

OBSTACLES TO ECONOMIC DEVELOPMENT WITHIN THE ICT INDUSTRY: AN EXAMINATION OF TRENDS OVER TIME AT THE REGIONAL LEVEL

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ABSTRACT

This paper reports on the results of an evaluation of the economic development environment within the information and communication technology (ICT) industry for California's central valley over a five year period by combining six sets of data collected over a five year time span within these three regions. Student workers conducted computer guided telephone interviews with owners or high-level executives in ICT-related companies within each study region. The results include a background literature review, an overview of the methodology utilized, a preliminary analysis of the data, and future research plans. Factor analysis was employed as a means of extracting broad information from the data. **Keywords: ICT, economic development.**

BACKGROUND

Many communities regard information and communication technology (ICT) as a prime employment vehicle for economic development at every level. It is frequently cited in the literature as a path toward increased globalization and as a prime vehicle to utilize in the transition from a manufacturing or agrarian economy to an information or service oriented economy. [13] [15] This viewpoint is often promoted on a global basis, but it can also be a powerful tool to employ at the regional level. [9] McQuaid has indicated that "The relationships between entrepreneurship, ICT and local and regional economies are intertwined and each contains overlapping cultural, socio-economic, technological, spatial and temporal elements. How they are interconnected is still not fully understood and there is no clear theoretical framework linking all of them." [12 p. 909] Archibugi, *et al.* [1, p. 2] consider the necessity of developing a "system of innovation" that relates to the creation and diffusion of these technological innovations as a method of exploiting the opportunities offered by the combination of ICT and economic development.

It has become commonplace for governments and quasi-governmental agencies to identify "...commercial applications of information and communications technology (ICT) as offering great potential to accelerate economic growth in developing nations." [18, p. 301] However, there are still concerns in some quarters that the ICT industry might need to be viewed as a force for increased inequality in capitalistic economies due to increases in socioeconomic complexity and increases in skill set specialization. In this regard to those concerns, Steinberg called for an international strategy that focused on helping people "... escape the traps of poverty, disease, and lack of education." [16, p. 45] Steinberg also discussed the need to consider ICT as a "... potentially powerful tool when used judiciously as a part of an overall development strategy." [16, p. 48] He further discussed an evolving role where ICT could bring new ideas into economies that are currently outside the global mainstream. Geoffrey Hodgson suggested the

utilization of targeted education to "...break the link between growing knowledge intensity on the one hand and growing pecuniary and social inequality on the other." [8, p. 474]

The advantages of employing ICT as an economic development tool were cited by Sayed and Westrup whereas they viewed it as a vehicle for increasing economic activity and reducing social exclusion. [15, p.79] In addition, knowledge, technology, relationship management, and process management were all cited by Walters, Halliday, and Glaser as the building blocks for organizations in this new economy. [17] There is also a need to consider other forces that affect a person's economic decisions "...such as a lack of information, problems processing information, or even inertia..." when considering the utilization of ICT in a developing economy as cited by Asimina Caminis. [2, p. 5]

The monumental global growth of e-commerce coupled with the growth of ICT in general has prompted the initiation of government programs at the local, regional, and national levels to ensure that most organizations have high-speed Internet connections along with technically literate employees. "Implicit in government initiatives are both the promise and the expectation that focused support at all levels of economic activity will increase the competitiveness of European workers." [11, p. 322] The relationship of e-commerce and the Internet to regional economic development according to Charles Wood revolved around this concept: "Conceptually, bottom-up development approaches seek growth from the edges rather than from the center. Due to the benefits it offers, the Internet fits well with the dynamism of individual entrepreneurship, which is an important component of overall economic development." [18, p. 306] Any economic development initiatives within regions of high unemployment and low levels of ICT investment that exist as depressed pockets within more developed economies would be most appropriate for the application of these concepts. It should follow then that these concepts could be applied to the economic problems faced in California's central valley since it has an agrarian economy with high unemployment coupled with many educationally disadvantaged workers.

Nevertheless, one must take into account the many business climate issues faced by the state of California when considering economic development in this region. As described by DeRocker [3], this may be a matter of perception or reality, but it is an economic development problem that needs to be addressed. In general, most of the economic development effort within a locality is directed toward attracting and growing businesses within the ICT sector, but an effective approach in that regard might include working toward removing or minimizing obstacles to growth for the ICT industry within that region. It would appear that one of the best resources for defining current obstacles to economic development within the ICT industry within a particular locality would be the owners or executives of existing ICT businesses within that region.

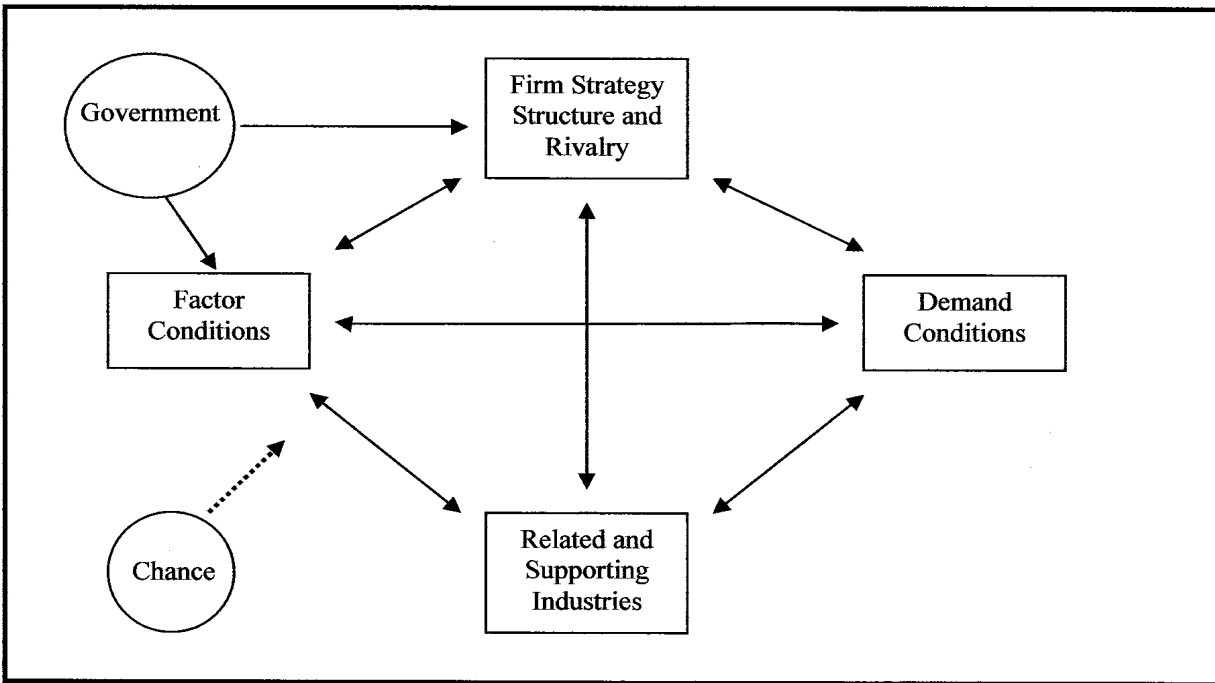
CONCEPTUAL FRAMEWORK

Data for this research thread has been collected over a five year period in three regions of California's central valley. This project was initiated in 2001 in the 559 telephone area code (around Fresno, California) was repeated in 2004. In a similar manner, data was collected in 2002 and again in 2006 in the 209 and 661 area codes (Stockton and Bakersfield respectively). The objective was to employ a computer-based interview tool in order to help determine the factors that companies in the ICT industry consider obstacles or hindrances to their economic

progress within each local study region. The same basic methodology was utilized for two studies in each of the three regions. The data collection process focused on the labor markets and community issues, including costs of doing business and quality-of-life questions. Student workers in a social-studies research lab conducted telephone interviews of owners or high-level executives in ICT-related companies in each of the studies.

This paper focuses on 18 questions related to the business climate including an analysis of environmental conditions that may have a negative impact on behavioral intentions in regards to economic progress through the ICT industry. The study is grounded on the theoretical foundation of the diffusion of technology and the concept of fostering a climate that supports innovation by identifying and mitigating obstacles to economic activity in the ICT industry. These 18 questions relate to a discussion of economic competitiveness by Malecki [10] with references back to Michael Porter’s work in 1990. [14] This is illustrated by the revised “diamond” model of competitiveness in figure 1.

FIGURE 1: THE ‘DIAMOND’ MODEL OF COMPETITIVENESS BASED ON PORTER [14], REVISED FROM MALECKI. [10, P. 8)



The objective of this aspect of the study was to determine which areas presented problems or obstacles for an ICT business within the study region. This would focus attention and possible corrective action on those issues that are sufficiently adverse as to cause a business to consider relocating. These include such factor conditions as:

- Infrastructure
- Skilled labor
- Knowledge resources
- Physical resources
- Financial resources

The following aspects were considered in regards to related and supporting industries:

- Suppliers
- Specialized suppliers
- Industrial Clusters

Demand conditions might include:

- Home market
- Links to global markets
- Sophisticated buyers

Other questions were related to quality-of-life concerns such as:

- Community crime rate
- Affordability of housing
- Transportation and accessibility concerns
- Quality and availability of education

Concerns related to Firm Strategy, Structure, and Rivalry were not considered in this study since those issues were seen as focused on one or only a few companies rather than on the industry as a whole. Those types of factors certainly have a role in competitiveness, but thus study has concentrated on the broader regional issues.

METHODOLOGY

Data was collected from a total of 840 cases spread almost equally across the three regions. In each region, the first round data collection included around 200 data points and the second round included around 100 subjects for each region. The response rates were 35% or more which lends support to the reliability of the data. (Henson, 2004) (Henson, 2005) (Henson, 2006a) (Henson, 2006b)

Dun & Bradstreet provided a data file that contained a list of 3011 businesses reporting NAICS (SIC) codes that indicated that the subject company had its primary function in an area that is involved in the ICT industry. . In addition, the list was filtered for companies having a specific telephone area code as a geographic selection criterion for the study region within California's central valley. This contact list of 1003 companies was utilized in every study.

While other data was collected, the 18 questions related to the business climate and forms the central focus of this paper. These questions related to circumstances within the business and labor environment of this region that might be serious enough to cause the organization to consider relocating. That would tend toward determining those environmental conditions that could have a serious negative impact on economic progress within the ICT industry within the study region. The responses to these questions were assigned possible values from 1 to 4, where a value of 1 meant that this item was not a problem for this business as perceived by the respondent. Conversely, a score of 4 meant that this item was a serious problem that could cause the company to consider relocating. This approach altered the usual 5 or 7 point scale where the center would be a neutral response. For the purposes of this study, the 4 possible responses represent only the range from neutral to very negative. This conformed to the objective of the

study which was to explore only those areas that were perceived to be a problem for an ICT business in the study region. This approach would ensure that attention was focused on problem areas leading to possible corrective action on those circumstances where conditions are sufficiently adverse as to cause a business to consider relocating.

DATA ANALYSIS

Data collected during the first round within the three regions included in this study were combined into a single dataset with 593 cases. A second dataset was derived by combining the data for each of the three regions that was collected in the second round approximately three years after the first round. This resulted in a collection of 249 cases.

While many avenues of analysis are open, it appeared that factor analysis would provide a broad insight into changes that have occurred in the perceptions of ICT managers in regards to obstacles to economic development activities within the central valley.

Several variations were utilized in an effort to refine the data into a few pertinent factors. While there was some blurring of variables, several relatively definitive factors emerged. In order to place the results into a meaningful form, descriptive name were assigned to each of the factors that emerged. This would facilitate a comparison of the situation in the early years to the circumstances found in the later years. Some discussion of the results would also be facilitated by these descriptive groupings.

RESULTS AND DISCUSSION

Examination of the rotated component matrix for factor analysis using the first round data resulted in seven factors that could be classified or named as follows:

1. Workforce dynamics
2. Financial Liquidity
3. Costs of Doing Business
4. Location Issues
5. Other Costs
6. Bureaucracy and Government
7. Crime Rate

In that same manner, factor analysis for the second round data resulted in the following tentative factors:

1. Workforce Dynamics (including crime rate)
2. Costs of Doing Business
3. Logistical Concerns
4. Other Costs
5. Location Issues
6. Bureaucracy and Government (including housing costs)

In discussing these results, it is recognized that other interpretations might be equally valid. The Workforce Dynamics factor did not include the crime rate in the first round, but that became a significant component in the second round. Crime rate statistics might shed some light on this difference. Another interesting note is that the crime rate stood alone as a factor in the early round, but then it merged with Workforce Dynamics in the later round.

Bureaucracy and Government in the first round did not include housing costs (defined as “affordable residential housing”) but it became part of that factor in the second round. Several assumptions might be made regarding that change.

In the second round, Logistical Concerns emerged as a factor. It revolved around Access to Customers, Access to Suppliers, and Air Transportation issues. As noted, other analysis techniques might provide other results as well as other significant trends and conclusions. The author would provide source data and interim results for further analysis upon request.

LIMITATIONS OF THE STUDY

Economic development issues that were disclosed in the earlier studies included shortage of capital, constraints from the infrastructure, responsiveness related to essential business services, language barriers, and an overall lack of modernization. Many of those issues are still of concern as shown in the subsequent studies. These studies were conducted in limited geographical regions within the United States, but the methodology could be applied in other mostly agricultural regions around the world that have a disadvantaged work force and high unemployment.

This study reflects the viewpoints of a small sample of the owners and managers of regional ICT businesses as reported to the interviewers. Companies who are not listed with Dun & Bradstreet were not contacted for this study. A few open-ended questions were provided and those responses have been considered as a means of better understanding these results.

The earliest data was collected in 2001 and 2002, so those results could not be considered current. Subsequent data collection efforts provided updated results in the 559 area code as well as the 209 and 661 area codes. The second round data was collected in 2004 and 2006. Consequently, this study seeks only to examine trends and changes over time.

REFERENCES

References and source data are both available upon request from James M. Henson:
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