Development*. http://asa-appraisers.com/articles/making_sense_of_clusters.pdf

Why do firms benefit from concentration? It is amazing but Alfred Marshall first answered this question at the end of the nineteenth century. In his book *Principles of Economics*, (Marshall, 1890, see Cortright) he looked at groups of industries in England and identified three main reasons for firms to cluster, called Marshall's trinity: 1. Labor market pooling. 2. Supplier specialization. 3. Knowledge spillovers. Recently Glaeser, Ellison and Dumais, after years of study, empirically tested the significance of each of the factors in Marshall's trinity and found that labor market pooling is clearly the dominant and most significant factor, followed by intellectual spillovers and lastly supplier specialization (Glaeser, Ellison, Dumais, 1997).⁵ In the 1980's Porter, who is said to be the founder of modern clustering theory, came up with a more comprehensive list of the reasons for clustering. In his book *The Competitive Advantage of Nations* (1990) Porter introduces factors that he calls the diamond of competitive advantage: Factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry.⁶ Recently the list has become even longer and more precise. Cortright mentions the following factors: Labor market pooling, supplier specialization, knowledge spillovers, entrepreneurship, path dependence and lock in, culture, and local demand (Cortright, 2005).

According to Cortright there are two methods used in the academic literature to study clusters. Top-down and bottom-up. Top-down methods use deductive logic and quantitative analysis. Usually these studies use different kinds of data to draw generalized results about the level of agglomeration. One of the most important studies

⁵ Dumais, Guy; Ellison, Glenn and Glaeser, Edward. (1997). *Geographic Concentration in as a Dynamic Process*. National Bureau of Economic Research. <http://www.nber.org/papers/W6270> p.28

⁶ Porter, M.E. (1998). *Clusters and the New Economics of Competition. Location, Competition, and Economic Development: Local Clusters in a Global Economy*. (2000). *Economic Development Quarterly* 14 (1), EconLit.

of this kind was done by Glaeser and Ellison (1999)⁷. It develops a geographic concentration index that is used to check the level of actual concentration of manufacturing industries in the U.S. The results of the article may be surprising to some. The authors find that most industries seem to be concentrated more than they should be if geographic location of businesses was completely random. At the same time, many concentrated industries are that way for natural reasons (like along the ocean coast for the fishing industry). Furthermore, the concentration of roughly 40% of industries seems to be pretty slight and not significant enough to look at those industries as ones that tend to cluster in any way which would be useful for the purposes of this project. Some authors argue that using census employment data divided according to the Standard Industrial Classification system (SIC) for cluster analysis is wrong, as a lot of clusters include firms across different industries. Nevertheless, the Glaeser-Ellison index is the best geographical concentration index available today.

The second method for studying clusters is from the bottom-up, which implies qualitative analysis at the local level, applying methods like industry genealogy research or case study. There are numerous studies of this nature. Some of the better known ones includes Silicon Valley (Saxenian 1994, see Cortright) and the Hollywood film industry (Scott 2004, see Cortright), both of which use case study methods to understand the way these clusters developed.

A great amount of research has been done in order to understand if clusters are beneficial for the area where they develop. One of the major questions here is whether specialization or diversification is more beneficial for a community (Cortright, 2005).

⁷ Ellison, Glenn and Glaeser, Edward. (1999). *Geographic Concentration in U.S. Manufacturing Industries: A Dashboard Approach*. The Journal of Political Economy. <http://www.nber.org/papers/W4840>

This question is controversial, for example Glaeser supports different points of view in two of his articles. He emphasizes the importance of urbanization in his early article (Glaeser, 1992), and focuses on the importance of specialization in one of his later works (Glaeser, 1997). Generally, the answer to the question is different for different communities, but every community would prefer diversified production as opposed to total specialization, even though the latter produces most scale economies (Henderson 2003, see Cortright). The other major question is whether clustering firms pay more to a local population relative to the alternative. Wheaton and Lewis in their study found a positive correlation between specialization and wages (Wheaton and Lewis, 2002, see Cortright).

There have also been many studies looking at policy measures that can contribute to cluster development. A lot of them agree that the emergence of most clusters seem to be due to random events (Rosenfeld 2002, see Cortright). But Feldman and Martin proved that there exists the phenomenon of path dependence, where areas with some specific kind of knowledge have a better chance of starting a cluster (Feldman and Martin 2004, see Cortright).

Sustainable Industries

As it has been mentioned earlier, there is a lot of controversy in defining a sustainable business. Different sources give different definitions that are completely irrelevant to one another. For the purposes of this research paper, we decided to implement a different method to identify sustainable businesses. Rather than looking for a definition which seems to include all features that different sources consider parts of

sustainability, we will instead use a more practical approach in order to look at various businesses, companies, or possibly whole industries, which are termed “sustainable” by different sources.

After examining a wide variety of sources we decided to base our analysis on lists of sustainable businesses and industries from the 7 following sources. (full citing in Works Cited section)

1. The Sustainable Industries Journal (<http://www.sijournal.com/>)
2. The Global 100 most sustainable corporations. (<http://www.global100.org>)
3. The Oregon Natural Step Network (<http://www.ortns.org/>)
4. The City of Portland Office of Sustainable Development
(<http://www.portlandonline.com/osd/>)
5. Sustainable business.com (<http://www.sustainablebusiness.com/>)
6. The Oregon sustainability consortium
7. Wikipedia.com (http://en.wikipedia.org/wiki/Sustainable_business)

Now we will give a brief description of each source and the way in which they understand sustainability based on the information they provide. In the end we will come up with a final generalized list of industries that will be used later in the chapter.

The Sustainable Industries Journal mentions four sustainable industries of focus. They include: Green buildings, clean energy, sustainable technology, and sustainable foods and farms. In general, this journal is mostly concerned with environmental issues.

As a result, they see sustainable businesses as those directly contributing to environmental protection or at least to a reduction in pollution. Most of the businesses listed by the journal as examples, are small firms introducing new technologies or a brand new approach to specific production processes. Examples include previously mentioned SeQuential Biofuels, Portland's Brewery Blocks and The Organically Grown Company.

The Global 100 most sustainable corporations project introduces a completely different understanding of sustainability. The main idea of the project is to create a list of 100 global companies that are the most sustainable and to then change this list every year according to the companies' performance. It is easy to see that the focus is completely different from the previous source mentioned, as the project is mostly concerned with big industry leading companies, not small innovative firms. The understanding of sustainability is no longer centered on environmental issues. Here it takes into account social issues, as well as environmental ones, but most significantly, associates them with being an efficient, profitable business. A key part of this concept is the contribution to the development of technology and managerial techniques. As a result, the top 100 list includes companies representing different sectors such as manufacturing and utilities as well as purely service-oriented companies from the health care, financial, and even retail sectors. Judging by the fact that multinational companies like Coca Cola, Nike, and Walt Disney are a part of this list, leads us to believe that this understanding of sustainability is probably not what we are looking for.

The Oregon Natural Step Network is an association of businesses and individuals supporting sustainability, which introduces an understanding of this notion that is a combination of the two concepts explained above. Their primary classification of sustainability includes green housing along with service and manufacturing, rather broad classifications. If we look more specifically at the lists of companies that according to Oregon Natural Step Network represent sustainable manufacturing and services, we will see many of the same names that are included in the Global 100 list. Of further significance is the fact that this source introduces “hospitality” as a classification of sustainability. Hospitality would include such businesses as restaurants and hotels. Because restaurants and hotels are almost exclusively proportional to population size, they don’t have the propensity to cluster in the manner in which we are concerned. Due to these two factors, this source will not be largely represented in our list.

The City of Portland’s Office of Sustainable Development website pays special attention to several industries: Green building, renewable energy and bio fuels, recycling, and sustainable foods. It should be mentioned though that this organization also looks at sustainability as a feature of huge corporations. The smaller industries are seen as a core of sustainability, which are more relevant to the purposes of our research.

Sustainablebusiness.com, which is one of the most thorough online resources on sustainable businesses, provides the most complicated and diverse classification of sustainable businesses. It splits businesses into narrowly defined groups and gives a lot of examples of each. If we take these narrowly defined groups and generalize them to some

degree, we can say that the industries of main focus are: Renewable energy, energy efficiency (conservation), sustainable foods, and housing.

The Oregon sustainability consortium documents can hardly be considered a legitimate source information about sustainable industries. But we decided to use the list of consortium participants as another representation of sustainable businesses. Most of these participants were representing industries that were frequently cited by other sources: Recycling, green building, and sustainable foods were the most prevalent.

We also used Wikipedia.com as one of the sources. It is well known that information from this website can't be guaranteed as documented truth, as anybody is capable of modifying it. However, in this part of our research we are trying to gather as many different opinions as possible. Wikipedia's article on sustainable industries actually provides a pretty detailed list of industries. Most significantly it includes: Green building, sustainable energy, green transportation, sustainable forestry and forest management, and finally sustainable foods and waste management. This list appears to be quite relevant to our purposes and it adds the industry of sustainable forest management, not previously mentioned in other sources, but especially important for Oregon and Eugene specifically.

Industry	SBI	The Sustainable Industries Journal	The Global 100 most sustainable corporations	The Oregon Natural Step Network	The City of Portland Office of Sustainable Development	Sustainable business.com	The Oregon sustainability consortium	Wikipedia.com
Renewable energy	X	X			X	X		X
Reused wood products, forestry care.	X							X
Sustainable (organic) foods	X				X	X	X	X
Reuse and Recycling	X	X			X	X	X	X
Green building and building materials	X	X		X	X	X	X	X
Corporations introducing sustainable practices			X	X				

Analysis

After surveying the preceding various sources on sustainability, we can produce a useful list of sustainable industries that takes elements from each source in the context of our issue. As mentioned earlier, we are going to ignore the understanding of sustainability as quality of business management (as in the case of multinational corporations), as this definition is not overly conducive with the purposes of our project, local development of sustainable business clusters. We are looking for possibilities to create sustainable clusters that would benefit the Eugene community in the long run. If a

multinational corporation were to extend a branch here, it would certainly not be the start of a cluster as they would prefer, and actively seek to not face any competition in the area, as well as export profits to the parent company. Taking into account the assumptions we have made about our working definition of sustainability (derived from the goals of this project), and taking into account the compiled definitions of sustainability from the various described sources, we arrive with the following list for what we will consider sustainable for the rest of this work. Although not necessarily all-inclusive, the main list is as follows:

- Green Housing (construction)
- Sustainable foods
- Renewable energy and energy conservation.
- Recycling.

These are the industries which are mentioned in almost every source on sustainable businesses. We will add sustainable forest management to this list as it is Oregon and Eugene specific.

Standard Industry Classification System

The next step in this analysis will be to create a list of industries by their 4 digit Standard Industrial Classification (SIC) codes that fit our understanding of sustainability, or, can at least represent industries that share main features with the industries of our interest. The SIC system is a way to categorize industries by type. By selecting specific types which match those industries that were defined as sustainable for our purposes in the previous section, we can get data specific to each industry. This is done in order to

evaluate various industries' clustering potential using geographical concentration indexes developed by Glaeser and Ellison (Glaeser, Ellison 1999). Assigning SIC numbers to sustainable industries is not as easy as it may sound. In the times when the system was developed, nobody thought of separating environmentally sustainable industries into a separate class, so most of them are included within bigger industries. Because of this we will have to assume that the way businesses operate does not change too significantly between a sustainable and non-sustainable modification of the same business. If we for example compare organic food production to usual food production we will assume that the production process doesn't change too much. Organic food production would most likely use different inputs and be more conscious about using preservatives, chemicals, and things of that nature, which would make the marginal costs of the business slightly higher, but not fundamentally change the principles of the production process. This assumption is introduced only to make sustainable and non-sustainable industries of the same kind comparable so that we can use the Glaeser index of geographical concentration.

The only industries from our sustainable list that are represented in the SIC classification in their original form are recycling and sustainable forest management.

Recycling:

5093 - scrap and waste materials

2493 - reconstituted wood products

Forest management:

0851 - forestry services,

0831 - forestry nurseries and gathering of forest products.

To assign indexes to other sustainable industries we have to use the assumption made previously. All types of sustainable food manufacturers will fall under a broader 2-digit industry classification:

20 - food and kindred products

Green building would likewise fall under a broader 3-digit classification:

152 - General Building constructors, residential

154 - General Building constructors, nonresidential.

Finally, all energy industries are represented by:

4911 - electric services.⁸

Estimating the Clustering Potential of Sustainable Industries

In this part we will use the Index of Geographic Concentration that was developed by Glaeser and Ellison (Glaeser, Ellison, 1999). The article mentioned provides information about index values for 4-digit manufacturing industries. Index calculations are based on data about employment distribution between spatial units (states, or counties) for each industry. The index shows the level of geographic concentration according to the dartboard approach theory (the assumption that all businesses otherwise would be randomly placed on the map). The index's values range from 0, indicating that businesses in the given industry are absolutely evenly distributed among the states, to 1, which means that all firms are located in the same state. In practice most of values are

⁸ U.S. Department of Labor Occupation Safety and Health Administration. *Standard Industrial Classification System Search*. Official website (<http://www.osha.gov/pls/imis/sicsearch.html>)

really low, so if the index value exceeds 0.05 we can talk about existence of geographical concentration (a cluster).

As we only have values for manufacturing industries we won't be able to estimate every industry that we are interested in. But let's start with the food industries. Overall, the concentration index for them equals 0.002, which shows almost no concentration whatsoever. This makes sense as demand for food is distributed proportionally to population and several types of it expire quickly, preventing extended transport. But at the same time, there are some 4-digit classifications inside the food industry that, according to the index show a tendency to concentrate. This is true for industries with the longest and most complicated production cycles and for products that are easier to transport: Cheese production, frozen fruit, rice milling, and dried fruit. Even though these specific industries have clustering potential, they don't seem to fall into the category of the sustainable industries that we are looking for. So we didn't find any proof of the food industries' clustering ability, but this analysis might not give a proper picture of the sustainable foods industry. First of all, the index is calculated for state concentration and might not be correct for county level where distances are shorter and the transportation factor is less important. At the same time, the sustainable foods sector may have other qualities that can contribute to forming a cluster, which we will discuss later on.

We can also reference the index results for the reused wood industry. The Index value, 0.029, is not enough to talk about a high level of concentration here. For other industries at this point we can only make predictions.

It is hard to expect construction companies to form a cluster, as housing demand is also exclusively proportional to population. However, sustainable raw materials can easily be concentrated in a certain location, and this may refer to both the recycling industry and green construction. Overall it is hard to give a definite answer.

The situation with the energy industry can be even more complicated. It is obvious that energy generation can't possibly be clustered because the losses associated with energy transportation costs make it unreasonable. But other energy related sustainable businesses may have clustering potential, for example biofuel producers.

Adapted Local Approach to the Glaeser/ Ellison Index

Even though the indexes developed by Glaeser and Ellison give a good basis for the comparison of industries, this is not necessarily so with regards to clustering potential as there are a number of problems with them. First, of all the results we were using were calculated with the use of employment data by state. It is clear that this is an entirely different, and perhaps irrelevant scale compared to the focus area of our research. In general, it is easy to see that industries that tend to cluster at a state level probably won't be able to cluster in a city like Eugene. A well-known example is the automobile-assembling cluster in Michigan, which is too big to be supported by any other city in the state than Detroit. The second problem with the Ellison-Ellison results was that they were not available for a number of the specific industries we were looking at, so we had to find another way to estimate their clustering potential.

The next step is to get some information on the clustering potential of sustainable industries at a local level, for example at the county level within state of Oregon. The

first idea was of course to calculate the Ellison-Ellison indexes on the county level. Unfortunately, in their calculations, the authors use Herfindal indexes for employment by individual businesses in the industry. This data was not available to us. All published statistical data must fit the confidentiality criteria, so numbers for specific firms are not available. But we had access to employment per industry data for all counties in Oregon. Using this data along with total employment in Oregon data we could easily calculate the basic concentration coefficient proposed by Glaeser and Ellison. This index can give a good idea of the general level of concentration. The index is based on the comparison of the shares of two values assigned to the same feature. In our case it is the comparison of the share of employment in a specific industry to the share in total employment in the state for each county.

Before proceeding, we first faced another problem. More recent statistical data is organized according to a more recent classification called the North American Industry Classification System (NAICS). This classification is much different from the one used in the days when Glaeser and Ellison published their article. It is hard to find direct relevance between the sustainable industries we found in the old classification and industries distinguished by the new classification. So we had to figure out the codes of sustainable industries in NAICS in the same manner we did for the SIC. Here is the list we came up with.

236 (Construction of buildings)

326 (Plastic and rubber)

327 (non-metallic mineral)

1132 (Forestry nursing and gathering)

1153 (Support for Forestry)

311 (food)

3121 (Beverages)

562 (Waste management)

2211 (electric power)

This time we also assumed that non-sustainable and sustainable industries of the same type share same qualities.

We acquired employment data for these industries from the Longitudinal Employer-Household Dynamics section of the official census website (http://lehd.dsd.census.gov/cgi-bin/qwitop_naicmain?xstate=or&xstyle=lehd&xdbase=naics).

The index we were looking for is calculated according to the following formula.

$$g = \sum_{i=1}^M (s_i - x_i)^2.$$

(Glaeser, Ellison, 1999), where s is the proportional employment share of the county, i is the states total employment, and x is the actual employment share of the county for the specific industry. We still faced a slight methodological problem before calculating the index. We figured out that because some of the counties only have one enterprise in a specific industry, the information about its employment is considered confidential. Information for these counties is listed as N/A. In the end, the sum of employment by county was not equal to the total state employment statistics. So to calculate the shares, we used the sum of employment by county with the data available, considering the value of all others to be equal to 0. This method is more statistically correct and should not significantly distort our results.

Our results are presented in the table below.

County	236 (Construction of buildings)	326 (Plastic and rubber)	327 (nonmetallic mineral)	1132 (Forestry nursing and gathering)	1153 (Support for Forestry)	311 (food)	3121 (Beverages)	562 (Waste management)	2211 (electric power)
g	0.0137	0.0675	0.0136	0.9456	0.1674	0.0347	0.0826	0.0273	0.0422

The index interpretation is really straightforward. If there is no employment concentration in the industry, then the share of employment for this industry in each county would be equal to the county's share in total employment, yielding an index value of 0. At the other extreme, when all employment in a given industry is concentrated in one county, the index will approach 1. The final result would depend on the preexistent spread of shares.

Looking at the indexes we achieved for per-county employment in Oregon we can see that Forestry Nursing and Gathering seems to be extremely concentrated. Unfortunately, we have to admit that this result is not credible because of the industry's specific features. First of all, state employment for the industry is only 111 people. This low level of employment inherently shows us that this is not an industry with good clustering potential. The result we achieved is explained by the fact that only one of the counties has the exact number of employees listed. The information for other counties is shown as N/A due to the confidentiality issues that we discussed earlier. We can still say that industry employment is concentrated because Clackamas County accounts for more than 50% of it (60 employees). There is an explanation for this- most of the territory of

Clackamas County is covered with woods and more importantly the Mt. Hood National Forest is located in this county. As national forests get more funding for forestry services it boosts industry employment. If we use Glaeser, Ellison terminology, we can say that this specific example of concentration can be explained by natural advantage.

No other results show any significant concentration. Only the index value for the Support for Forestry exceeds 0.1, but the same effects that influenced the results for the Forest Nursing and Gathering industry can explain this. All other industries do not show any significant level of concentration. Of course we can speak about relative levels and say that for example, plastic and rubber production is much more concentrated than food production, but we think that at this scale of differences it really doesn't matter, as these small changes can be explained by simple statistical errors in data biases as described before.

Concluding this analysis we have to state once again that we haven't found any convincing examples of clustering sustainable industries. We looked both at the state and national level, but the results we obtained didn't give us a clear understanding of which sustainable industries have a good clustering potential.

This result shouldn't be interpreted as a failure for several reasons. First of all, we can't really tell if the existence of one cluster in a specific industry means that there is a better chance of forming a new cluster in that same industry than in an industry, which has not been known for successful clustering before (just because it worked once doesn't mean it will work again). Another explanation can come from looking at sustainable industries and their qualities. By now it is clear that even though we assumed that sustainable industries have the same qualities as relative manufacturing industries, it is

not necessarily true (however we needed to make this assumption to proceed).

Sustainable food production is a good example, as it can be very different from general food production. The differences are difficult to explain applying economic concepts. For example, one possible explanation is the existence of a subculture around healthy foods. This involves different consumer attitudes toward the product and results in their willingness to pay more for healthy (organic) products, which limits the necessity for mass production and changes the way the industry looks completely, as smaller businesses can now enter the market.

Later in this paper we'll talk about other ways to look at sustainable industries clustering. But before we move on we would like to make one last point. When we initially defined sustainable clusters we mentioned that they need to be beneficial for the Eugene community. Unfortunately there is no proof that they are. To show this we looked at average wages in sustainable industries by calculating the average earnings per worker. We used the following list of industries: 1132 (Forestry Nursing and Gathering), 1153 (Support for Forestry), 311 (food), 3121 (Beverages), 562 (Waste Management). We left out Construction, Construction Material and Electric Generating industries because average wages in them would not be relevant for sustainable versions of these businesses as they only represent a tiny part of the industry as a whole. We used official census data⁹ as well as well as data of Pacific Northwest Economic Analysis Project.¹⁰ Here are the results we achieved.

⁹ U.S Census Bureau. Longitudinal Employment- Household Dynamics. (<http://lehd.dsd.census.gov/led/>)

¹⁰ Smith, Gary W, Ph.D. (May 4, 2007) *Pacific North West Economic Analysis Project*. Bureau of Economic Analysis. <http://www.pnreap.org/>

Average earnings per job in sustainable industries	\$2,814.20
Average earnings per job in Lane county	\$2,930.75
Average earnings per job in Oregon	\$3,619.50

Here you can see that average earnings in industries that we considered sustainable are below average earnings for the state as a whole and for Lane County. We have to admit that this is not an absolute result, due to limited data availability on sustainable businesses, but it gives you a basic idea that it looks like sustainable businesses are not ones that tend to pay a lot. Do we really want to bring sustainable businesses to the community even though they are going to pay less than average? This is a question for policymakers. We just hope that our analysis, even though not leading to exact results, can contribute to a better understanding of the nature of possible sustainable clusters and how beneficial they would be for the Eugene community.

Negative Aspects of Clustering

Even though clustering is unarguably considered to be good for the economic development of communities and their standard of living, some economists have expressed concerns about it. Most of them are concerned with the limited ability of heavily clustered areas to overcome economic recessions. One of the reasons for this is the fact that different industries can suffer from recessions in a different way. Some find it easier to recover while others keep stagnating for a long period of time. If a community is largely tied to a certain cluster, it runs a high risk of being tied to the fate of

that clustering industry. If the next recession were to strike this particular cluster, the whole community might find itself thrown back a good decade in terms of economic development. This is the most general vision of problems that can arise from clustering. This is comparable to idea of having a diversified investment portfolio. If your investments are all in tech companies, and the market sees a ‘bubble burst,’ as happened in the late 1990’s – early 2000’s, then your portfolio will be thoroughly damaged. In the following section we will focus on more specific theoretical explanations of problems that can arise due to excessive clustering.

First we will introduce a concept presented by Adrian T.H. Kuah in his paper “Cluster Theory and Practice: Advantages for the Small Business Locating in a Vibrant Cluster.” He adopts a hypothesis introduced by Martin and Sunley (2002, see Kuah) that is based on the concept of the famous Kuznet’s business cycles. Kuznet’s idea was that the industry leading economic growth of the country couldn’t stay on top forever. One day it would reach the limit of its development potential and would be overtaken by another industry. The same logic can be adapted to clusters. Research shows that at some point clusters can reach a point at which they no longer benefit from agglomeration. One of the reasons for this comes from the limitations of the firm’s strategic behavior within clusters. As clusters develop, firms get used to synergies, innovation and strategy within cluster. In the end it leads to firms not being flexible enough individually to adapt to sudden changes in the market or in the economy as a whole. Individual businesses are usually faster to adapt to shocks,¹¹ so less clustered, more diverse communities can overcome recessions easier, as each individual business will get over it faster. Porter

11 Kuah, Adrian T.H. *Cluster Theory and Practice: Advantages for the Small Business Locating in a Vibrant Cluster*. Journal of Research in Marketing and Entrepreneurship: Volume Four, Issue 3, 2002

(2000) and Swann and Prevezer (1998, see Kuah) took this ideas even one step further. Porter suggested that clusters might not adopt radical technological or institutional innovation because they are locked in with their current path of development. That gives independent firms the advantage of benefiting from the latest technological achievements and gives them more flexibility in fighting recession.¹² Swann and Prevezer suggest that cluster usually don't last further than the technological achievement that got them started. If firms within a cluster are not willing to switch to new more productive methods when they appear, their niche can be overtaken by other businesses of the same kind operating individually.

Rutledge Vining presented another view of the same problem in his paper "Location of Industry and Regional Patterns of Business-Cycle Behavior." He focuses on the difference between firms producing for local consumers and firms oriented towards export. He claims that these 2 types can behave very different in the way they face recession. The author makes the point that demand for products of exporting industries can shrink much more than demand for products of firms producing locally. Communities that might suffer the most are those that import necessities and export durable or luxurious goods.¹³ Now if we remember that clusters are oriented toward exports, their development in Eugene may lead to an increase in economical volatility, especially in times of recession. We also believe that sustainable products can to some extent be considered luxurious as they are produced with the use of less efficient technologies and sold for higher prizes. The whole idea of sustainable goods is based on

¹² Porter, M.E. (2000). *Location, Competition and Economic Development: Local Clusters in the Global Economy*. Economic Development Quarterly, Vol.14-1: P. 15-31.

¹³ Vining, Rutledge. *Location of Industry and Regional Patterns of Business-Cycle Behavior*. Econometrica, Vol. 14, No. 1. (Jan., 1946), pp. 37-68.

the belief that people would be ready to pay extra for their environmental qualities. During economic recession this willingness to pay may decrease, which could put Eugene in a really bad situation.

Concluding this part of our research we want to state once again, that we don't want to say that sustainable clusters would be harmful for Eugene. We just want to stress that we think that it is important to understand all possibilities that arise from a commitment to the idea of building clusters in Eugene.

Role of Government, Possible Policies

This section will discuss the theoretical role that government should play in establishing these clusters, and then discuss the comparative advantages tied in with this role, as well as an example of an effort already underway.

Traditional economics states that government should intervene in the free market when there are otherwise unsolvable market failures. When we are talking about developing sustainable clusters, 2 key causes of failure come to mind: Imperfect information and free riding. The first addresses the issue of sustainability. This alludes to the fact that firms don't attempt to achieve sustainable practices because they are unaware of the potential benefits. These benefits are not necessarily direct, nor seen in the short-term. For example, most arguments today pushing for more environmentally friendly business practices are based on the worsening climate crisis which will not be realized until the mid to long-term. Although most business leaders are aware of this, they don't have any sense of how exactly this will affect them. This is where the government could come in and educate businesses that spending a little more on

sustainable efforts now, will save them money in the long run, just like any investment. However, not all benefits are accrued in the long run. There are several examples, as laid out in the SBI Final Report, of short-term measures that existing businesses have already taken which currently save them money. These efforts are also something that should be stressed.

The second cause, free riding, moreover addresses the issue of clusters. We can think of this as a game of steal the bacon. Firms want to have a more unified approach to marketing in order to most efficiently draw upon all collective resources for the betterment of the group as a whole. The holdup is that no one wants to go first and end up having their efforts disproportionately distributed amongst the group. This is where an outside body (namely government, but not necessarily as described below) needs to step in to facilitate the cooperative measures. It is important to note that this doesn't mean government will act as a dictator. Likely, these firms have already had it in mind to accomplish something similar, but haven't had the mechanisms to do so. Government can provide these mechanisms.

If the Eugene area is to develop itself into an exporting cluster of sustainability, then it must capitalize on the comparative advantages that it enjoys. Eugene has had a longstanding tradition of being a midsized community with a strong local demand and appreciation for the environment, the outdoors, and sustainable practices. It is this sentiment that must be marketed to other like-minded individuals, groups, and businesses beyond the local geographic borders. With worsening global environmental conditions etc., awareness for all things sustainable is on the rise and Eugene must position itself from a sales perspective to be ready to take advantage of this and be seen as an industry

leader (geographically). Although we have gone into detail about the controversy surrounding the definition of sustainability, for the purposes of selling/ marketing local products it really doesn't make a difference which definition you use. The point instead is to support the popularizing of the term and to then create the public perception that 'sustainability' is closely associated with Eugene. This is similar to the manner in which the term "all natural" has become popular as a means of marketing a variety of products. If you look in detail/ depth at this term, you will find that it means different things for different products, just as sustainability means different things to different people. Regardless of people's definition, if they think of Eugene as being a center for sustainability, then the objective has been achieved. It is important to note that the concept does not necessarily advocate misleading people about what sustainability means, but rather to use name recognition to increase overall customer awareness. To get more specific, if local government or other groups were to take some form of action, they would go about identifying target markets, or those which have been determined to have a large concentration of people with a demand or interest in sustainability. From there, they can create a campaign tailored to the given target market to influence their purchasing decisions. This type of activity is something that must be done as a collaborative effort, as any single firm will not have the resources to do this.

An example of an association already beginning these efforts is the Willamette Valley Sustainable Foods Alliance. This is an organization, comprised of 55 local food producers with a goal to "promote natural food businesses through relationships, education, and sustainable business practices." As described by Alliance Board Member Brad Averill, "There is such a strong natural foods industry and tradition here, and we

have something that's really unique." This is exactly the point that must be effectively conveyed to outside markets if this association and industry is to evolve into a larger cluster. When we look at other similar clusters, such as the Napa Valley wine producing area of northern California, we see that this cluster benefits greatly by having a wide public association between the terms 'Wine' and Napa." Developing similar recognition for 'Willamette' foods is likewise an essential part of achieving the same effect.¹⁴

The issues just discussed, will be addressed in further detail in next section, analyzing the specific recommendations of the SBI.

Analysis of the Sustainable Business Initiative Recommendations for the Private Sector and Non Profit Organizations.

In this part we would like to take a closer look at the recommendations presented in The Sustainable Business Initiative Final Report for the Private Sector and Non Profit Organizations, and comment on them from the perspective of our research. We started out this paper by briefly presenting highlights of SBI, and now after we have gone through all the stages of our analysis, we are ready to give our assessments of the final results of the SBI.

It is necessary to mention that not all of the recommendations have to do with economics. A lot of them have more of an organizational purpose. For this reason we won't focus on recommendations from parts A, B and D, which are concerned with a detailed presentation of the vision of a sustainable Eugene and proposed changes in

¹⁴ McDonald, Sherri Buri. (March 4, 2007). *Natural Alliance Grows in Valley*. The Register Guard, P. B1

governmental methods and policies. Specifically, we will be focusing on part C of the SBI Final Report (pp. 35-37), which is devoted to recommendations for the private sector and non-profits.

The first recommendation invites businesses to introduce sustainable methods and spread them in the community. From a theoretical point of view, businesses will never switch to sustainable techniques unless it is profitable for them. We can say that in most situations introducing sustainable methods to business operation will mean additional fixed costs, concerned with adaptation to new methods, and potentially growth of marginal costs. Without an increase in prices, which is unlikely to happen, this will lead to a decrease in profits. We can assume that probably after becoming sustainable a firm might be able to sell its good for a higher price. Still it is unlikely that this effect will be able to overshoot the effect described earlier. If we look to the long-term, the case can be made that future profits will be greater by adopting sustainable practices now, but this is at the sacrifice of current profits. Here we can conclude that the only way to make firms switch to sustainable practices in the short-run is to provide them with a certain financial incentive in the form of tax rebates, free services, or other kinds of transfers. At the same time this is not quite what we want to do, as our aim is to develop clusters that would benefit the community, which implies that they would need to contribute to the local budget rather than detract from it. In the end, we can only say that this recommendation may be economically questionable though its political motivation is clear.

The next recommendation comes really close to the main focus of our research, as it talks about commitment to the expansion of sustainable business clusters. One thing that is important here is the statement of interest of local government in cluster development, contrary to the development of single businesses. As we have discussed earlier in this paper, clusters are really hard to develop and predict, with many of them happening accidentally. Unfortunately, it looks like this recommendation doesn't take this into account. The main focus of the recommendation is encouraging local non-profits to help members of developing clusters in problem solving and communication with each other. This could be a useful line of suggestions for an existing cluster facing recession. In the case of Eugene we can't really speak of well-developed sustainable clusters. In Eugene's situation it is important to think of creating an incentive for new businesses to come in, which is providing them the best conditions to use local comparative advantages in order to make profits. We presented a suggestion on this part earlier on when we talked about regional brand marketing. We think that introducing a unified marketing strategy for all products within the cluster can succeed in building up demand for goods as well as building up the attractiveness of the area for businesses.

The next recommendation speaks about the recruitment of businesses to fill niches in existing sustainable clusters. It brings us to the argument expressed in the previous paragraph. Recruiting businesses for the cluster seems to be a strange idea. If those businesses had enough financial incentive to operate in the community they would come here themselves. A successful and profitable cluster would easily create all sorts of service business around it as it would be capable of paying enough to all services to

guarantee profitability to these businesses. At the same time, businesses that come to the community on their own would probably be much more sustainable in a purely financial way in terms of producing profits for a long period of time than businesses artificially brought here.

Recommendation #4 speaks about forming associations within each developing cluster. In our view this will not necessarily bring large gains, but there is definitely a lot of economic sense to it. As it was stated in the very beginning of this paper, the main source of scale economies for cluster members is a shared labor market. Better cooperation can definitely contribute to the development of this shared market and therefore help individual firms take better advantage of local comparative advantages. This may lead to making businesses more profitable, which in turn can make clusters more profitable, and therefore attractive for new businesses to come in. But to be honest we have to admit that this picture is really idealistic, and in reality this measure cannot solely change the situation. For it to work, it is important that individual businesses recognize the benefits they get from cooperation, even though the payoff they may only happen in the long run.

Recommendation #5 is probably the most misleading recommendation in the list. It talks about increasing local awareness about the positive value of sustainable products. From an economic standpoint it directly encourages boosting local demand for sustainable goods, assuming that this is necessary for cluster prosperity. As we have indicated earlier, export potential is one of the most important requirements for cluster

development. A cluster is meant to produce more than is necessary for the local community. Therefore it is inherently oriented to other non-local markets. Of course, it is great to develop a community valuing sustainable goods, as it would contribute to the overall image of the area and probably be an additional comparative advantage. But from the purely theoretical view this recommendation cannot be targeted only at local consumers. The focus should be on bringing local goods to outside markets, not just boosting local demand.

The next recommendation talks about increasing access to loans and grants. Overall it seems like a great idea as it fits the earlier idea of creating additional incentives for businesses to go sustainable. The recommendation talks a lot about letting financial businesses know that investments in sustainable businesses can bring profits. If there is actually an informational barrier like that it is important to clear it. But we believe that if sustainable businesses could generate consistent cash flows, they would have no problems attracting funds from financial institutions. Here we once again go back to our suggestion about focusing on finding markets for sustainable goods and creating conditions for their profitable functioning. We would also suggest that on the stage of cluster development, loans and grants from governmental agencies could be important, as at this stage financial institutions tend to overestimate risk concerned with investing into a developing industry.

The last recommendation looks at a number of very important social questions, unemployment and low wages included. It is important to understand these problems and

look for ways to solve them, though the creation of a taskforce, which is considered in the recommendation, may not be that useful. The economic decision would be to concentrate on supporting the business community development and encourage it to pay higher wages and be socially responsible overall. When talking about sustainable clusters, we should remember that they tend to pay wages that are lower than average. So, do we really want them? Furthermore, it should be realized there is an opportunity cost associated with spending city funds on sustainable efforts, such as not having those funds available for other social programs like education, health, safety etc. Any efforts to allocate these funds to sustainable initiatives should be evaluated against the next best possible use of those funds, to see which provides the greater net benefit.

It is really ironic that we finish this part with a question. In a way the SBI recommendations provide more questions than answers. Perhaps it is natural when initiatives, such as this one are first stated. We hope these constructive criticisms from an economic point of view are useful in further refining the goals of the SBI.

Conclusion

The Sustainable Business Initiative, brought forth by the Mayor of Eugene, first introduced the idea for this paper. Our aim was to overcome the confusion surrounding sustainable business clusters by applying basic economic concepts to the issue. It turned out that there are many more problems and unresolved issues in this area than at first glance. We found out that there is no unified understanding of sustainability, and depending on the way in which we look at it, we get different viewpoints of what the

Eugene Government is looking for. We started off by introducing different definitions of sustainable businesses and chose the medium one for the purposes of our paper. We decided to focus on sustainable businesses that in their work either directly contribute to environmental protection or at least tremendously reduce external effects of the product by using more environmentally friendly approaches.

We then took a closer look at the sustainable industries matching this definition and tried to analyze their individual clustering potential. After using different approaches we failed to find any credible example of a sustainable industry with a consistent tendency to cluster. We consider this result not to be a failure, but an affirmation of the true nature of clustering: A controversial issue with no general rule saying that industries that have never clustered before can not form a cluster, and vice versa, that industries that have clustered in the past will necessarily cluster again when attempting to replicate conditions. It is also important to understand how the specific qualities of sustainable industries already present in Eugene can be used to turn this presence into a developing cluster.

The issue of clustering itself produced a number of questions. We found out that the vast majority of clustering theorists point out that the mechanism of cluster formation is still to be explained and in many famous examples, local government policies had hardly contributed to clusters' success. It is important to understand that cluster is a formation of like businesses producing goods at a larger scale than that necessary to satisfy local demand. In other words, they explicitly **export**. In successful examples, clustering industries make use of local comparative advantages, as well as specific labor force concentrations and knowledge spillover effects to produce a better and cheaper

good, capable of profitably exporting to distant markets. It seems that Eugene has the potential to meet some, if not all of these basic requirements. Assuming that it can, the problem becomes whether or not these clusters we want so bad would actually provide a net benefit to the community, and if yes, what kinds of policies can contribute to cluster establishment. Unfortunately, simple statistical checks showed that sustainable industries tend to pay less than average wages, which questions the whole idea of fighting for these clusters.

If we finally decide that our chance of starting a cluster is quite good and its social effects are indeed positive overall, what policy should we then implement? Of course coordination and labor education are important parts of clusters, but in our opinion if these measures are forced on businesses, they don't really lead to positive results. It is more important to create a situation where businesses can make the most out of Eugene's comparative advantages. As mentioned, one of the ways to do this is to start a marketing campaign, focused on promoting regional brands, not just products of specific businesses. Once this brand gets an established image, like the famous Bordeaux and Napa wines or Swiss Chocolate, it gives outside businesses a signal that the area's comparative advantages will naturally help businesses succeed, and promotes the region as an attractive place for businesses of a particular kind (clusters).

In the end it is important to say that this work only introduces the reader to the issue of sustainable clusters. There is little to no preexisting research on this specific topic. In this work we gave an overview of the principal problems facing the issue and then pointed out directions for further research. One of the major ways to continue

researching the topic is to alternate different understandings of sustainability and see how the results may change.

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