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The Leader Firms and the Evolution of an Industrial District: A Case Study of Hosiery District in Taiwan

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Abstract *The transformation of industrial districts has become a hot debate since the increasing globalization of national and regional economies occurred in the 1980s. This paper empirically examines the changing social networks, technological learning and industrial organization in the regional transformation of the hosiery district in Shetou, Taiwan. It shows that primordial social ties render the production networks costless and the networks of learning efficient for price competition in the early stage. However, as new challenges linked to the globalization process approach, the leader small and medium sized enterprises in Taiwanese industrial districts are not necessarily compelled to shift production jobs abroad, but they reposition themselves in local production chains with incurring extra-local resources to cope with the threats from new competitors. On the one hand, these leader firms take strategies of local reaction to rely overwhelmingly on local supply chains to meet the challenge. On the other hand, those owners of workshops which sit in the bottom of the local supply chains can do nothing but to live self-exploitative lives and face the perils of extinction.*

Introduction: Rural Industrialization and the Networked Production System

Small size and flexibility have been regarded as the significant features of the post-war economic miracle in Taiwan. Within the miracle, a wide array of industrial entities of various sizes, including family workshop, single assemble line and factory, concentrated in the rural areas after the 1970s. Between the thorny decline of agriculture sector in rural area and burst growth in urban area, government attempted to draw the embryonic industries into the rural areas to create job opportunities for alleviating the pains of transformation and balance the rural–urban disparity (Sun, 1988). The countryside has grown to be the sites of mixing agriculture and manufacturing activities since the 1970s.

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To support rural industrialization, hundreds of satellite factories were in place, making various components or parts. Most of the firms located in the same township, village, community and even avenue. Sometimes, the jobs were subcontracted to the household and mobilized the labour reserve army, such as the housewives, the elderly, the kids and particularly those men who still engaged in farming (Shieh, 1992). With the social base for the rural industrialization, Taiwan economic miracle is well noted for SME's cheap costs and flexible production among the newly industrializing countries (NICs) in East Asia.

Being a labour-intensive and low-technology industry, the producers in the Taiwan should be vulnerable to the fierce competition from their counterparts in the second-tier developing countries. As a result, it is often predicted that the labour-intensive segment of the production system will be moved to the low-cost areas, and the firms in the old regions will be forced to upgrade their productive roles, otherwise driven to the wall. In Gereffi's (1995) analysis of triangle manufacturing, he proposes a role for the semi-peripheral manufacturers to transit from direct suppliers for US market to "middleman" in the production chains. The essence of triangle manufacturing is that the first-tier subcontractors and their located regions such as Taiwan take the orders from the global buyers, and then shift part of the requested production to affiliated offshore factories in other peripheral countries. By doing so, the intermediary manufacturers could upgrade their position in the ladder of global value chains.

However, a deep scrutiny will find that the co-existence of the technically upgraded and strategically sophisticated firms, on the one hand, and the technically conservative and strategically race-to-bottom workshops, on the other hand, make the prediction puzzling. In what sense will the divergent strategies adopted by the different firms be caused by the extra-local forces? Moreover, as regional economies evolve in response to a fundamentally organizational fragmentation of production in the global economy, how will the cooperative milieu shape the district change? Finally, the emergence of leader firm and the increased sourcing of products and materials from outside the district will become a thorny issue for the district transformation (Zeitlin, 2007).

This research is particularly relevant to the overwhelming literature on the transformation of industrial district. In appearance, the story of rural industrialization in Shetou looks similar to the case of the third Italy, with the concentration of small and medium sized enterprises (SMEs) around the rural areas and constituted a fully vertically disintegrated system with strong social embeddedness on familism (Orru, 1991; Esposti & Sotte, 2002). But, the different positions in the global production networks occupied by Italian and Taiwanese firms, respectively, would expect to lead to divergent trajectories of district transformation.

We will start with a theoretical review on the evolution of regional development of rural industrialization, with a focus on subcontracting system, social bondage and interactive learning, which are widely argued to lead to a flexible learning region. Then, we will show that under different circumstances, the holy trinity will become an ugly triceratops to lock the industrial region in the developmental *cul-de-sac*. A case study of the hosiery industry at Shetou Township in Zhanghua County (Figure 1) will be used to illustrate the contradictory dynamics behind the triangulation process. The dynamics behind the district transformation will be identified, and a brief deliberation on regional economies and diverse networking will wrap up the paper.

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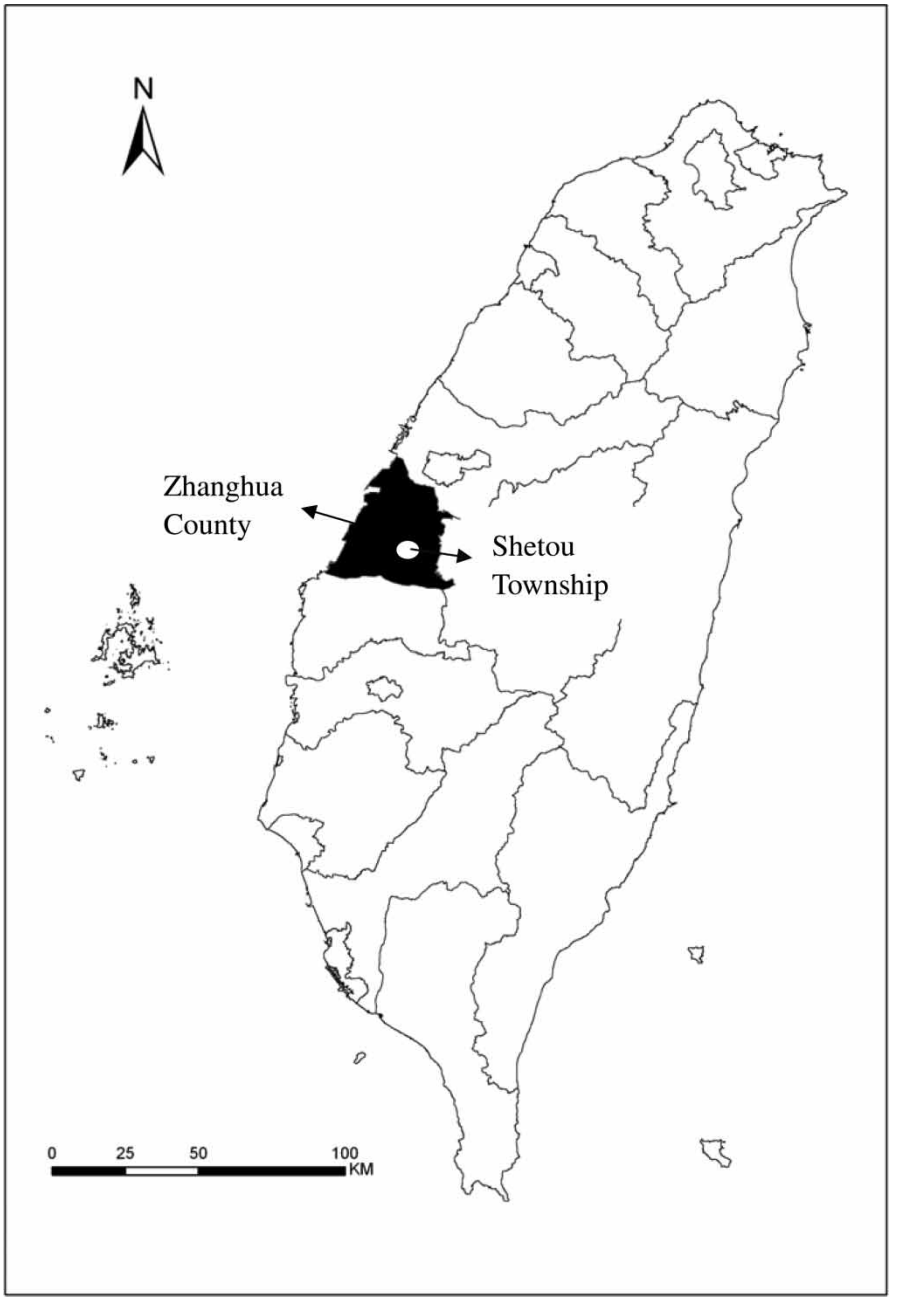

Figure 1. Map of Shetou Township in Changhua County
Source: Comprehensive Development Plan in Changhua County (1st revised edition), various years.

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Theoretical Context: Storporian Trilogy, Diverse Networking and District Transformation

Storper (1997) proposed a holy trinity: technology–organization–territory to explore divergent worlds of production in different regions (Figure 2). Evolving technologies will involve the change from standardization to flexibility as the central competitive process and from the diffusion to the creation of asymmetric knowledge as the central motor force. Divergent industrial organizations will consist of the varieties of input–output linkages and different extents of overlapping in firm boundaries. Finally, diverse territories often represent distinctive constellations of institutional environment and become the dynamics behind the intertwined transformation of divergent regional development. In other words, the entangled interaction among these three entities constitutes the collective asset of certain region and facilitates spatial embeddedness of the economic actors in the path dependency or breakthrough of regional development.

Following the Storporian trilogy, one of the major advantages bred from vertical disintegration, or Marshallian district, has been the learning potential created by the interacting agents since the tone of flexible specialization was set in the 1980s. To engage in the process of interactive learning, the flow of information can take place among the participating members only if an effective channel of information exists. Information should be contextually decoded, and the channel is usually supported by common cultural proximity and short geographical distance, as argued by Lundvall (1988) and Bathelt and Glückler (2003). This common ground is said to reduce the uncertainties involved in the learning process.

Firms must be understood as being embedded in their respective socio-economic contexts of supplier and customer relations (Grabher, 1993). Two degrees of social ties, strong and weak, work within the interactive learning process (Granovetter, 1985). While strong ties are closed entities in which agents feel the pressure to conform to social rules and

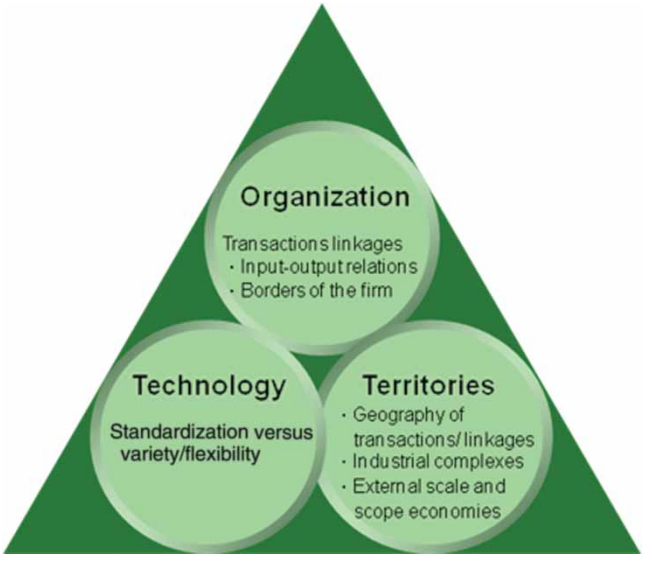

Figure 2. The holy trinity from Storper (1997)

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roles, weak ties are less bounded containers and adhocracies, open to being exploited by agents for individualistic purpose. Different degrees of social ties give agents the chance to expose to different kinds of information and exist as the precondition for interactive learning. Strong ties allow a major exchange of tacit knowledge because of a higher degree of trust, weak ties limit the exchange of tacit knowledge while highly differentiating the information sources, facilitating to expose agents to different perspectives on the same issue (Uzzi, 1997). Accordingly, Storper (2005) refers the strong ties as a community which demands conformism in exchange for a sense of belonging and a well-defined identity, and the weak ties as a society which are lived as spaces for discovering different sides and self-potential through comparison with other agents. As a result, communities are better social containers for incremental innovation, whereas societies are the qualified places for boundary-spanning learning (Ruef, 2002).

Moreover, literature on district transformation points out that open networks will emerge as extra-local forces were drawn to the district's orbits (Whitford & Potter, 2007). Consequently, divergent degrees of strength, and more importantly, different kinds of networking, will more than often lead to differentiation in the size distribution of enterprises within the district, some emerge as leader firms and separate from others in the district evolution. Open and formal networking is expected to proliferate and extra-local connecting increasingly prevails in the district. Following Grabher and Ibert (2006), a typology to identify divergent types, rather than degrees, of networking in different ecologies of industrial organization might be useful to examine the dynamics behind district transformation. They differentiate and extend the spectrum of networking modes from communality (Granovetter network) to sociality and connectivity. While network communality intricately interweaves private with professional dimensions of social exchange (high multiplexity) and network sociality is dominated by professional agendas that merely are underpinned by private aspects, network connectivity is almost exclusively professionally oriented (low multiplexity). These three types of networking penetrate mutually, overlap ambiguously, articulate ephemerally and are full of contradiction and heterogeneity, thus not necessarily co-exist harmoniously in different social–organizational contexts and industrial sectors.

In light of the diverse typologies of knowledge networks, Storperian duality of social ties (bondage and bridge) should be modified to engage divergent traditions of network thinking (Storper, 2005). In other words, the divergent kinds of networking amalgamate into a diffuse relational space which could situate people at the confluence of different social domains and create opportunities for the novel combination and recombination of ideas. Individuals who take advantage of the nodes in the divergent and hybridized networking are active in introducing dissimilar others and facilitating action among previously tied alters (or people in one's social network) will be more involved in the combinative activity that leads to innovation.

Recent empirical evidence shows that many Italian industrial districts have been significantly shaped by some individual entrepreneurial strategies (Lazerson & Lorenzoni, 1999; Sammarra & Belussi, 2006). As observed by Zeitlin (2007), a broad trend can nonetheless be delineated in the transformation of industrial districts: increase differentiation in the size distribution of enterprises within the districts, whether through the emergence of "leader firms" or through the creation of formal and informal groups of firms. In particular, the emergence of leader firms has affected districts' internal organizational structure: the way they compete, cooperate and access to input and external markets. Leading firms

promote internal cooperation and foster the creation of subcontracting firms. They open gates to external markets and create channel to access knowledge (Belussi & Sammarra, 2010; Chiarvesio *et al.*, 2010). The leader firms are able to lead local transformation on the basis of a new approach to innovation or supply chain organization. Based on their leading position, the firms' strategies affect the established mechanisms of governance at the district level. In particular, leader firms demand more qualified services than those usually provided by the district system (i.e. quality certification, technology transfer, training, communication, etc.). In order to face the lack of offer by the district of such advanced services, leader firms might promote specific organizational structures to support their strategies or even resorting to extra-local sourcing (Micelli & Di Maria, 2007).

More than often will certain crises, such as the decline of market, the emergence of new technologies or the rise of new competitors will disrupt existing transactional networks, releasing resources for alternative uses. Under such circumstances, some suppliers and service firms that serve the dominant production networks might take chances to shift part of their resources to experiment other ventures. Moreover, it will lead to the trend towards greater internal differentiation and external openness of the districts and place great strains on their traditional governance mechanisms, especially where these have relied primarily on local tacit knowledge and informal social norms (Bellandi & Caloffi, 2008). Accordingly, the attention should focus on how the economic agents in the regional production networks respond reflexively to the divergent local institutional environment and the corresponding organizational reshuffling. In addition, such new, vertically disintegrated organizations are characterized by pervasive collaboration among specialized units. Driven by the need to both innovate and reduce costs, these collaborative ties are highly unstable and subject to more or less continuous recombination and redefinition. In this context, industrial communities are today constituted on multiple scales and the spatial character of community (Bunnell & Coe, 2001), The district transformation usually involve different typologies of networking and various scales, intra-local and inter-local, of social communities in the new regional experimentalism (Fuchs & Shapira, 2005).

Methodology

This research adopted corporate interviews. About 40 interviews with Shetou hosiery firms, including contractors, subcontractors and family workshops, were conducted in the four fieldtrips from mid-2006 to early 2007. The selection of the sampled firms was based on the database published by key trade association (Taiwan Hosiery Manufacturers' Association). All of the targeted firms were on the list of top hosiery firms. Based on snowballing method, more inter-related firms were added to the interview list (Table 1).

In the beginning of the research, a temporary hypothesis about the formation and operation of subcontracting system based on theoretical review was proposed. Under this framework, a semi-structured set of questions was developed for interviews, which focused on the firm formation in the beginning, the process of the shaping of production networks, the issues encountered in the corporate management, the responses to the challenge incurred by the new competition and how they evaluate the future of business in the globalization pressure, such as the cheaper import from China. The interim framework will focus on the research topic and, simultaneously, to expose feedback on the original hypotheses from the empirical investigation. As more information was gathered, the

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Table 1. The List of Interviewees

Date	Code of interviewee	Type of Firm	Job Position
09.01.2006	A-01	Contractor (Cotton socks)	President
09.01.2006	A-02	Contractor (Cotton socks)	President
16.02.2006	A-03	Contractor (Cotton socks)	President
16.02.2006	A-04	Contractor (Cotton socks)	President
17.02.2006	A-05a	Contractor (Cotton socks)	President
05.09.2006	A-05b	Contractor (Cotton socks)	Warehouse manager
24.04.2006	A-06	Contractor (Cotton socks)	President
06.09.2006	A-07	Contractor (Cotton socks)	Sales manager
07.09.2006	A-08	Contractor (Cotton socks)	President
07.09.2006	A-09	Contractor (Cotton socks)	President
07.09.2006	A-10	Contractor (Cotton socks)	President
07.09.2006	A-11	Contractor (Cotton socks)	President
09.01.2006	A-12	Contractor (Silk socks)	General manager
16.02.2006	A-13	Contractor (Silk socks)	President
17.02.2006	A-14	Contractor (Silk socks)	President
24.04.2006	A-15	Contractor (Silk socks)	Manager
05.09.2006	A-16	Contractor (Silk socks)	President
15.02.2006	B-01	Family workshop (Knitting)	Owner
15.02.2006	B-02	Family workshop (Knitting)	Owner
05.09.2006	B-03	Family workshop (Knitting)	Owner
05.09.2006	B-04	Family workshop (Knitting)	Owner
05.09.2006	B-05	Family workshop (Knitting)	Owner
05.09.2006	B-06	Family workshop (Knitting)	Owner
08.09.2006	B-07	Family workshop (Knitting)	Owner
08.09.2006	B-08	Family workshop (Knitting)	Owner
15.02.2006	C-01	Subcontractor (Sewing and seaming)	Owner
15.02.2006	C-02	Subcontractor (Sewing and seaming)	Owner
06.09.2006	C-03a	Subcontractor (Sewing and seaming)	Owner
06.09.2006	C-03b	Subcontractor (Sewing and seaming)	C-03a's wife
06.09.2006	C-03c	Subcontractor (Sewing and seaming)	C-03a's son
09.09.2006	C-04a	Subcontractor (Sewing and seaming)	Owner
09.09.2006	C-04b	Subcontractor (Sewing and seaming)	Owner
08.09.2006	D-01	Subcontractor-Setting	Owner
16.02.2006	G-01	yarn dyer	Manager
03.05.2006	H-01	Trader	Manager
05.09.2006	J-01a	Dealer	Owner
05.09.2006	J-01b	Dealer	J-01a's wife
17.02.2006	K-01	Precision machine maker	Manager
25.04.2006	L-01	Hu-wei towel workshop	Owner
25.04.2006	L-02	Hu-wei towel workshop	Owner

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points were sharpened and more critical issues were raised in the interviews. In the corporate interviews, in particular, the researchers were cautious to double-check each interview results with cross-references. These interviews typically lasted at least 1 hour. In addition to the interviews, a number of shop-floor visits were made with the permission of the owners. Most of the interviews were recorded. Notes were also taken in the course of the interviews. The research team discussed the findings, encoded the information and worked to challenge each other's viewpoints.

In addition in-depth interviews, government publications, business survey and journal reports have provided valuable materials for this research. However, in order to avoid turning the research into a collection of business anecdotes, we have been particularly careful in drawing conclusions from these reports. We have double-checked with the relevant people or agencies before we make the final judgements.

The Hosiery Industry in the Shetou: An Illustration

The production system of the hosiery industry is shown in Figure 3. The hosiery industry itself produces an enormous variety of often rapidly changing products. Aggregately, two major kinds of hosiery products are made: the mass-produced ones, such as cotton socks, silk stockings and fashion tights, and niche-market products, such as sport socks (soccer socks and motorcycle socks) and medical socks (heel sleeves and ankle protected socks). Very often, the design and knitting are performed quite separately from the sewing and seaming processes, which are usually subcontracted to family workshop.

In appearance, the trend of the hosiery industry in Shetou verified the patterns of triangle manufacturing identified by Gereffi (1995), since the volume of hosiery product declined in accord with the increase in sale price after 1992 as shown in Figure 4. Nearly 70% of socks makers were located in Shetou in 2001. According to the 1993 population census data, the industrial structure in Shetou, even after more than two decades of industrialization, displayed 38.9% in agriculture, 34.8% in manufacturing and 26.2% in service industry. Even agriculture employment occupied the majority by slim difference, it was found that most of the manufacturing employment concentrated in the socks making. Based on the 2001 industrial and commercial census, there are 327 hosiery enterprise units in Taiwan and 64% of them employ less than five persons. As most production tasks could be subcontracted to families (Shieh, 1992), there are at least 300 hosiery "CEOs" who own these "extra-small" subcontracting factory and family workshop around Shetou.[1] Three periods are specified to expound the industrial development.

Period of District Shaping (Before 1980s)

The local development of the hosiery industry was formally initiated by a vertically integrated firm, Datong, which was founded by Xiao brothers who learned hosiery-making skills from Mr Zheng from Shanghai in the early 1950s. It is equipped with more than 200 automated machines and hired more than 2000 workers to produce cotton and nylon socks in mass volume. Datong ranked fourth in the textile industry in the early 1960s. However, good times did not last long, and the economic crisis incurred by the skyrocketing oil prices toppled the company down. More than 1000 employees were laid off, and some of the skilled workers decided to spin off the business operation. They moved the machines, as stopgap for dismiss compensation, from the factory back to their houses to start their own small business. Instead of working under the same roof, these ex-colleagues set up production networks by connecting the independent family workshops within the countryside. As a matter of fact that 54% of the 8000 households in Shetou belonged to the extended Xiao family, the production network highly overlapped with the extension of family and neighborhood network (Chen, 2005). More than 1500 households involved in the hosiery production at its peak.

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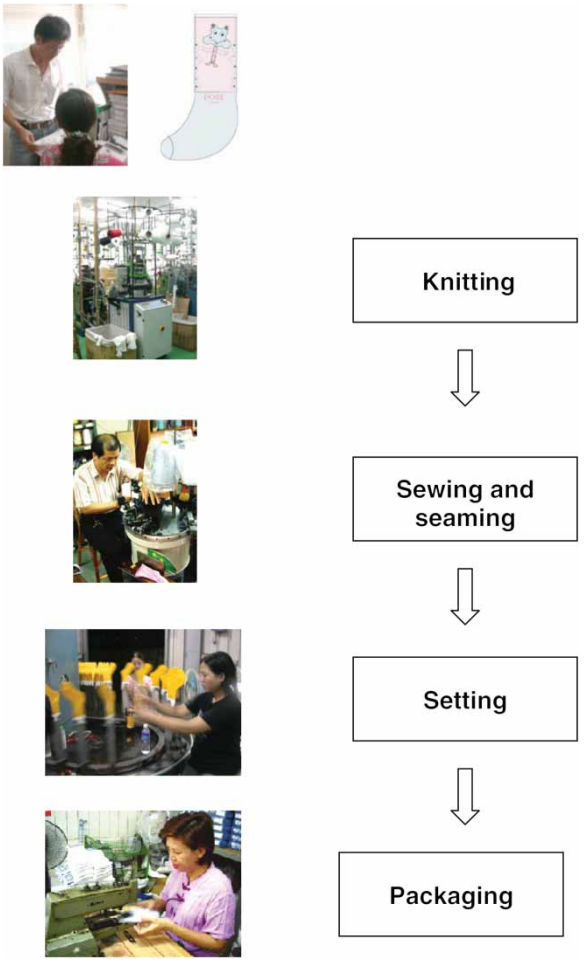

Figure 3. The subcontracting production system of the hosiery industry
Source: The Shetou Hosiery Culture Website.

The timing was good as the new international division of labour took shape and most of the labour-intensive manufacturing was relocated in the NICs such as Taiwan. At the same time, the government encouraged the entry of manufacturing activities to compensate the decline of agriculture in countryside. Against the backdrop of international and domestic factors, the organizational capillary of the production networks mobilized the latent reserve supply of labour such as housewife, retired people, farmers and even child labour. Close social ties in the rural areas were penetrated by the dense production networks, and community life was incorporated into the economic activity. As pointed out by interviewee A-01, the president of a leading hosiery firm, "My uncle worked in Datong, and founded a firm by moving some machines from the company after it was out of business. I and my two brothers learned the skills from him. At the early stage, I hired people in my factory to make the socks, but found it cheaper and efficient to

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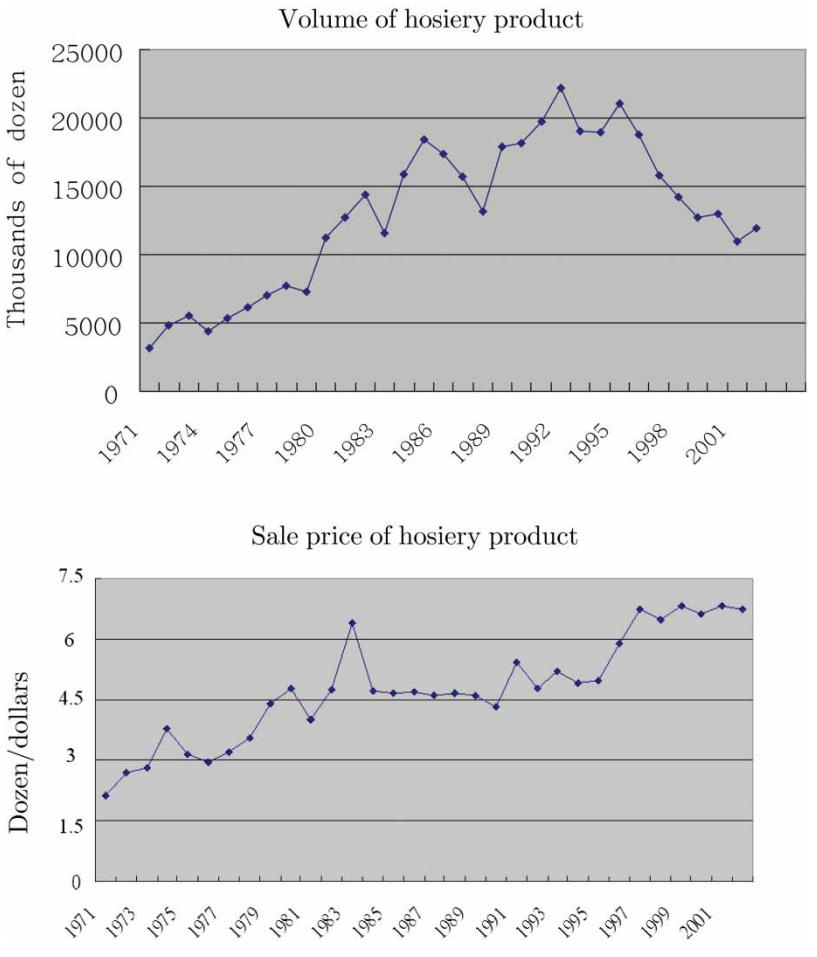

Figure 4. The volume and sale price of hosiery product
Source: Industrial production statistics Taiwan area, the Republic of China.

subcontract the jobs to the family workshops. Most of them were my employees or the colleagues of my uncle. We knew each other quite well".[2]

In most cases, cooperation was found between the different firms in the decentralized production networks. Past working experience in Datong or long-term working partnerships created trust and reputation at the early stage. Trustworthiness can represent itself in rapid response and accurate quality. In fact, the Agrarian traditions of rural communities enhanced cooperation among the rurally based industrial firms. Primordial social relationships, such as kinships and neighbours, provided supportive ties to render transactions in materials and information flows easy. In addition, the close ties also reduced the perils of opportunism incurred in the transactions. Trust could be strengthened in the small village where people met each other frequently and social gathering prevailed everywhere.

A collective order took shape in the networks. Among the networks, those who were managers in the factory often became the leaders of the production chains and coordinated the system to meet the demands of the foreign buyers. In addition to the local production

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system, a key role played by the trading companies could not be overemphasized in governing the decentralized industrial system. According to Hsing (1999), the trading companies not only took charge of the import–export transactions, but also, more importantly, engaged in quality control and on-time delivery, product design and development, risk-sharing and coordination of inter-firm scale and scope economies. In other words, a decentralized production network was shaped by three key layers of agents (Figure 5). On the top, the traders played the interface role of connecting extra-local forces, the global buyers and the local production systems. The second tier was composed of the contractors who took charge of coordinating production process to meet the parameters set and delivered by the traders. In the bottom, the subcontractors, mostly family workshops, constituted the pillar of manufacturing with mobilizing the workforce in the rural villages. By and large, such a vertically disintegrated industrial system remained dominant in the Shetou hosiery industry before the mid-1980s.

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Period of District Consolidation (1980s–Mid-1990s)

Such an industrial district within a global commodity chain basically characterized the development of rural industrialization before the mid-1980s in Taiwan. The vertical linkage connected the rural district and the global networks. However, dramatic change occurred when the outflow of rurally based industries were allowed because of an acute shortage of cheap labour and land, and more importantly, the rise of the late-latecomers such as the Southeast Asian industrializing countries and mainland China in the mid-1980s. The change reshuffled the stable industrial organization and brought forth both new crises and opportunities.

At the same time, computer-aided machine rendered product design and production process flexible in the 1980s. Buyer's demand, not only on fast volume production, but also on quality improvement, passed down to the subcontractors. The key to success in com-

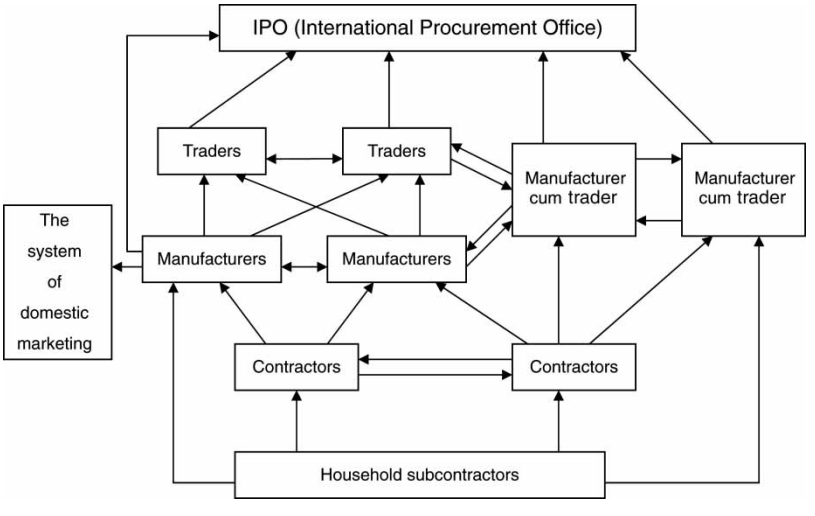

Figure 5. The Production Networks in Taiwan's Export-led Industries
Source: Adapted from Hsing (1999).

petition became how to achieve numerical flexibility and quality control, in addition to maintaining low cost. The shaping and functioning of subcontract regime had to be transformed.

The transformation occurred in two sides. On the one hand, the round of each subcontracting should cut short to meet the demand of time to market. In the existing subcontracting system, subcontractors used to return the semi-manufactured goods to contractors to check the quality of the goods after finishing each step of task. Then, the contractors forwarded the semi-manufactured goods to another subcontractor for the next step task. The production chain was somehow long-winded. Under the new arrangement, the upstream subcontractors handed down the semi-manufactured goods to their next subcontractors directly. It would save time and cost of goods transportation in the production process. How to control quality while the round of subcontracting shortened became the key factor of managing the system. In fact, quality control was checked by the contractor at the last stage. Most of the jobs of quality control were shifted to each subcontractor in the production process. As contractor A-01 said, "Each subcontractor has to monitor the quality of the upstream subcontractor. If a defect was found, the contractor would trace the responsibility and deduct the payment to the subcontractor who was at fault".[3] External pressure from the international buyers forced the hosiery firms to tighten their mechanism of quality control which could offset the negative effect of close social ties, such as free riders, moral hazard and rent-seeking (Portes, 1998). To do so, Shetou's hosiery firms had to strengthen their networking capacity, and enhanced capacity-based trust, rather than emotive trust (Ettlinger, 2003). While emotive trust was bred by maintaining and deepening interpersonal relationships, the capacity trust was strategically steered and sociality-oriented. This was a strength for the system as a whole as it faced the challenge of rapidly changing competition.

On the other hand, exploiting the flexible machines became imperative in the fierce competition. As a matter of fact that there was no formal technological or educational institution to support the hosiery industry in Shetou, producers always improved their skill through learning by doing. Under such circumstances, the interactive learning system based on the collaborative networks was important to the technical improvement and diffusion. In spite of automatic machine-saved labour force, it was never a simple deskilling process. In contrast, subcontractors had to update their capabilities of combining skill and machine. Even when the machine was shutdown, they could repair by themselves immediately. By doing so, they could save lots of time and costs of machine fix in this way. At the same time, they even could re-assemble some parts of the machine to produce special socks by accumulated technical skill which were mostly tacit and embodied. "Even opening the door or the window will change the indoor temperature and disturb the quality control. Making socks sounds easy, but there are lots of explicit and implicit knowledge about how to make excellent socks", as pointed out by A-02, an independent workshop owner. In fact, the clustering effect rendered the diffusion of tacit technical knowledge possible in the subcontracting system. It facilitated communication, above all face-to-face meetings, between transacting partners and ensured quick feedback on the production process.

The proliferation of specialized but interdependent producers promoted external scope economies. It attracted cotton and nylon material, equipment and ancillary service suppliers. In Shetou, the hosiery makers constituted a critical mass that allowed cotton thread suppliers to set up new plants nearby. This clustering effect was even more observable in the case of equipment suppliers. To establish more intimate relationships with its

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customers, company K-01, a precision machine maker which specialized in the hosiery equipments and located in Zhanghua City with a 20 min drive, had set an office in Shetou and despatched two experienced technicians to provide on-time service. Frequent communication with the socks makers contributed to the improvement in the equipment design and increases the productivity and flexibility of the machine use. As the efficiency of a particular piece of equipment would vary in accordance with its utilization and operation by different users, the interaction between the equipment suppliers and their customers was critical for the competitive advantage of the hosiery manufacturers.

In brief, this period constructed the regional advantage through three inter-dependent pillars which were characterized by learning by doing, numeral flexibility and trust embeddedness in Shetou hosiery district, as shown in Figure 6. External economies and flexible adjustment were achieved collectively by the decentralized industrial system. The key to the flexibility came from the dense social ties that lubricated business transactions and interactive learning. In the sense, social embeddedness constructed the bonding effect for the hosiery district (Storper, 2005; Uzzi, 1997).

Period of District Divide (Mid-1990s–)

Fierce competition from globalization magnified in the late 1990s. On the one hand, Shetou hosiery faced the plight of losing contracts with latecomer competitors. On the other, even in the domestic market, dumping from China threatened their market share. Under the worse business environment, the fundamentally harmonious industrial system started to split. While some of the agents upgraded through exploiting their strategic positions in the subcontracting system, others raced to the bottom by overexploitation of marginal labour force.

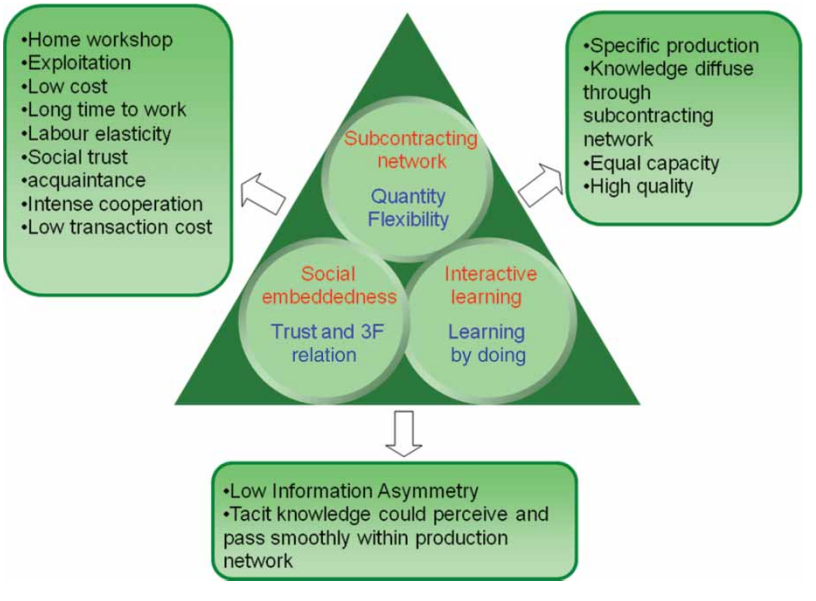

Figure 6. The consolidation of Shetou hosiery district in the 1980s

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Wage cut and order shrinkage drew tension to the hosiery firms after the mid-1990s. For example, the subcontract fees were cut from around NT$80–100 per dozen at the peak to NT$42–56 in 1995. It became an issue for each agents of the decentralized system to negotiate and settle before the system could keep operation smoothly. In most cases, sharing the operation expense and profit lose was the consensus, particularly among the long-term subcontracting partners to call for united efforts to meet the challenges.[4]

It is hard to imagine how the small workshop could survive under such ruthless condition. Unlike their counterparts who employed new generations of machinery to increase production efficiency and enhance product quality, most of the family workshops relied on the outmoded machines and more critically self-exploitation to make a living. Interviewee B-01 was typical as he described how he handled the competition from new competition which induced wage cut and order shrinkage. "We have 20 machines. They belong to the third generation and were made 10 years ago. Unlike the new generation machines which are smart enough to adjust to the new colorful design swiftly by computer-aided manufacturing. If I decide to upgrade my machines, I need to invest more than NT$10 million. It's too risky for us, a small workshop. So what we can do is to use the old machines at its full capacity. The machines operate 24 hours each day with two shifts. We, me and my wife, take the responsibility of checking and troubleshooting for the two shifts in turn. We just drift along as days pass".[5] The secret of the survival of the traditional workshops which rely on the old machines is revealed as they take a subsistent mode of production to meet the fierce competition in labour cost and quality enhancement. Being subsistent, they engage in production not to expand capital accumulation, but to fully extract the residual value of the old machines with the self-exploitation of domestic labour. Just as the small farming prevalent in Shetou is for subsistence, the majority of the workshops are for income increase and family survival (cf. Chen (1997) on the textile industry in Homei). The rural pattern of living cast a scar in the workshop industrialization.

Worst of all, despite geographic proximity and intimate social relation enabling the occurrence of interactive learning, most of the learning was bounded in a single process of production chain. Fragmentizing learning hardly promoted the upgrading of the whole chain without institutional or organizational platform bridging the external resource in and coordinating with the internal resource in the transformation of the Shetou hosiery district. The lack of institutional support to coordinate and integrate the detailed division of labour would deteriorate the learning effect of the whole production system as most of the subcontractors engaged in their specialized areas without boundary-spanning actors to make relevant external information available for the firms. For instance, interviewee A-08, a contractor, observed that "the key technique of hosiery today was how to combine the design of computer program and the skill of traditional mechanics. Without specific training program, it would be very difficult to combine these two techniques through individual effort".[6]

In fact, to be competitive in the late 1980s, a firm had to aggressively acquire as early as possible a firsthand knowledge of the products, and to design accordingly their own product models. This also meant that a learning process different from learning by doing had to be undertaken—a process of learning for doing (Lin, 2000). In the new competition, the hosiery makers had to articulate with new external assets or skill to change the way they were used to develop. However, under the subcontracting regime, most of the makers were entrapped in enhancing the efficiency of short-term flexibility, rather than engaged in non-local connections with new ideas.

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In contrast to the conservative attitude towards the restructuring imperative by the outmoded family workshops, a number of firms seek actively for upgrading options to avoid the destiny of profit decline and even out of business in the cut-throat price competition. In addition to the local industrial community mentioned above, the search for linking with extra-local actors is usually utilized by the aggressive agents to overturn the established power relation. As Humphrey and Schmitz (2000) argued, firms in the global value chains could engage in upgrading by incremental learning, but the crucial variable is whether lead firms (both locally and globally) support the repositioning of the local cluster. Power relation, in their viewpoint, was based on the position and orientation of lead firms.

The extra-local actors usually brought forth the necessary assets for innovation which was hard to take shape in the local milieu. HSIAOTEX was a case in point. In the beginning, it was a small subcontracting workshop founded by the Hsiao brothers in 1989. It soon found that the price competition would push the firm to corners and decided to dabble at the upstream area of contractor. With the help of traders, it became the principle contractor and weaved a web of subcontracting with more than 20 workshops in 1993. It grew rapidly during 1996–1998, but encountered the aftermath of the East Asian economic crisis. The buyers, mostly the key retailers in the US, would transfer their orders to the makers in the mainland China if the HSIAOTEX could not cost down to the competitive level. It left the firm with two options, either investing in the mainland or finding new customers who might not just keep an eye on price competition. Finally, it chose the latter and developed the new markets in Europe. Why did it not move the operation to China? As Johnny Hsiao, the general manager of HSIAOTEX, explained, "Most of our subcontracting partners were family workshops which were small size and combined work with family lives. Thus, it was hard to move them together with us to China. In Shetou, we had a strong team of family workshops to back us up. In contrast, we had to integrate most of the operations under the roof if we moved to China since we could not find the collaborative partners there. The risk was just too high to be taken".[7]

Cultivating new customers was not that easy for the small hosiery makers such as HSIAOTEX. As complained by the owner of A-14, who was a small contractor, "I was a conservative guy, and relied on my old customers and subcontractors very closely. I wondered if I could survive in the future as we together got used to the old ways of doing business".[8] It meant the firm had to reposition itself in the production chains to take advantage of the newly added assets. By doing so, the firms should not be confined within the existing relations to allow new ties to nourish.

HSIAOTEX tried to cooperate with different firms in other industries.[9] For example, they team up with plastic firms to develop air cushion socks, with metal firms for electrotherapy socks, with cosmetic firms for moisturizing and nourishing socks. They extend their professional ties beyond existing network. HSIAOTEX pointed out "the tip is being 'unabashed' to consult with other firms which are experts in different fields when HSIAOTEX encounters some difficulties in developing new projects". By doing so, HSIAOTEX could exploit new opportunities and technologies in the new competition. More than often it would request networking beyond the communality circle to establish new forms which were based on sociality and even professionalism.

New products also meant new markets for the hosiery firms which were used to play as OEM (original equipment manufacturing) makers and took orders from their old buyers. The subcontracting system had been reversed as new products were designed and

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developed in the sites of maker who looked for new buyers to take care of market distribution. Trade fair became the key site of encountering where capacity trust was bred. As HSIAOTEX described how they engage in the remolding process, "We had to search for new outlets as the old customers always wanted to cut our prices down. To do so, we were eager to participate in the trade shows, particularly the one in Frankfurt, which we could meet directly with the key buyers. At first, they might not trust us, but gradually they would find we are trustworthy as we demonstrate our capability and flexibility to meet their demands. We even hired a managing team from a well-noted consulting company to help us to streamline the management jobs. We were the first socks maker who was granted the ISO 9002 certificate in 2000. The certificate did help us to attract new customers". Owing to the HSIAOTEX's leading position in subcontracting network, the learning and upgrading process have not only happened within HSIAOTEX but dispersed through production chain. HSIAOTEX have encouraged their subcontractors to attend the consulting and management courses and invest new machines to meet the lately orders from new customers.

It was clear that two factors rendered the repositioning strategy possible for a number of key firms such as HSIAOTEX and allowed them to stay in Shetou to meet the challenge of restructuring. On the one hand, a stable and cooperative subcontracting team supported the principle contractors to make necessary change in product development and production innovation. In fact, to meet the harsher demands from the key customers who were forced to respond to ethic trade and would visit the shop floor regularly to check up, the supporting workshops, under the advises of the contractors and the consultants, renewed some of the equipments and cleaned the working environment. The backup of the locally bonded production network was necessary for the leading firm to reshuffle the extended production chains.

On the other hand, innovative ideas and practices usually involved the associational capacity of firms which enabled new ways of connecting with actors at a distance and orchestrating economic development. The draw of the external forces into the orbit of the local production systems was critical for the firms to avoid locking in a *cul-de-sac* of overexploitation. In other words, the local resources inherited from the rural past had to be bridged to new economic forms in ways that might overcome the traditional weakness associated with development "from within", i.e. that such resources might become "stubborn obstacles" to the promotion of innovation (Amin & Cohendet, 2004).

But the process was not without tensions. While the leading firms had to rely on the subcontracting system to support the experimentation of a new operation or the development of a new product, they simultaneously had to change their partners who were reluctant to catch up in the transformation process.[10] The new networks of connectivity which based on the rule of professionalism were far more precarious than the old networks which were embedded in co-working or family relationship. It led the leading firms to adopt a strategy of "learning by learning" to muddle through trouble water of cost saving and idea innovation and dance with the amalgam of divergent relational spaces (Sabel, 1995).

In brief, things changed dramatically when globalization pressure pushed Shetou's hosiery production system to restructure significantly to meet the price competition from other latecomer firms, particularly those from China. It led to the split of the district, as most of the family workshops suffered from overexploitation, and a number of contractors took advantage of external connections, such as trade show and consultants, to

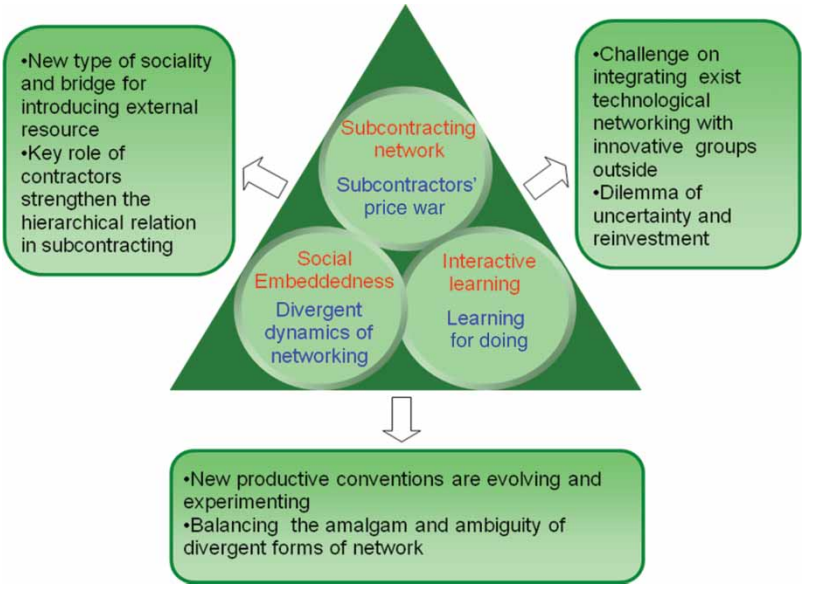

Figure 7. The transformation of Shetou hosiery district after the 1990s

re-position themselves in the higher value-added segments of the production chains. However, the organizational adjustment needed for innovation to de-couple and re-bundle social ties was not an easy task in the densely connected industrial system. Most of the social assets and networks immersed in the dominant trajectory, numeral flexibility based on short-term and familist level, in the early stage, and it became difficult to construct new types of networking which followed divergent sociality and connectivity rules to form an alternative path. What district split led to the rise of leader firms and the dark side of the family workshops that characterized this period (Figure 7).

Concluding Remarks: The Dialectics of Lock-In and Innovation

The story of Shetou's hosiery district empirically demonstrated that the dense social ties which provided the social bases of flexibility for the decentralized industrial system ironically became the buffers from new ideas which might draw the system in alternative trajectories. The major learning advantage, interactive learning or incremental learning, becomes fragmented and confined within the mastery of existing technologies. As the level of innovation accelerates, the firm's production factors and relations undergo transformations which in turn encourage the firm to free itself from its close subcontracting relationship through more autonomous innovation.

It seems that some kinds of bonding render the networks of production costless and the networks of learning efficient for price competition in the early stage. It is clear that the trust based on the rural primordial relations, such as kinship, fostered and lubricates the transactions between the different firms in the hosiery production network in Shetou. A number of conventions in rural areas, such as familism and sharecropping,

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are prevalent in the industrialization process. Even subsistent system in agriculture incorporates into the family workshops and leads to a "survival without accumulation" system which is based on self-exploitation (Gates, 2005). Such an industrialization model with rural characteristics partially explains why the number of firms does not decrease even meeting the challenge from other latecomer countries, such as China. The case demonstrates that it is clearly the social embeddedeness which consists of social ties and trust that shaped the hosiery industrial system, but at the same time, the spatial embeddedness which means the existing local conventions and regional industrial history that help constraining the evolution of industrial trajectories in Shetou.

The findings also contribute to a comparative study with the case of the Third Italy, in which specialist SMEs concentrate in the rural industrial estate. However, two key differences emerge after detailed scrutiny. First, while the Italian case is well noted by its product innovation with brand-name manufacturing, the case of Shetou hosiery district suffers from the lack of creativity to meet the upgrading challenge. This difference comes from the combination of rural industrialization and OEM in the Shetou case. As a result, it becomes a "truncated industrial district" whose main dynamics resides in repositioning in the global production networks, as Coe *et al.* (2004) argued.

Secondly, such a difference leads to the divergent trajectories taken by the SMEs in Italy and Taiwan, when they meet the globalization challenges. Despite performance evaluation of Italian industrial districts as a consequence of new challenges linked to the globalization process varying (cf. Bellandi & Caloffi, 2008), the successful ones are able to enact a selective process of relocation, substituting outplaced activities with more valuable ones and attracting inward investment (Sammarra & Belussi, 2006). In contrast, the case of Shetou district demonstrates that leader SMEs in Taiwanese industrial districts are not necessarily compelled to shift production jobs abroad, as predicted by Guerrieri *et al.* (2001), but they re-position themselves in local production chains with incurring extra-local resources to cope with the threats from new competitors. Instead of adopting strategies of internationalization as their Italian counterparts do, the SMEs in Shetou hosiery district take not-so-aggressive strategies of local reaction to rely overwhelmingly on local supply chains to meet the challenge. Worst of all, those owners of family workshops which sit in the bottom of the local supply chains can do nothing but to live self-exploitative lives and face the perils of extinction.

Even the strategies of re-localization need the leader firm to build up a new interaction with other fractions, particularly the dominant, of the economy and have as much, or more, influence on how the family-based industrial system operate than did anything inherent in the form of production itself. In most cases, innovation is often a process of creating new social connections between people and the ideas and resources they carry, so as to produce novel combinations. New and formal ties, such as professional connection, more than often become the key sites in which innovative activities embed, and close inter-firm relations that embed in communal personal ties will result in serious shortcomings in boundary-spanning functions that are essential for making external information relevant for the firm. Dense and informal networks present the optimal conditions for the exchange of the complex information necessary for innovation in complex organizations (Uzzi, 1997; Hansen, 1999), but present an idea problem because of the redundancy of information circulating within the network (Granovetter, 1973). As Herrigel (2008) observes, against the taken for granted in the earlier discussion of flexible industrial organization, flexibility today seems to be driven far more by formalization, than by a reliance on

informality and tacit forms of knowledge in organization. Similarly, Whitford and Potter (2007) proposed an open network in which the leader firms consciously organize supply chains across organizational and geographical boundaries by making tacit knowledge explicit. Consequently, it becomes the imperative task of balancing the amalgam and ambiguity of divergent forms of networking for Shetou, a labour-intensive industrial district, to undertake in the era of new competition.

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Notes

1. The number was an informal estimate by the local hosiery association.
2. Interview with interviewee A-01, 9 January 2006.
3. Interviewed with interviewee A-01, 9 January 2006.
4. But, under certain circumstances, the subcontractors could unite to fight for unfair wage cut. For example, a dispute was raised by the abrupt half cut of subcontracting fee in 1995. According to the report in *China Times* (6 May 1995), it was due to the shortage of order which was allocated mostly to labour cheaper location such as the Southeast Asia and Mainland China. Also the appreciation of Taiwanese dollar concurrently devastated the profit-making of the hosiery orders in 1995. As a result, the profit loss was transferred to the subcontractors. After the collective strike and fight by the subcontracting homeworkers, an agreement was reached and the contractors and the subcontractors burdened the loss equally.
5. Interview with interviewee B-02, 15 February 2006
6. Interviewed with interviewee A-08, 7 September 2006.
7. Interview with interviewee A-05, 17 February 2006.
8. Interview with interviewee A-I04, 12 February 2006.
9. Interview with HSAIOTEX, 20 March 2006.
10. In particular, the restructuring process usually entailed the subcontractors to change their methods of doing things and even machinery which might be costly and risky without order guarantee. As a result, the subcontractors usually hesitated to invest and brought forth conflicts with the subcontracting firms who encouraged the subcontractors to match the demands on new investments.

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