

The Empirical Foundations of Industrial District Theory

by

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Abstract

The growing complexity and volatility of business competition has led to a search for flexible approaches to innovation. Piore and Sabel's (1984) work on fundamental shifts in the social organization of production stimulated a flurry of studies on the innovative potential and success of industrial districts. Industrial districts are defined as networks of mostly small and specialized firms which are located in close proximity and are embedded in local social structures supporting a mix of cooperation and competition. We review a sample of 55 empirical studies on industrial districts, published between 1990 and 1998, to evaluate research designs. We find that few researchers use a systematic sampling plan, discuss the validity and reliability of variable measures, apply a method of control, and discuss the generality of their results. Inherent in weak methodologies is the risk that business strategy and public policy are poorly guided and possibly even misinformed. We argue that attention to the methodological concerns raised in this review could advance research on the innovative potential of industrial districts to produce a strong basis for future policy.

1. Introduction

The demand for innovation to respond to the complexities of rapid technological development, sophisticated and fragmented consumer markets, and an increasingly globalized economy has been well documented (Best, 1990; Langlois and Robertson, 1995). Innovation systems challenge developers to integrate the competing needs for flexibility and change versus stability and security. Such integrative systems combine dynamic labour markets and rapid diffusion of technology within the parameters of dense networks of public and private support institutions and local social capital (Asheim, 1996). Not surprisingly then, governments of a growing number of countries and regions have looked to the success of industrial districts for innovation opportunities thought to lie in the flexible transfer of new knowledge through cooperative interfirm linkages (Sabel, 1989; Pyke and Sengenberger, 1992; Harrison, 1994).

The academic literature on the "industrial district phenomenon" has proliferated as well. Since the publication of Piore and Sabel's influential work in 1984, several dozen books have appeared on the subject, and between 1990 and 1998 over 100 (mostly conceptual) studies have been published in English-language

journals. Prominent in this discussion is the question of whether the social organization of industrial districts is capable of delivering on strategic promises. Some have criticized the industrial district model as being too optimistic about the development prospects of locally concentrated production systems in global economies (Amin, 1993; Harrison, 1994). Several studies have questioned the capacity of industrial districts to create high skill, high wage, and high value added employment, and to combine economic efficiency with social equity (Murray, 1987; Staber and Sharma, 1994). And some scholars have argued that, because the performance of industrial districts is highly place and context specific, opportunities for using industrial districts as a universally applicable blueprint for the revitalization of stagnant or declining economies are limited (Amin and Robins, 1990). Such discussions about the innovative potential of industrial districts are often theoretical, grounded in debates, for example, about the relationship between globalization and localization tendencies. Our objective in this paper is to explore the empirical basis of the industrial district model, focusing on claims made about the economic success and dynamism of districts and district firms.

Ideally, social science addresses the need for explanation and prediction through systematic sampling, precise measurement, objective data collection, and sophisticated data analysis in the test of hypotheses derived from tentative general propositions. The practical challenges of good research, such as measurement problems and making inferences from non-experimental (uncontrolled) data in the field, are compounded in studies of innovation systems by the number and diversity of variables and complex relationships that exist at the system level. While few would claim that natural science approaches can fully capture the complexity, dynamics, and sensitivity of this subject, research must at least strive towards attaining the highest possible level of rigor, if it is to produce sound recommendations for business strategy and public policy. In this paper, we survey seven major journals in entrepreneurship, regional studies, and economic geography for recent empirical studies on industrial districts, to assess the extent to which investigators have employed research designs that follow standard criteria of science. On the basis of our data, we argue that the empirical foundation for many theoretical claims made about the success of the “district approach” to economic development is rather weak.

2. The Industrial District Model

Industrial districts have been credited with all sorts of benefits. They are thought to stimulate innovation, support business adaptability, and facilitate endogenous regional development in an increasingly global marketplace (Amin and Thrift, 1994). Examples of well known industrial districts include the textile, ceramic tile, and machine tools networks in Northern and Central Italy (Paniccia, 1998), the electronics, multimedia, and cultural products agglomerations in California (Scott, 1996), and the technology-intensive industrial regions in Baden-Württemberg, Germany (Sabel et al., 1989; Herrigel, 1993). Because of their economic success, these regions are often seen as a “third way” to economic and social development, operating at the center of a fundamental historical transformation in society and economy (Piore and Sabel, 1984), and therefore worthy of public support (Rosenfeld, 1997).

The literature on industrial districts that developed since Piore and Sabel's (1984) widely cited work on the emergence of a new economic order has generally adopted an ideal-typical characterization, defining districts as networks of small and specialized firms which are located in close proximity and are embedded in local institutional structures that support a dynamic mix of cooperation and competition (Brusco, 1982). Because this definition is broad, it has resulted in “all kinds of different areas in different countries ... being described as industrial districts” (Amin and Robins, 1990: 19) and limited the ability to conduct comparative research. Below, we identify empirical studies which address issues related to the functional, social, and spatial organization of industrial districts.

2.1 Flexible Specialization

District firms specialize horizontally in one or a few products and/or vertically in a phase of production along the value-added chain, if the production process is technologically divisible into product components and production phases. In complex and volatile markets, integration is risky and costly to sustain, because competitors are more likely to use price cutting to minimize overcapacities (Harrigan, 1985). In such markets, firms will produce less in-house and purchase more from outsiders, thus shifting some of the risk of adjustment to other firms. The district model views the extensive functional division of labor between small and specialized firms as a source of external economies of scale and scope (i.e., economies that are external to the firm but internal to the system of firms), raising their collective innovative

potential relative to that of large and integrated companies (Lazerson, 1988; Bellandi, 1989). Through specialization in a distinctive competence, each firm thus contributes to the district's innovative capacity with a maximum of economy.

2.2 Interfirm Cooperation

By altering the nature and pattern of interdependency, specialization has implications for interfirm relations. When knowledge is tacit, interdependencies are untradeable (reflecting region-specific material and non-material assets and relationships), and technical progress is disembodied (i.e., independent of changes in physical capital stock), it is difficult and costly to coordinate activities and strategies in the open market (Asheim, 1996; Storper, 1995). Specialized firms will then have an incentive to cooperate and to share information and resources in ways that lead to learning and create innovation advantages in inter-regional competition (Amin and Thrift, 1994). Studies have shown that the nature and pattern of interfirm cooperation can differ widely across industries and regions because the skills, traditions, and institutions relevant to innovation have their greatest impact at the local level. Institutions include formal organizations, such as educational and training facilities, funding agencies, and technology transfer centers. But their presence alone does not always lead to interfirm cooperation, and does not guarantee that cooperation will have innovative consequences. Rather, it is the social aspects of institutions, defined as cognitive and normative meaning systems, which determine how cooperative relations are enacted. Institutional meaning systems can be highly place-specific because they reflect the local culture and history. To the extent that they are difficult to replicate they can be an important source of sustainable competitive advantage (Bellandi, 1996).

2.3 Geographic Proximity

District firms are clustered in space to obtain cost reductions from access to local infrastructures, specialized machinery, and skilled labor. But the industrial district is not merely a static territorial aggregation of producers and activities. It represents a system with emergent properties, evolving not necessarily linearly and uniformly, and reflecting relations of power, status, and reputation. To the extent that information flows freely among the actors, the district is in constant flux. Territorial clustering offers

information externalities by enabling firms to learn more readily about new technologies and market opportunities, and creates possibilities for individuals to act as brokers and carriers of knowledge (Garnsey, 1998). When functional interdependence among specialized firms is high, it is essential that actors can learn and respond quickly by exchanging information directly. Especially in industries where innovation and risk-taking are critical, it may be advantageous for all firms to cluster because it is difficult to predict which firm will develop the leading innovation.

2.4 Social Embeddedness

A key argument in the industrial district model is that firms are embedded in a strong local culture which gives meaning and legitimacy to collective learning and resource sharing (Dei Ottati, 1994; Harrison, 1992). Social proximity encourages face-to-face interaction and the circulation of new information. The integration of firms in local social structures helps to attenuate opportunistic tendencies and serves as a basis for trust on which firms can draw when they engage in risky innovations. When this type of social embeddedness is strong, opportunism, uncertainty, resource dependencies, and power asymmetries are felt less dramatically than in open markets, and firms are more likely to cooperate, even if it means the loss of some of their autonomy (Uzzi, 1996). Thus, the cognitive and normative learning aspects of firms' integration in local social structures contribute an important dynamic dimension to the innovation properties of industrial districts.

In summary, the competitiveness of industrial districts and district firms is based primarily on flexibility and innovative activity, rather than on cost and price reductions. The innovative capacity of districts is a system property, reflecting a dynamic structure of interdependencies and mutual adjustment. Innovation is also a property of territory, based on the co-location of specialized firms which are oriented towards each other. Innovation in districts is not linear and technocratic, but discontinuous and social, reflecting processes of learning by doing and interacting (Lundvall, 1993). However, to what extent industrial districts have structures and processes that can be collapsed into an internally consistent theory is not clear, two decades after Italian social scientists first expanded on Alfred Marshall's (1891) ideas about the innovative potential of local agglomerations (Becattini, 1975; Bagnasco, 1977; Brusco, 1982). The tentative conclusion,

some ten years ago, was that the empirical foundation for the theory of industrial districts is quite thin (Amin and Robins, 1989: 31). In this paper, we ask if research has progressed significantly since then, to the point where reasonable policy recommendations can be deduced.

3. Literature Surveyed

We used the generic definition of industrial districts outlined above to search for empirical studies on the subject. To be included in the survey, studies must have examined one or more key aspects of industrial districts, that is, the presence of mostly small and specialized firms, which are linked cooperatively, geographically concentrated, and embedded in local social and institutional structures. Authors must have referred to firm clusters as industrial districts, or must have offered their study as a contribution to the industrial district literature. We limited the analysis to studies published in journals. We excluded books, because they are often collections of conference papers, many of which also appear (in revised form) in journals.

Our review covers the complete population of articles that were published between 1990 and 1998 in seven major English-language journals: *Cambridge Journal of Economics*, *Economic Geography*, *Entrepreneurship and Regional Development*, *European Planning Studies*, *Growth and Change*, *International Journal of Urban and Regional Research*, and *Research Policy*. These journals serve as important outlets for industrial district research, as evidenced by the frequency with which they are cited in publications. To be parsimonious but also sufficiently comprehensive, and to restrict potential sample-selection bias, we included contributions from various disciplines (sociology, economics, economic geography, regional planning, etc.) and studies using different methodological approaches.

We selected from these journals all articles that study any aspect of industrial districts. To identify these articles, we read abstracts, looking for references to industrial districts, interfirm networks, innovation systems, flexible specialization, and production clusters. From these articles, we then selected those which discuss an empirical study of the subject matter, limiting our analysis to studies which used original data, rather than review the findings of previous studies. Our search produced 46 articles which form the data base for our analysis. These articles include 55 studies on 52 industrial districts, located in 16 countries (Table

1).

[Table 1 about here]

4. Survey Results

We evaluate the existing evidence on industrial districts from a positivist research perspective. By positivist research we mean an emphasis on developing testable hypotheses and theory that are generalizable across settings, and a concern for construct measurement and replication (Popper, 1959; Hempel, 1965). We explore the extent to which investigators have followed systematic analytic procedures, provided sufficient information on sampling, data collection procedures, and variable measurement, and attempted to rule out alternative explanations of their findings.

4.1 Theory Building and Theory Testing

Writing about industrial districts is informed mainly by economic and sociological perspectives. One of the most widely cited approaches in the analysis of industrial districts is the transaction cost perspective (Williamson, 1985). This approach focuses on the transaction as the unit of analysis and proposes that firms will select a mechanism for governing exchange that minimizes the transaction costs associated with information search, behavioral control, performance evaluation, and so on. Industrial districts are seen, from this perspective, as a more efficient alternative to markets and hierarchies, under conditions of uncertainty (Storper and Christopherson, 1987; Lazerson, 1988).

By contrast, researchers arguing from a social-institutionalist perspective call for greater attention to the concrete social relations and structures in which actors are embedded (Granovetter, 1985).

Institutionalist theory emphasizes the role of symbolic, normative, and cognitive factors in the governance of district firms and networks. Districts are viewed, from this perspective, as communities of firms and support organizations that participate in the same meaning system and are subject to common regulatory processes. Local customs and traditions specify the normative structure of networks and the kinds of behaviors to be considered legitimate. A central argument of the industrial district model is thus fundamentally sociological: Innovation is possible because the actors live in an historically bounded area and share a common culture; by interpenetrating one another's formal organizational boundaries, they build

a basis for sustained trust which supports long term cooperation and risk taking (Harrison, 1992; Dei Ottatti, 1994).

An economic efficiency perspective cannot easily be reconciled with a social-institutional approach, because the perspectives are rooted in different paradigmatic traditions, operate at different levels of analysis, and focus on different problem areas. At the core of the different assumptions about actors, resources, mechanisms, and normative foundations lie the central and controversial questions of what motivates actors to participate in cooperative networks and what makes them accept the collective outcomes of their economic efforts. From an institutional perspective, district actors seek a sense of belonging to the community and are interested in building a distinctive collective identity. The key problem is deciding what behaviors are to be considered “socially correct” and how social obligations are to be formulated and enforced. From a transaction cost perspective, actors seek to maximize their individual profits arising from competitive interdependence. The key problem here is balancing competitive motives and resource dependencies. These perspectives offer different answers to questions of district governance, which research needs to address.

The admittedly crude categorization of perspectives shown in Table 2 indicates that, of the economic approaches, the transaction cost theory receives the most attention, although it is often mentioned only in passing. Of the sociological perspectives, investigators draw most heavily on institutionalist theory and make some effort to at least outline its basic assumptions and arguments. In some cases, authors do not mention institutionalism, but this is the theory they seem to have in mind when they discuss the importance of social embeddedness and institutional linkages. Hence, we classify these studies as falling in the institutional domain.

[Table 2 about here]

Most would agree that “theorizing” should be a continuous feature of the research process (Lieberson, 1992). Theory generates principles that explain existing information. And it is through theory that new knowledge is discovered and preserved, and new evidence is gathered and interpreted. By this measure, much of industrial district research is not aimed, deliberately and systematically, at theory

development. This is evident in the fact that ten of the studies (22 percent) reviewed here are silent on theory, and nine studies (20 percent) make only fleeting reference to one or several theories, without developing any propositions or clearly specifying the theoretical context within which the findings can be interpreted (Table 3). These studies are not deliberately anti-theoretical by consciously arguing, for example, that the “industrial district phenomenon” is impossible to understand through the use of analytic concepts and frameworks. Rather, the investigators are interested merely in exploring the extent to which the region or business cluster meets the defining characteristics of an industrial district. These studies tend to be descriptive, rather than analytical.

[Table 3 about here]

Without a clear theoretical rationale for the objectives and methodology of the study it is difficult for the reader to interpret empirical findings. A likely consequence is that readers will impose their own preferred theoretical interpretation of the data. For example, a finding that interfirm relations in the district are becoming more hierarchical may imply that large firms are re-asserting their power at the expense of small dependent subcontractors, consistent with the neo-Fordist political economy approach. Or, it may mean that some firms adopt a broker role to improve the efficiency of governing interfirm relations, consistent with transaction-cost economic theory. Without theoretical guidance from the researcher, readers may not know how to interpret inconsistent findings, or may not even realize that findings are inconsistent.

Seven studies (15 percent) discuss, in considerable detail, more than one theory. In some cases, the authors explain how different theories handle a particular aspect of industrial districts. In other cases, they provide a general overview of how the “industrial district phenomenon” fits into theoretical debates about regional economic development, innovation, new economic orders, and so forth. But in none of these studies do the authors develop specific hypotheses and test them with empirical data. Three of these studies discuss both economic and sociological perspectives, but miss the opportunity to develop testable rival hypotheses. Concerning the role of spatial proximity, for example, economic perspectives predict that firms agglomerate to obtain external economies, minimize transaction costs, and so forth. Sociological perspectives postulate that firms agglomerate to improve their learning capacity, build trust, enhance their

reputation, and so on. Formulating competing propositions, operationalizing them in such a manner as to render the theory subject to disconfirmation, and then testing them with available data, is a good way to develop theory (Staber, 1998).

Twenty studies (43 percent) focus on one theory, discuss its key premises, and explain, in more or less detail, how the subsequent data collection is tied to theoretical arguments. To some extent, the “theory sections” of these articles are redundant. They tend to repeat the basic arguments and do not add much value beyond the “classic” and most frequently cited publications. This may be acceptable if efforts were made to empirically test some of these arguments. But only six of the studies formulate a specific hypothesis, explain its underlying rationale, and interpret the empirical observations in light of the hypothesis. The more typical approach is to present findings without making any direct references to theoretical premises and expectations, and to leave it up to the reader to infer any lessons from the findings. Thus, if the investigator’s goal is to improve upon an existing theory or build a new theory, this should be communicated more clearly at the outset of the study.

4.2 Sample Selection

Selecting cases for investigation is a critical aspect of theory building and theory testing. A good understanding of the population is crucial, because the population defines the set of cases from which the research sample is to be drawn. The careful selection of a population is also a way to control for extraneous variation and to set boundaries for generalizing the findings.

The observed tendency to treat all kinds of business clusters and regions as industrial districts (Amin and Robins, 1990) suggests that many researchers overlook problems of defining population boundaries. This has made it difficult to draw strong inferences from conceptual differences between clusters and to control for critical contingencies and context dependencies. It is not clear, for example, if technology parks and high-tech business clusters should be seen as special variants of industrial districts or as prototypical districts. Cluster-specific factors create problems for interpretation because they cannot easily be incorporated into a general model of industrial districts. Hence, it is important to define *a priori* the relevant parameters of the district under investigation and to formulate a sampling plan based on these

parameters.

The ideal of statistical sampling is random selection of cases. When there is substantial knowledge available about the population under study, statistical sampling is the preferred choice. However, there are times when random sampling is not possible (for example, if there is a small N to choose from) or necessary (for example, if N is so small that all cases can be studied). When the goal is exploratory research, cases may be chosen for theoretical reasons (Glaser and Strauss, 1967). Researchers may focus, for example, on what they believe are the extreme cases, and compare prospering with declining districts, or districts that have a long history of business cooperation with those in which cooperation is a more recent phenomenon. That is, sampling may be restricted to factors, based on what is already known about the districts. In theoretical sampling, the idea is normally to select cases that are likely to replicate or extend findings from previous studies or to build emergent theory. But, as in statistical sampling, the sampling plan should be deliberate and systematic, reflecting a good understanding of what is already known about the subject matter from previous studies or the theoretical literature. Whether the research goal is hypothesis-testing or exploratory, it is important to be clear about the boundary conditions within which the findings are generalizable.

The absence of random selection poses serious difficulties if there is reason to believe that the cases thereby assigned to different conditions (e.g., institutional infrastructures and cultural milieux) differ in other ways that are related to the outcome of interest. The research problem then is not knowing whether the observed outcome reflects the effect of forces under investigation or unmeasured differences between the initial populations experiencing each condition. For example, if the objective is to explain the performance of districts or district firms, care must be taken to select not only successful cases and then attempt to explain success in district-theoretic terms. The earlier studies often focused on successful districts, mostly those located in Italy (Goodman and Bamford, 1989; Pyke et al., 1990). Many of these districts continue to be cited as model cases, especially in the practitioner oriented literature. But the error committed when selecting only high-performing districts is that sampling is done on the dependent variable (success), which makes it impossible to test hypotheses about the causes of performance. Without a control group of less

successful cases as well as outright failures, one cannot be certain that it is the hypothesized factors which explain success rather than omitted variables or chance events.

Sampling must be done with care, especially when the number of districts to choose from is small and, therefore, the probability of reaching an erroneous conclusion is great (Liebersohn, 1991). For example, if one finds in a comparative study of two districts that the prospering district has numerous research institutes and the declining district has few or no institutes, the investigator may conclude that the presence of institutes causes economic growth. Or, at best, if the correct causal factors are included in the model, the conclusion may be that the presence of institutes is inconsequential for district performance, when in fact other, omitted factors explain growth. A contradictory finding, which is likely in single-case or small-sample studies, may be dismissed erroneously on the grounds that a single deviation is insufficient to reject the theory because of possible measurement error, spuriousness, interaction effects, and so forth. The key point is that small samples provide a weak basis for generalizing about complex processes.

Many district researchers provide the reader with limited or no information about the sampling procedures they employed. Only thirty percent of the studies surveyed discuss criteria for selecting districts. The explanation provided is either that the researcher wants to replicate a previous finding, study the district because it is successful, examine whether the district model holds also for areas outside the Third Italy, or test whether the performance of the district studied previously has been stable over time. Seventy percent of the studies provide no rationale at all for case selection. In many instances, one gets the impression that the author chose the district because his/her affiliation is with a university located in the district (explaining the researcher's personal interest in the district, facilitating data collection, etc.) or because the data were originally collected for different purposes. A quarter of the studies compare two or more districts. In some of these studies no explanation is given for case selection. In other studies authors offer a variety of rationales: comparing districts with different entrepreneurial cultures, government approaches to regional economic revitalization and small business development, networks of technology transfer centers and research institutes, and developmental trajectories. In sum, only a minority of researchers discuss criteria for sampling districts and explain how these criteria are linked to theoretical

arguments about districts.

The situation is similar with respect to sampling district firms. From the information provided, we conclude that only one study used a random sampling design, two employed a stratified sample, and seven studies covered the entire population of district firms. Three studies attempted to survey the entire business population, but fell far short of obtaining usable responses from all firms. In the absence of information to the contrary, one gets the impression that the majority (72 percent) of studies used convenience samples, that is, the investigators surveyed any firm (or individual) willing to be studied. Convenience sampling may lead to erroneous inferences. In most of the studies we surveyed, the samples are small, often including fewer than 30 firms, and only in 22 percent of the studies (in which information on sample size is provided) covering at least 100 firms. Half of the studies do not indicate response rates. In some studies with low response rates (as low as two percent), the author expresses some dismay but then proceeds to interpret the data as if they were representative of all businesses in the district. For a third of the districts studied no information is provided regarding sample size. This makes it virtually impossible for the reader to assess the explanatory power of the empirical observations. Perhaps not surprisingly, given the lack of expressed concern for sampling issues, most of the studies that use convenience samples also draw small samples or do not offer any information on sample size (chi-square = 20.7, $p < .001$). In sum, in the empirical literature we surveyed, probability samples are the exception rather than the rule. At both levels of analysis, district and firm, authors often draw samples without a systematic sampling plan or they do not report how samples were selected. Many samples of firms are small, and their representativeness is unclear.

Sample ambiguities lead to problems of generalization. If the population boundaries from which samples are drawn are not known or not specified, it is difficult to make meaningful generalizations. Only about half of the authors make qualifying statements, but generally do not discuss, in any detail, the implications of their method of sample selection for the generality of their empirical results. The most frequent comments are that the findings are consistent with developments in other districts, reflect location-specific conditions, or indicate the need for further research on other districts. The other authors do not mention the generalizability of results. Their concluding comments often read as if general lessons have

been learned or as if all districts are alike. Consequently, it is impossible for the reader to evaluate the boundaries of generalization.

4.3 Time and Change

An industrial district is normally discussed as an historically bounded area, reflecting local traditions and entrenched relationships. Its current structure and performance are seen as the result of long term developments which can span decades. The much-celebrated Emilia-Romagna district(s) in Italy, for example, took three to four decades to reach a stage where one can reasonably speak of economic success (Murray, 1987). Districts in Baden-Württemberg, Germany, have their origins in artisan traditions dating back to the early 1800s (Medick, 1993). And the current success of districts in Denmark is said to be the result of an entrepreneurial spirit that developed at the end of the 19th century (Kristensen, 1994). The importance of local social structures, cultural milieux, and traditions highlight the evolutionary nature of industrial districts.

The observation that the evolution of a district is not always uni-directional and linear (Amin and Robins, 1990) calls for a dynamic research design to capture continuations and reversals. A dynamic approach is important if one wishes to understand transformations of action and structure rather than merely identify historical trends. When do critical transformations of a district begin and end? When is the appropriate moment to assess outcomes of changes? Do events at different levels of analysis occur in different time cycles? Are the effects of changes symmetrical? A focus on current events may give the impression of change, whereas an historical emphasis may suggest continuity. The choice of a timeframe for analysis is therefore critical.

A dynamic approach is especially important in research on industrial districts because of the theoretical emphasis on business flexibility, network adaptability, and system innovativeness. The essence of industrial districts is disequilibrium, as all actors try to adjust to new conditions and to anticipate each other's reactions. In systems of constantly innovating firms, network structures are dynamic and governance arrangements are fluid. Cross-sectional research designs will capture organizations at different points in their adjustment to changing conditions and assume that all variables are in equilibrium and that all

relationships have worked themselves out. A cross-sectional analysis is appropriate for making statements that generalize across members of a class of organizations, activities, or events. For example, the claim that geographically proximate firms tend to cooperate is more credible when it can be shown that various forms of cooperation occur more in clustered than dispersed business populations. But similar outcomes may arise from different processes, and different outcomes may arise from similar dynamics. A longitudinal approach is necessary for explaining the etiology of the differences. Proximity could lead to different outcomes, and for reasons independent of clustering. Only longitudinal data can clarify the unfolding of events and disentangle the processes by which proximity leads to cooperation.

Forty-one percent of the studies use over-time data, but data collection is often problematic. None of the studies surveying respondents about past events, organizational properties, network relations, and so forth, question the reliability of retrospective reporting. This is particularly problematic when interview questions touch on sensitive matters of interfirm relations, such as reciprocity and cooperation, or when questions address directly issues of change. Further, about half of the studies using longitudinal data measure variables in sporadic intervals. This is especially true for performance indicators, such as employment and wage levels, job creation, and business formations. Sometimes different variables are measured for different years, with no explanation given for the choice of time frame. Because of the limited attention many investigators give to measurement issues (discussed below), it is unclear whether the district is becoming more or less successful. In light of the argument that some of the previously much-celebrated districts in Italy are deteriorating or are transforming into a different mode of production (Dunford et al., 1993; Harrison, 1994), it would be helpful if researchers collected data that would permit a better evaluation of the causes and consequences of changing district relations.

4.4 Variable Measurement and Analysis

Most would agree that measurement in research on industrial districts is problematic, for several reasons. District governments differ in their capacity for data collection and in operational definitions. In some cases, districts are defined on the basis of a particular industry and related industries, as in the knitwear/clothing district in Carpi (Bigarelli and Crestanello, 1994). In other cases, district boundaries are

defined administratively, as in the “hub-and-spoke” district in Seattle (Gray et al., 1996). In comparative studies, it is not always possible or desirable to use the same variables, if actors’ interpretations are specific to the local context and are difficult to translate to other locales. In the eastern part of Denmark, for example, entrepreneurship has a different meaning than in the western part (Kristensen, 1994). Using the same indicators of entrepreneurship would reduce the confidence with which inferences can be made. Our review of comparative district studies suggests that most authors assume, usually implicitly, that measures are equally valid in different settings.

“Controlled comparison of a small n should follow a procedure of systematic data compilation” (George and McKeown, 1985: 43). This includes data collection on the same variables across units, which are measured identically, if causal inference is to be possible. A problem is that many of the key constructs in the industrial district model are difficult to measure. Constructs such as interfirm cooperation (institutional, technological, material, etc.), social embeddedness (culture, identity, trust, etc.), and flexibility (innovation, change, mobility, etc.) have various meanings and multiple dimensions. Ideally, researchers should explain how they measure the constructs and how they distinguish the underlying dimensions. But only 40 percent of studies provide explicit definitions, and only 31 percent discuss the dimensionality of constructs. For example, authors studying cooperation ask respondents if they cooperate with other firms and organizations in product development, marketing, research, and so on. Only rarely do they discuss the meaning of these dimensions or contemplate the governance implications of different types of cooperative exchange (Sobrero and Schrader, 1998). None of the authors explore alternative or multiple indicators of their central constructs, which would enhance the validity of measurement. These are potentially serious problems, which limit the confidence with which inferences can be made.

While description is an important component of theory development, critical research must also provide insights into the causal mechanisms and processes at work. For example, the mere existence of particular institutional arrangements for interfirm cooperation does not imply that cooperation is always forthcoming or that cooperation, when it does exist, is caused by these arrangements. An adequate explanation of regulative processes in districts requires the specification of causality as well as the

mechanisms by which one variable is causally related to the other. Mechanisms are critical in causal explanations, because they indicate which factors should be controlled for. When the mechanisms at work are understood it is less likely that *ad hoc* arguments are proposed, and this facilitates theory testing. However, mechanisms, like constructs, are not directly observable but must be inferred from observables. If they lack direct empirical referents, how then are they to be imputed? The problem is that “*there appears to be an inherent gap between the languages of theory and research* which never can be bridged in a completely satisfactory way. One *thinks* in terms of a theoretical language that contains notions such as causes, forces, systems, and properties. But one’s *tests* are made in terms of covariations, operations, and pointer readings” (Blalock, 1961: 5; emphasis in original).

The studies we reviewed placed limited emphasis on clarifying cause and effect relations. As we already indicated, more than half of the researchers employ cross-sectional data, but they often use language that indicates causality. Authors speak of effects, influences, and determinants, rather than associations and correlations, which is all that cross-sectional data permit. None of the investigators who claim to have found evidence that interfirm cooperation explains district or business success consider the possibility that success leads to cooperation. Perhaps even more surprising is the finding that the large majority (95 percent) of studies use no statistical method of controlling for potentially confounding factors. Only two studies use a multivariate analytical framework to estimate contingency relationships. Very few authors indicate potential omitted variables or offer alternative explanations for observed relationships. It is thus not known whether particular district structures exist because they are indeed the most successful ones or because they are, for example, an institutionalized response. In the absence of attempts at controlling for confounding variables, it is difficult to draw firm conclusions about causation.

5. Conclusion

Our basic premise guiding this survey of studies on industrial districts followed Kaplan’s (1964) suggestion that empirical observation is critical to the advancement of knowledge. “It is in the empirical component that science is differentiated from fantasy” (Kaplan, 1964: 35). It is of some importance to policy makers and business practitioners to know that empirical evidence is collected and communicated in a way

that provides useful and valid feedback on propositions developed about the workings of economy and society.

Our survey of published research suggests that the potential of industrial districts for innovation and regional development may be overstated, not necessarily because theoretical arguments lack substance, but because the empirical test of these arguments is weak. Many investigators operate within the parameters of loose conceptualizations or pursue narrative descriptions of isolated cases. We find that probability sampling is rare in district studies. Researchers generally do not address the dimensionality of constructs and the validity and reliability of measures used. Very few investigators apply a method of control, either statistically or through alternative explanations for their results. Generalizing findings to the “industrial district phenomenon” as a whole is complicated by the way in which cases are selected for analysis. Few authors discuss the generalizability of their findings or the justification for any generalizations that are made. Similar to the situation in political science and policy analysis (King, 1991), researchers, as a general rule, do not offer any estimate of the degree of confidence they have in the inferences they draw from the data.

Our findings suggest that many investigators are concerned more with a rich description of specific districts than the development of a generalizable theory. This, in itself, would not necessarily be problematic, if the intent were limited to obtaining a rich understanding of a particular case. It is, however, problematic, if claims that particular facts have general validity are not supported by methodologically rigorous research. As a result, the policy implications that some authors propose may be overstated. From the available data, it is not clear that the defining characteristics of industrial districts, such as dense networks, territorial proximity, and social embeddedness, are an important causal factor in regional development or business success. In the absence of controls for exogenous factors, such as interest rate fluctuations, national-level government regulations, and product life-cycle effects, it is difficult to conclude that certain kinds of policy interventions make a difference in the performance of districts. It is also not clear that policy interventions have intended effects. For example, government initiatives to support the development of interfirm networks may actually lead to collusive behavior such as price fixing or market

sharing, rather than the kind of collective learning that stimulates innovation and change.

In normal science, theory is developed through incremental empirical testing and extension (Kuhn, 1970). Researchers draw on past literature, empirical observation, and new insights to develop incrementally more powerful theories. However, sometimes not enough is known about a phenomenon, or new observations indicate the need for a new theory. In these situations, research is more exploratory than theory-testing, and the goal is new theory. Some may argue that industrial districts may be an area of inquiry which, at this stage in theory development, call for mainly exploratory research. But good exploratory research must also incorporate scientific standards, in order to support theory development by challenging and extending existing knowledge and by providing compelling evidence. We believe that closer attention to the methodological concerns raised in this review could advance research on industrial districts and, by implication, the policy recommendations that derive from such research. In the meantime, the question of whether one can make general statements about the innovative potential and success of industrial districts based on the published literature remains open.

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Table 1. Location of Industrial Districts Covered in the Literature Surveyed

| Country | Industrial Districts |
|----------------|---|
| Australia | South Australia |
| Austria | Steiermark |
| Belgium | Southwest Flanders |
| China | Beijing, Hong Kong |
| Denmark | East and West Jutland, Herning-Ikast |
| Finland | Lahti |
| France | Le Choletais, Lyons |
| Germany | Aachen, Lüneburg, Neckar-Alb, Reutlingen, Stuttgart |
| Italy | Bergamo, Carpi, Como, Emilia-Romagna, Lecco, Lombardia, Prato, Veneto, Vigevano |
| Japan | Seto |
| Mexico | Leon |
| Norway | Jaeren, Horten |
| Sweden | Gnosjö, Målerås, Söderhamn |
| Switzerland | Jura |
| United Kingdom | Cambridge, City of London, East Midlands, Hertfordshire, Leicester, Nottingham, South Wales |
| United States | Central New York State, Denver, Pennsylvania, Silicon Valley, Southern California, Western Massachusetts, Western New York State, five regions in the Northwest |

Table 2. Theories and Perspectives Used in District Research (N mentions)

| Theory | Primary (discussed) | Secondary (honorable mention) |
|------------------------------|------------------------|----------------------------------|
| <u>Economic theories</u> | | |
| Transaction cost | 3 | 10 |
| Agglomeration | 1 | 1 |
| Growth pole | 2 | 1 |
| Flexible specialization | 2 | 0 |
| Evolutionary ecology | 2 | 3 |
| Innovation | 1 | 0 |
| <u>Sociological theories</u> | | |
| Institutionalism | 18 | 8 |
| Social network | 0 | 2 |
| Learning | 0 | 2 |
| Neo-/post-Fordism | 1 | 1 |
| Regulation | 1 | 1 |

Table 3. Number of Studies Using a Theoretical Framework, Focusing on Economic and/or Sociological Perspectives

| | Economic focus | Sociological focus | No focus | Total |
|---------------------------|----------------|--------------------|----------|-------|
| Multiple primary theories | 3 | 1 | 3 | 7 |
| One primary theory | 2 | 18 | | 20 |
| No primary theory | 3 | 5 | 1 | 9 |
| No theory | | | 10 | 10 |
| Totals | 8 | 24 | 14 | 46 |