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Information and Communication Technology and the Places Left Behind[1]

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Abstract *This article focuses on the critical role ICT policy design and implementation can play in developing a knowledge-based economy in distressed US communities. Using a multiple case study research design, the study tests three hypotheses: (1) linkages among government, education and industry are a critical success factor for ICT interventions; (2) due to the long-term nature of ICT, vision and leadership are also critical; and (3) investments in technology infrastructure must be part of a larger local planning process to succeed. These hypotheses are supported, but the strength of the article is in the details about how communities crafted unique responses to critical issues.*

Keywords: digital divide; distressed communities; economic development; ICT.

Introduction

Over the past several decades policy-makers at all levels of government in the United States and abroad have come to regard information and communication technology (ICT) as an important part of their economic development infrastructure. A growing body of evidence has begun to demonstrate that ICTs are necessary (but not sufficient) for economic growth in the knowledge economy of the twenty-first century.[2] However, much of that evidence is either fairly aggregated econometric analysis or single case studies. Those approaches miss the richness of what is occurring at the local and regional levels, where most ICT policy is centered today.

This article focuses on the critical role ICTs can play in economic development, especially in helping distressed communities in the US move successfully into the knowledge-based twenty-first century. In particular, it looks at the community's role in overcoming distress and bridging the digital divide by expanding access to ICT infrastructure, including broadband and fiber-based services. The article provides insight into what types of investments in technology infrastructure are the most sound for distressed communities, and what local or regional factors are critical to the success of ICT initiatives. It departs from the existing literature by employing a

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multiple case study research design which provides a much wider view of ICT policy development and implementation in the US. By commissioning this work, the Economic Development Administration signaled its understanding that regions are distressed in the United States because of inadequate levels of investment not only in traditional infrastructure—highways, electricity, water and sewer, and natural gas—but also, in ICTs. They planned to use this research to help guide their grant activity in that new area.[3]

This paper is divided into five further sections. We first state the research questions to be addressed. We then provide background on key issues surrounding distressed communities and ICTs. Next, the paper outlines three hypotheses developed prior to the launch of the primary research. In the fourth section, we outline the case study approach to the research and then test research hypotheses against the empirical data that were collected. Lastly, we draw conclusions from the research about the impact of ICT policy on distressed communities.

Traditional and Technology Infrastructure

ICTs are a subset of what is commonly referred to as technology infrastructure or knowledge infrastructure.[4] Like traditional infrastructure, such as roads, railroads, water and sewer lines, gas lines, telephone lines and services, technology infrastructure is characterized by stocks (the value of the capital) and flows (the services that the capital can provide). And traditional and technology infrastructure both serve to connect points in a network. Some authors, such as Malecki,[5] include human capital and knowledge institutions, such as universities, community colleges, and research centers.

Distressed Communities' Economic Development Challenges

The knowledge economy of the twenty-first century (like earlier historical periods) consists of communities that are thriving and others that are struggling.[6] The thriving communities have strong knowledge bases and the capacity to generate new productive activity from within. They also attract additional technology-based enterprises and 'knowledge workers' from outside which provides both the impetus and resources to improve 'knowledge institutions' (local schools, colleges, universities, research institutes, media centers).[7] This self-induced, upward spiral of development relates to what has become known as endogenous growth theory: 'As the skill or knowledge base of a regional labor force is perpetually enhanced from within, it becomes a continuous internally created source of competitive advantage … for an economic system'.[8]

But many communities in the United States (and other countries) are being 'left behind', not able to keep up the pace of technological change necessary to compete in the twenty-first century economy.[9] The EDA classifies communities as 'distressed' when their per capita income is no more than 80% of the national average, or their unemployment rate is one percentage point or more greater than the national average over the last two years of reported data.[10]

Whether inner city, rural, or somewhere in between, distressed communities have not enjoyed the same sustained growth in the past several decades as other places in the US. Businesses' reluctance to locate in distressed communities, urban and rural, is based on different reasons from place to place, but typically relates to an area's poor-quality traditional and technology infrastructure. Basic

utilities (water, sewers, electricity, good roads) either are not available (in rural areas, for example), or are in disrepair (in inner cities and declining mid-sized cities). Those communities that have maintained or expanded their physical infrastructure often must charge high rates or impose high local taxes. Some distressed communities charge uncompetitive utility rates for other reasons. For example, many small towns in North Carolina are locked into high electricity rates because they agreed to purchase high-priced nuclear energy from energy companies many years ago.[11] High rates and taxes, along with poor-quality physical infrastructure and inadequate skilled labor, discourage private investment and job creation.[12]

The heightened interest in ICT policy by EDA and others is based on the belief that technology infrastructure can help distressed communities catch up and become more competitive. One hope is that the interconnectivity it provides can help overcome the disadvantages of rural or otherwise remote location, for businesses in those areas that lack access to urban amenities and markets, for individuals who attend schools that may have poor knowledge resources such as libraries and expertise, and for educational institutions.

For remote rural or inner city areas to move from a distressed state, these communities must make the necessary investments in information and communication technologies in terms of both physical infrastructure and human communications to support productivity gains.[13] Technology infrastructure is important because of its ability to improve economic performance by helping to integrate new technologies into existing economic activities, upgrade technology and skills at the local level, and develop and commercialize new technologies.[14]

It is important to keep in mind, however, that investment in ICT infrastructure *alone* cannot solve distressed areas' economic development problem. It must be linked with other types of investment and supportive policies.[15] A lot of progress has been made recently to bring high-speed access to more users outside metropolitan areas, and in many cases the physical infrastructure is already there.[16] However, significant hurdles remain, including a lack of information and adequate training. Users at all levels—individuals, businesses, and local governments, as well as other public services—are frequently not aware of the technologies that are available to them, about the true costs, and about the best way to take advantage of existing technologies and facilities. A lack of coordination and communication dampens investment and can lead to higher costs.[17] Potential users who do not have sufficient skills and training are unable to benefit from a technology that becomes ubiquitous and part of everyday life. ICTs will only be a successful regional economic development tool for distressed regions if investments and strategies focus on the human capital part—the users, education and training facilities, and workforce development—and if technology infrastructure investments are part of a broader development plan that involves all sectors and areas of community and regional development.[18] We will discuss those aspects in greater detail in the section on the study hypotheses.

Key Hypotheses

Rather than focus on the statistical relationship between economic variables and regional outcomes, the research study that is the basis for this article relied on qualitative, institutional, and behavioral factors to answer the question—why have some regions been successful at executing their ICT strategies while others have not?

Several methods are used, most centrally a qualitative analysis of ICT-related initiatives in 13 distressed communities in eight states, to address these questions.

Three hypotheses were formulated at the outset of the research, based on a review of the academic and professional literature and best practices. We convened a national advisory board early in the project to verify the plausibility of these hypotheses. The wording of some of the hypotheses presented was modified during the course of the study as a result of what was learned in the field: as we (the study team) collected information and conducted interviews, we were able to refine our thinking about the key phenomena to test.

Hypothesis 1—Linkages among government, education and industry are a critical success factor for ICT interventions. State policies and corporate actions are important determinants of local 'success'

According to the US Advisory Council on the National Information Infrastructure,[19] successful information technology infrastructure development requires a broad range of stakeholders: private sector leaders, community partnerships/coalitions, government leaders, and strong individuals who champion the cause. The Council further comments:

> Where appropriate, the private sector should take a leadership role in working with the government in the continued development if innovative uses of the Information Superhighway in socially beneficial areas such as education, cultural enrichment, public safety, and health care … [A]ll levels of government have significant roles to play in ensuring the effective development and deployment of the Information Superhighway … [and] should work together to encourage private investment, foster flexible and responsive governmental action including harmonization of laws and regulations, and to provide privacy and security protection to users.

Bohland, *et al.*[20] similarly point out:

> perhaps the most significant recent development within the member states of [the] Southern Growth [Policies Board] has been the creation … of broad-based policy initiatives designed to address the Digital Divide on a number of fronts simultaneously … The challenges of the Digital Divide, like information technology, cross many boundaries and require a broader more coordinated approach.

Both of these studies emphasize the importance of what has been referred to as the 'innovation triangle' in the creation and implementation of ICT policy. The vertices of the triangle represent business, government, and higher education.[21]

The deployment of ICT infrastructure is not unlike the installation of other types of infrastructure; by definition of the word 'infrastructure' large amounts of capital and long time horizons are needed for the hardware to be put into place. That requires the identification of funds, cutting through regulatory requirements, and management of a cumbersome construction period. Those tasks typically involve multiple layers of government and, increasingly, public–private partnerships. One key to successful ICT integration is that market segments such as schools, hospitals, businesses and government branches learn to maximize

their resources by coordinating usage among themselves. They also create economic linkages which allow institutions to import the information that they seek from others while they export the information that others seek from them. Those linkages provide opportunities for technology resources to be shared (services/facilities exchanged) for the benefit of two separate institutions. The cooperation between hospitals and public education provides a good example. Hospitals can use public school facilities to provide public health classes in topical areas of interest such as childbirth, parenting, elderly care and coping with common diseases. A Northern Telecom[22] report emphasizes the importance of cooperation as well: 'If one of the community network user groups is left out of the planning process, or refuses to share its resources, the momentum for the community support is reduced. The project may be stalled, derailed, underdeveloped or even canceled'.

Hypothesis 2—Because of the long-term and expensive nature of ICT, vision and leadership are critical success factors

The literature on the importance of leadership and vision at the state and local levels comes from a variety of applications and contexts.[23] For example, a Nebraska study[24] of rural places makes the following observations.

- Leadership plays a key role in business success. In small communities nearly all of the citizens become cheerleaders to promote the success of new enterprises. They understand the importance of cooperation between businesses and all other parts of a total community.
- Technology and attitude are more important than location. With the use of advanced telecommunication technologies, successes of entrepreneurial efforts are more related to 'possibility thinking' than to geography or the size of a community.

Hypothesis 3—Investments in technology infrastructure must be part of a larger local planning process to succeed

In the preceding section we suggested that ICT infrastructure alone is not likely to lead to successful regional economic development. There needs to be complementary investments in traditional infrastructure, in soft infrastructure, and in an appropriate tax and regulatory environment. Each of those supporting structures seems to be necessary if not sufficient for success.

The missing ingredient is planning—a process to tie together all the complementary elements required for success in the New Economy. Regional development policies, including those related to ICTs, must recognize the primacy of existing regional infrastructure and knowledge bases in the development process.[25] This process includes clear goals set by policymakers in combination with technical feasibility studies and target population needs assessment to tailor public sector efforts supporting expanded ICT access.

The literature is filled with examples of how planning has made a difference. Luger and Goldstein,[26] for example, illustrate the role various planning efforts have played in the success of research parks in North America. 'Coordinated planning', meaningful 'public–private partnerships', and involvement of local universities are among their list of critical success factors for research parks, including

those based on ICTs. Atkinson[27] tells a similar story for state science and technology policy, including early efforts in ICT-oriented development.

Choosing Cases, Defining 'Success', and Testing Hypotheses about ICT and Economic Development in Distressed Communities

The central research method we employ is case study analysis. For this qualitative approach the cases were chosen to be representative of the diverse set of areas in the United States that are implementing ICT-related strategies. With a carefully chosen set of sites for the case studies, we are able to conduct what Ragin[28] calls 'comparative analysis'. If constructed properly, this approach is able to provide rich contextual detail that helps make sense of the data collected (high 'internal validity'). And, to the extent that the cases chosen are representative of the universe of places in the US, one can generalize from the sample of cases chosen to the entire country ('external validity').

Designing a Case-Based Approach

We began by reviewing national data and literature to develop preliminary typologies both of technology infrastructure and distressed communities. As discussed, technology infrastructure includes hardware (computers, broadband networks, cable systems) as well as knowledge institutions (universities, hospitals, technology companies) and knowledge workers. Dimensions of distress as defined by the EDA include both low income or earnings and high unemployment relative to the national averages—this can lead to persistent states of high poverty rates, welfare dependency, population loss, poor health, and weak institutions within a distressed region.

The general approach for the case studies was to gather and synthesize data and perspectives from published materials and telephone contacts, and then use time on-site to generate issue- and solution-focused discussion with key parties. In addition to talking with these individuals about their own plans, barriers, and ideas, the study team assessed the extent and nature of their interaction with each other, with the expectation that good local communication among public and private sector leaders is one of the enabling conditions for sound infrastructure investments.

Choosing Cases

Cases were selected to represent as broad a spectrum of technology infrastructure interventions and types of community distress as possible, and to attain a geographic mix. In addition, the ICT program had to have been in place for several years, to ensure that there were results that could be observed. The intent was not to limit site selection to places that were believed to be successful, but rather to learn from communities at various points on a continuum of progress.[29] We considered several factors that mitigate distress, including type of economy, proximity to urban centers, and long-term versus short-term distress. Initial site visits to these communities were conducted in 2001, with additional interviews and follow-up two years later.

Table 1 briefly characterizes the 13 selected sites and the distressed status, in terms of per capita income and unemployment. Five of the sites meet both the

Table 1. Summary of case study sites

Place	Nature of area and its distress	Per capita income as a percent of US average, 2004[a]	Average annual unemployment rate, 2005[b]
Helena, AR	Delta: river town	63	9.0 (Phillips County, AR)
Monticello, AR	Delta: agricultural town	70 (Drew County, AR)	8.0 (Drew County, AR)
Pine Bluff, AR	Delta: small city adjacent to Little Rock	70	7.1
Hays, KS	Plains: small town in corn belt, losing population	89	3.4 (Ellis County, KS)
Springfield, MA	Frostbelt: declining industrial city	94	5.3
Billings, MT	Ranch country: small city in very low-wealth, low-density agricultural and oil area	94	3.2
Kinston, NC	Coastal plain: low-growth agricultural area	78	6.1 (Lenoir County, NC)
Greenville, NC	Coastal plain: small city in very low-wealth area	79	5.8
Bloomsburg, PA	Frostbelt: small town, remote	85	5.7 (Columbia County, PA)
Meadville, PA	Frostbelt: small town	72	5.8 (Crawford County, PA)
Northeast PA	Frostbelt: declining industrial region	88 (Scranton, PA)	5.5 (Scranton, PA)
Willacy County, TX	Rio Grande Valley: low-growth, low-density agricultural area	54	9.6
Seattle, WA	Northwest: poor inner-city neighborhood in large, growing high-tech metro area	136	5.1

Notes: [a]Average US per capita income was $33,050 in 2004.

[b]Average annual US unemployment rate was 5.1% in 2005.

Source: Bureau of Economic Analysis, 2005; Bureau of Labor Statistics, 2006.

income and unemployment criteria for a distressed community. The other eight sites either meet one of the criteria or have an average above the EDA definition. While the averages for these regions may be above the EDA definition, the sites of the ICT interventions themselves were distressed.

The case study sites each tried a somewhat different infrastructure investment that in most cases was a composite of several different interventions on the part of various actors. Nonetheless, in an attempt to characterize the expected economic development outcomes for different types of efforts (if successful), we can observe the following.

- Community networks help forge the necessary people connections among government, business, education and non-profits to map out and make effective use of the physical technology for improving business competitiveness and the workforce's preparedness for new economy jobs.
- Telemedicine networks help keep key institutions (clinics and schools) in small rural communities intact, and stem out-migration of both the general population and health care professionals.
- Technology parks support the development of companies that need the high-speed fiber networks, the supportive services of technical training institutions, and/or the research spinoff opportunities of a federal lab or research university.
- Workforce training and distance learning programs can help existing businesses be more competitive, allow the workforce to stay local, and elevate the attractiveness of the area to other firms.
- Creation of community portals and specialized marketing portals create awareness of the community and open new markets for its economic products.

The robustness of the results, in light of the wide range of places studied, increases our confidence in the external validity of the findings. Had the sites all been similar in their initial characteristics or the intervention tried, or had they shown vast differences in their support of the study hypotheses, it would be difficult to consider the results relevant in other communities.

Judging 'Success'

Our methodology was to use multiple cases to ascertain 'critical success factors' for various ICT initiatives. We measured the success of each intervention against its expected outcomes for two practical reasons. First, the programs are all relatively new, so longitudinal outcome data do not exist, obviating the 'progress over time' approach. Second, we did not choose the same interventions to track across multiple communities, nor a set of communities that were comparable.

Table 2 briefly characterizes the nature of the technology intervention being tried in each site.

A few comments are in order here. First, any assessment of this nature relies on professional judgment. We relied on the expertise and experience of research team members and an external advisory committee to form judgments. Second, success/failure is not a dichotomous outcome, but rather, a continuum. Consequently, we used a six-point scale to describe outcomes, including 'positive', 'mostly positive', 'mildly positive', 'mildly negative', 'mostly negative' and 'negative'.

Table 2. Summary of case study sites

Place	Nature of intervention
Helena, AR	Community network
Monticello, AR	Community network
Pine Bluff, AR	Technology park: Bioplex
Hays, KS	Telemedicine network and call centers
Springfield, MA	Technology park and incubator
Billings, MT	Telemedicine network with rural towns in region
Kinston, NC	Technology park: Global transpark
Greenville, NC	Telemedicine network with rural towns in region
Bloomsburg, PA	Broadband Internet
Meadville, PA	Distance learning lab and strategic community IT initiative
Northeast PA	Call centers as stepping stone to higher IT
Willacy County, TX	Broadband Internet
Seattle, WA	Computer training for poor persons

Testing Hypotheses and Drawing Inferences about Factors that Affect the Success of ICT Strategies

Given this diversity in cases studied, the application of a common set of hypotheses constitutes a hard test of phenomena. If hypothesis tests are qualitatively robust across such different cases, we would seem to have uncovered some strong relationships.

Here, we attempt to distill that large volume of material by testing the hypotheses one by one, by looking at all cases together. In the last part of the section, we draw some conclusions about what might be called 'critical success factors'.

Hypothesis 1—Linkages among government, education and industry are a critical success factor for ICT interventions. State policies and corporate actions are important determinants of local 'success'

The linkage of concern here is not among units of government, but among the vortexes of what has been called the 'innovation triangle': business, government, and education, especially higher education. For this hypothesis to be judged TRUE, there should be a correlation in the same direction between that indicator and the indicator of outcome success.

In eight cases, there is some level of cooperation, and some degree of success. In one case, there is neither; and in one case it is too early to tell. Billings and Willacy enjoyed some success despite cross-cutting action, and eastern North Carolina has yet to reap the fruits of its efforts.

The weight of evidence here suggests that Billings and Willacy are outliers—both where a private business is the primary driver—and the innovation triangle is, indeed, a necessary, if not sufficient factor for success. That is based on the balance between true and false and on the observation that ties with universities, hospitals, and private businesses could substitute for linkages with government (as seems to be the case in Monticello and Hays). Again, this suggests that flexibility/adaptability is a key factor.

Table 3. Linkages among government, education, and industry are a critical success factor for ICT interventions. State policies and corporate action are important for local success

		Outcomes and inputs		
Place	**Hypotheses**	**Outcome**	**Linkages present?**	**Comment**
Helena/Phillips County, AR	TRUE	Neg	No	Gaps in relationships abounded; no mention was made of local university
Monticello/Drew County, AR	TRUE	Pos	Mostly	Committee is clear rendition of this three-way partnership at the local level. State policy actors were not salient
Pine Bluff/Jefferson County, AR	TRUE	Mixed	Yes	An informal tri-partite committee worked well together to link education, government, and business
Hays, KS	Mostly TRUE	Pos	Yes	There were strong linkages among the sectors. However, some state policies were cited to be holding the plan back: a lack of statewide ICT strategy and prohibitions on tax abatements
Springfield, MA	TRUE	Pos	Yes	Pioneer Valley Planning Commission and Springfield Technical Community College both worked hard to create opportunities for all three sectors to meet and provide input
Billings and Eastern MT	Mostly FALSE	Pos	Little	Higher education, government, and business are not well integrated. The independent streak in Montana dominates. And there is a historical absence of strong government
Kinston, NC	Mostly FALSE	Mostly neg	Mostly	The three sectors worked in unison and effectively got considerable outside resources onto the table. Some public agencies could have been involved more (DOT); but generally there were good linkages. The key university linkage, however, was to a campus outside the region in a more liberal urban culture
Greenville, NC	TRUE	Pos	Yes	The ECU hospital is itself a hybrid of state, educational and private sector influences, and the network connects public, private and educational users
Northeast Pennsylvania	Too early	Too early	Some	Through the sponsorship of the chambers of commerce, the business communities are working together. Some state agencies are involved, though not that deeply. Of the involved state agencies, the Ben Franklin program is the most visible. The Great Valley alliance has also worked well with the local higher education sector. The weak link is the local government side
Bloomsburg, PA	Somewhat TRUE	Mildly pos	Mostly	BTC3R was well connected with universities and schools. The Ben Franklin Partnership was also involved. A subset of county commissioners participated, but the support of the local governments in the region was mixed, as was corporate participation
Meadville/Crawford County, PA	TRUE	Pos	Mostly	The most important elements of the innovative triangle were present and involved
Willacy County, TX	Mostly FLASE	Pos	Little	The coop had some connection with the schools, but connections with universities and government are weak. To realize an economic development benefit, these may be necessary
Seattle, WA	TRUE	Pos	Yes	Although the connections were not centralized and planned, the segments worked well together

Hypothesis 2—Because of the long-term and expensive nature of ICT, vision and leadership are critical success factors

Vision and leadership are among the most abstract factors to judge. We did so by reading the history of each intervention and interviewing the architects of the initiatives and other key business, education, and government leaders. Studies of other types of policy interventions had concluded that vision and leadership were critical success factors, and we hypothesized it to apply to ICT interventions, as well.

The evidence strongly supports the hypothesis, since it was judged to be true in every case but two, Pine Bluff and Kinston. In Pine Bluff, however, outcomes were mixed, allowing for vision and leadership to have affected at least some elements of the initiative. Also, regional leadership around eastern North Carolina helped create a revenue source (vehicle tag fee) to support basic infrastructure and site development in the region, even as they await the impacts from the Global Transpark itself.

Hypothesis 3—Investments in technology infrastructure must be part of a larger local planning process to succeed

Table 5 indicates whether the case study community employed a larger local planning process, and whether the outcome was successful. For this hypothesis to be judged to be true, there should be a positive correlation (both positive or both negative) between the two variables.

We were able to support the hypothesis in eight of 12 cases (the 13th being too early to tell). That includes several cases where the planning process was present but limited, and the outcome was somewhat, rather than fully, successful. In two cases, a planning process was in place but outcomes were negative or mixed, signifying that the condition is necessary but not sufficient. In three other cases, a larger regional planning process was not present, but outcomes were mixed or positive. Those were cases where very strong individual or institutional leadership pushed reforms through.

The sum of the evidence suggests that a larger planning process in which ICT is embedded is a critical success factor. In exceptional cases, the lack of planning can be overcome by strong individual/institutional leadership, but that is hard to sustain and not likely to work in larger communities. Having a planning process in place, however, will not guarantee success; other conditions must also be present.

Critical Success Factors and Implications for Policy

This section provides some general lessons from the case studies.

- The 'innovation triangle' (cooperation among business–government–education leaders) is a necessary, if not sufficient factor for success.
- Vision and leadership are hard to measure, but critical for the success of initiatives, especially those that require considerable resources and time.
- A larger planning process in which ICT is embedded is a critical success factor. In exceptional cases, the lack of planning can be overcome by strong individual/institutional leadership, but that is hard to sustain and not likely to work in larger communities. Having a planning process in place, however, will not guarantee success; other conditions must also be present.

Table 4. Because of the long-term and expensive nature of ICT, vision and leadership are critical success factors

		Outcomes and inputs		
Place	**Hypotheses**	**Outcome**	**Vision/leadership present?**	**Comment**
Helena/Phillips County, AR	TRUE	Neg	Limited	There is fatigue among the local leaders who are stretched thin across many initiatives. Isolation has limited leaders' exposure to outside ideas
Monticello/Drew County, AR	TRUE	Pos	Yes	Community installed a broad and redundant leadership structure to ensure sustainability
Pine Bluff/Jefferson County, AR	FALSE	Mixed	Yes	Community had good leadership and shared vision, but disappointing results. That suggests leadership is necessary, but not sufficient
Hays, KS	TRUE	Pos	Yes	Leadership originated from hospital and university sector (the users) that exerted pressure on public officials (the agencies responsible for economic development)
Springfield, MA	TRUE	Pos	Yes	One leader in particular (STCC President Sciabelli) overcame skepticism of region's business leaders
Billings and Eastern MT	TRUE	Pos	Yes	This leadership also comes from the users/providers of the service rather than from local or state government. To see economic development benefit, other leadership will be required
Kinston, NC	FALSE	Mostly neg	Yes	Whatever positive results there have been have been from the cooperation among regional leaders. Again, a necessary but not sufficient condition
Greenville, NC	TRUE	Pos	Yes	Leadership in this case was at different levels
Northeast Pennsylvania	Too early	Too early	Yes	
Bloomsburg, PA	TRUE	Mildly pos	Yes	Leadership in this case came from one person, in particular, who mobilized other local leaders to help advance the cause
Meadville/Crawford County, PA	TRUE	Pos	Yes	
Willacy County, TX	TRUE	Pos	Yes	Here, leadership came entirely from the private sector/service provider, which has been a longstanding civic presence, rather than from the government. To see economic development benefit, other leadership needs to get on board
Seattle, WA	TRUE	Pos	Yes	This case is about a policy entrepreneur/grass roots activist who made things happen, and about a progressive and innovative local government

Table 5. Investments in technology infrastructure must be part of a larger local planning process to succeed

Place	Hypotheses	Outcomes and inputs		Comment
		Outcome	Larger local planning process present	
Helena/Phillips County, AR	TRUE	Neg	Absent	The inability of community to coalesce is single most important reason for lack of success
Monticello/Drew County, AR	TRUE	Pos	Present	Pro-active and broad-based, committee was instrumental
Pine Bluff/Jefferson County, AR	Mostly FALSE	Mixed	Present	This suggests that a larger, effective planning process is necessary, but not sufficient for success
Hays, KS	Mostly TRUE	Pos	Present but not fully coordinated	The initiative had many pieces. One (information city) had a cohesive planning effort. The others had planning but were only loosely coordinated. The success of planning was by happenstance and due to a culture of cooperation
Springfield, MA	TRUE	Pos	Present	The regional planning organization (Pioneer Valley Planning Commission) played a pivotal role
Billings and Eastern MT	Mostly FALSE	Pos	Mostly absent	Intervention was not designed to spur economic development, and local planning leadership is not coordinated. But planning underway now through the university business school will leverage the telemedicine network as an economic asset
Kinston, NC	FALSE	Mostly neg	Present	County commissioners and the regional planning organizations have worked well together and effectively planned, including leveraging outside resources. Again indicates that planning is necessary but not sufficient
Greenville, NC	Mostly TRUE	Pos	Present but limited	Planning was conducted by the university and state, and to some degree, by the regional planning agency. But the initiative was not part of a large planning effort
Northeast Pennsylvania	Too early	Too early	Present	The core of the initiative is a new planning body
Bloomsburg, PA	Mostly TRUE	Mildly pos	Present	This also revolves around a regional planning initiative (BTC3R). We point out, though, that not all members of the consortium were equally committed
Meadville/Crawford County, PA	TRUE	Pos	Present	Clear and strong planning and coordination among entities, notable Crawford County Development Corporation and Crawford County Regional Alliance
Willacy County, TX	FALSE	Pos	Mostly absent	The telecommunications coop proceeded with the cooperation of local government and public schools, but that was not a result of a larger local planning effort. So planning may not be necessary as a condition for initial success, but it will be required to realize economic growth for the area
Seattle, WA	Mostly TRUE	Pos	Present but not coordinated	The various pieces were planned, although sometimes loosely. There was no grand plan

- Flexibility/adaptability is a critical success factor: if public sector partners are not able or willing to help a local community, it can still succeed by mustering its own resources. That, however, is much harder to do and sustain.

Conclusion

Much of the current discussion about the digital divide emphasizes that rural, inner-city and other low-wealth communities must not be left behind in the knowledge economy.[30] Many of these regions have endured painful transitions away from manufacturing, but lack of connectivity to the Internet and in turn the global economy, will limit the economic opportunities for entrepreneurship investment, and development.[31]

When we get more deeply into issues of ICT, another perspective about distress emerges that is important to understand, namely the limited ability of national and state-level policies to heavily influence the adoption of ICTs.[32] Our research, coupled with the limited impact by state ICT policies, suggests that distressed communities must adapt and lead their own initiatives to improve deficits in physical, human, and social ICT infrastructure.

Notes and References

1. The research behind this article was funded by the US Department of Commerce, Economic Development Administration. The project report was co-authored by Luger, Leslie Stewart and Johannes Traxler. Dr Irwin Feller, Dr Peter Blair, Dr Edward Feser and Deborah Watts each conducted a case study. The authors alone are responsible for the views that are expressed and for any errors of fact or interpretation.
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7. Joseph Cortright, 'Making sense of clusters', prepared for The Brookings Institution Metropolitan Policy Program, Washington, DC, August 2005.
8. Edward J. Feser, Harvey A. Goldstein and Michael Luger, *At the Crossroads: North Carolina's Place in the Knowledge Economy of the Twenty-First Century*, report for the North Carolina Alliance for Competitive Technologies and North Carolina Board of Science and Technology, University of North Carolina at Chapel Hill, Chapel Hill, NC, April 1998.

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