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Strategic coupling and regional resilience in times of uncertainty: the industrial chain chief model in Zhejiang, China

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Abstract

The question of how regions can remain competitive and resilient in times of uncertainty is a central concern for economic geographers. To date, two key concepts— strategic coupling and regional economic resilience—have been used separately to study regional economic dynamics in times of uncertainty. Through a careful examination of the industrial chain chief model in Zhejiang Province, this paper argues that both concepts are essential and should be combined in a coherent manner to better explore the topic of interest. Moreover, it is pointed out that the existing conceptualization of the two concepts suffers from some limitations and a reconceptualization of the two key concepts is needed if economic geographers are to make policy recommendations to local policy-makers.

Key words: Regional resilience; strategic coupling; Zhejiang, China; value chains; policy

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1 Introduction

Regions today are facing two fundamental challenges. First, accelerated globalization has meant that regions are increasingly exposed to the influence of extra-regional economic dynamics. There is no place in the world today that is unaffected by globalization. And the global division of labor, which occurs for reasons of cost reduction, has led to various shifts in global production/innovation patterns over the last decades (Dicken, 2011). While such global shifts have opened up opportunities for many regions of the world, they also pose significant challenges for other regions suffering from increased production costs, weakened innovation capacity, and depleted natural resources (Coe and Hess, 2010). Second, closely related to increasing globalization, regions are now increasingly exposed to crises of all kinds, ranging from natural disasters, terrorism, financial crises to pandemics and other public emergencies. Due to increasing globalization and accelerating mobility of goods and human capital, such crises appear to be increasingly contagious, with their effects quickly felt by actors in other parts of the world. The question of how regions can respond and adapt quickly and intelligently in the context of such dual challenges to remain resilient and robust is obviously a thorny one for which clear solutions have not yet been provided.

Economic geographers have long been interested in regional economic dynamics in times of uncertainty (i.e., increasing globalization and the prevalence of crises). Two key concepts—strategic coupling and regional economic resilience, have been introduced to explore the phenomena of interest. Rooted in the global production networks (GPN) literature, strategic coupling highlights that regions and clusters may gain developmental opportunities and realize value creation, enhancement and capture, by providing regional assets needed by global lead firms (Coe et al., 2004; Yeung, 2009a; MacKinnon, 2012; Hassink, 2021). While this perspective is indeed helpful to explain economic dynamics in many sectors (e.g., apparel, electronics, computer, automotive, etc.) in different regions or countries (e.g., Asian Tigers), scholars increasingly argue that it has limitations when applied to countries with a large domestic market (Wei, 2010, 2011; Wei and Liao, 2013; Zhou, 2008) and weak innovation capabilities (Murphy and Schindler, 2011). Moreover, relatively little has been said about the impact of fundamental disruptions and crises on GPN reconfiguration and strategic coupling (Bryson and Vanchan, 2020; Yeung, 2021a), as most work on strategic coupling focuses on regional economic dynamics in normal times. In contrast, research on regional economic resilience has paid considerable attention to how actors respond in times of crisis (Bristow and Healy, 2014; Martin, 2012; Martin and Sunley, 2015; Gong and Hassink, 2017). However, this literature focuses less on aspects of the value chain and the (re)configuration of production networks, and is therefore largely separated from work on GPN and strategic coupling.

We argue that both concepts are indeed relevant for a better understanding of regional economies under the megatrend of globalization and the increasing prevalence of crises in the contemporary world. To date, however, few efforts have been made to combine the two perspectives. In the remainder of the paper, we will show how the two previously separate perspectives can be combined in a coherent manner to explain regional industrial adjustment in times of uncertainty and related value chain fragmentation. Specifically, we

will examine the Industrial Chain Chief Model (ICCM) proposed by Zhejiang Province against the backdrop of the US-China trade war and the COVID-19 pandemic, and its implementation in two Economic Development Zones (EDZs) characterized by different levels of integration into existing GPNs.

The paper proceeds as follows. Section 2 reviews the current state of research on strategic coupling and regional economic resilience. Section 3 presents the background of the cases studied and the research methods. Section 4 introduces the ICCM working mechanism at the provincial level and its implementation in two pilot programs in Ouhai, Wenzhou, and Xianju, Taizhou. Section 5 theorizes the ICCM from an economic-geographic perspective. The last section concludes.

2 Regional development in times of uncertainty

Regions today are increasingly integrating into production networks and value chains organized by multinational corporations (Henderson et al., 2002). Such involvement in globalization has brought enormous benefits to regions, especially to many emerging economies, by allowing them to participate in the global division of labor and thus to extract value from serving global markets (Coe et al., 2004). However, such deep integration into the global economy has its downsides. Regions are now much more vulnerable to the occurrence of shocks and crises in other parts of the world, as the intertwined and interdependent relationships between different parts of the global economy and the increasing interconnectedness of the world have made crises more contagious and have far-reaching effects (He et al., 2021). This section carefully examines two key concepts in economic geography, namely strategic coupling and regional economic resilience, which are related to regional development in the context of uncertainty.

2.1 Regional development in times of globalization: strategic coupling as a heuristic?

Regional development today is increasingly subject to the influence of translocal dynamics. Over the past two decades, the global production network (GPN) perspective has emerged as an influential approach to understanding how regional developments are integrated into the global economy (Henderson et al., 2002; Coe et al., 2004; Hess and Yeung, 2006), alongside the parallel perspective of the global value chain (GVC) or global commodity chain (GCC) (Coe and Yeung, 2015).

One of the key contributions of the GPN research has been to (re)conceptualize regional development as a process of strategic coupling between regional assets and the strategic needs of lead firms in GPNs (Coe et al., 2004; Coe and Yeung, 2015). Yeung (2009b, p.213) defines strategic coupling as “the dynamic processes through which actors in cities and/or regions coordinate, mediate, and arbitrage strategic interests between local actors and their counterparts in the global economy.” According to this conception, regional assets in the

form of specific kinds of technology/ knowledge, organization, and territory-specific elements such as natural resources, provide an important resource for regional development when used by regional institutions to complement the strategic needs of global lead firms situated within GPNs.

More recent thinking on strategic coupling has evolved in several ways (Van Grunsven and Hutchinson 2016; Coe and Yeung, 2019). First, it is increasingly recognized that regions can couple to GPNs in multiple ways, depending on the intensions of global lead firms, as well as the local conditions of host regions (Nilsen, 2017). In terms of understanding key actors that are important for strategic coupling, in addition to the prominent role of the global lead firms, local actors, especially the state and local firms also have major roles in the strategic coupling processes (Gao et al., 2017; Haley et al., 2017; Kleibert, 2014; Liu and Yang, 2013; Zhu and He, 2016). In the context of emerging economies, Zhu and He (2016) argue that it is especially important to take into account the role of local governments, as they often get involved in shaping the regional economy, as planners, developers, and policy-makers.

Second, inspired by the evolutionary turn in economic geography, authors have sought to demonstrate how strategic coupling is a dynamic and evolutionary process, including not just strategic coupling, but also decoupling and recoupling (MacKinnon, 2012; Yeung, 2015). These studies examined the relationship between strategic coupling and different types of regions. MacKinnon (2012), for example, connects coupling, decoupling, and recoupling processes to dynamic regional hotspots in North America and Western Europe, old industrial regions (OIRs), and East Asian growth regions, respectively. In a similar vein, in the GPN 2.0 theorizing, Coe and Yeung (2015) have differentiated between indigenous coupling, functional coupling and structural coupling for core, emerging and peripheral regions, respectively. Empirically, many of the studies are (still) focusing on coupling creation between a region and a global lead firm (e.g., Dawley et al., 2019; Gao et al., 2017; Haley et al., 2017; Kleibert, 2014; Yang, 2009; Yeung, 2009a), highlighting the agency of local actors (especially the role of local state and institutions) in making such strategic coupling happening. However there has been growing empirical evidence that decoupling, and recoupling also occur in regions. Horner (2014), for example, helpfully distinguishes between structural and strategic modes of decoupling. In examining the transformation of the cross-border production networks of the computer industry driven by Hong Kong and Taiwan-based TNCs in China, Yang (2013) suggests that regional path developments of the computer industry in China have been reshaped by TNCs' decoupling from source regions in coastal China and recoupling with inland provinces. Recently, there are more efforts made to connecting strategic coupling with other key notions in evolutionary economic geography in order to better understand regional economic development. Van Grunsven and Hutchinson (2016), for instance, explore the evolutionary concepts of adaptiveness, adaptation and resilience in profiling the strategic coupling of southern Malaysia with the global electronics industry, while Yeung (2021a) usefully connects strategic coupling to the regional diversification discussion.

While the abovementioned development in the strategic coupling literature has provided extensive insights into understanding regional development in the global economy, it is however, primarily concerned with GPN configurations and strategic coupling in normal

times. Therefore, little has been said on the impact of fundamental disruptions and crises and related globalization in reverse on GPN reconfigurations and strategic coupling, and the role of both firms and non-firm actors therein (Yeung, 2021b). Bryson and Vanchan (2020), for instance, criticize the GPN work for being unable to analyze the new kinds of value and risk revealed by the covid-19 pandemic. Secondly, the GPN and strategic coupling research seems to overemphasize the role of globalization and extra-regional processes. Such an emphasis overlooks those development processes arising in and through alternative forms of market internationalization and in places where lead firms are absent (Murphy and Schindler, 2011). Moreover, little attention has been placed on the role of the domestic market in GPNs (Yang, 2014). Overall, as it has been summarized by Wei (2010, 2011), GPN scholars' efforts to account for regional development from a strategic coupling perspective often encounter problems of situatedness and specificity. To better understand regional development in times of recurring crises, another useful concept, regional economic resilience, has provided some complementary insights.

2.2 Regional development in times of crisis: regional economic resilience

Over the past decade, interest in the resilience of regional or local economies has grown as we are seen to live in an increasingly uncertain, volatile, and risk-prone world (Christopherson et al., 2010; Martin and Sunley, 2015). Resilience has been interpreted primarily in three different ways: first, it is regarded as 'bounce back' of a system following a shock to its pre-existing state or path, which in many applications is assumed to be a stable or 'equilibrium' state. Second, resilience is understood as a system's 'ability to absorb' a shock without changing its structure, identity and function. And finally, resilience is seen as the ability to 'bounce forward' to a new (better) status or functions. In understanding regional economic resilience to shocks and crises, economic geographers increasingly tend to follow this last interpretation and understand regional economic resilience as "… the capacity of a regional or local economy to withstand or recover from market, competitive and environmental shocks to its developmental growth path" (Martin and Sunley, 2015, p.13; Bristow and Healy, 2014; Boschma 2015). An evolutionary perspective conceives regional economic resilience as a multidimensional, adaptive concept embracing resistance, recovery, reorientation and renewal (Martin 2012; Martin and Sunley, 2015). As pointed out by Webber et al. (2018), in times of crisis regional economic resilience is dependent on the 1) nature, depth, and duration of the shock; 2) the prior growth path of a region, as well as the various determinants of that growth path; and 3) supportive measures undertaken by local and national institutions (Evenhuis, 2017; Martin and Sunley, 2015).

In terms of measuring resilience, regional economic resilience is principally operationalized by two dimensions: namely, a region's resistances to shocks—the extent to which it can withstand the disturbance and prevent it from having a large impact, and its recoverability—the speed and degree of recovery after the shock. Several quantitative measurements and indicators have been developed in this regard (e.g., Soroka et al., 2020; Martin, 2012; Webber et al., 2018). In terms of the determinants of resilience, analyses have tended to

focus upon the pre-existing structures of regional economic systems by using statistical approaches (He et al., 2021; Martin 2012, Webber et al., 2018), while the role of human agency, which lies at the heart of regional economic resilience, has received relatively little attention (Bristow and Healy, 2014). In this regard, Martin and Sunley (2015) argue that statistical methods could be used to measure and compare resilience to a particular shock across different regions, whereas case-study analyses are more appropriate to explain how those differences come about and what actors and agency are behind that. Furthermore, Evenhuis (2017) suggests that understanding the processes of reorganization and reorientation, which lie behind resistance and especially recovery, are as important as measuring the degree of resistance and recoverability of regional economies in crisis.

While research on regional economic resilience is indeed helpful for a better understanding of regional economic adjustment in times of crises, this literature focuses less on the (re)configuration of value chains and production networks in crises. Strategic coupling/GPN reconfiguration is only a small part of the overall resilience analysis, if it has ever been considered at all. This is surprising given that many regional economies are so deeply integrated into the GPNs of leading firms and are highly permeable to the effects of globalization.

2.3 Interim Summary

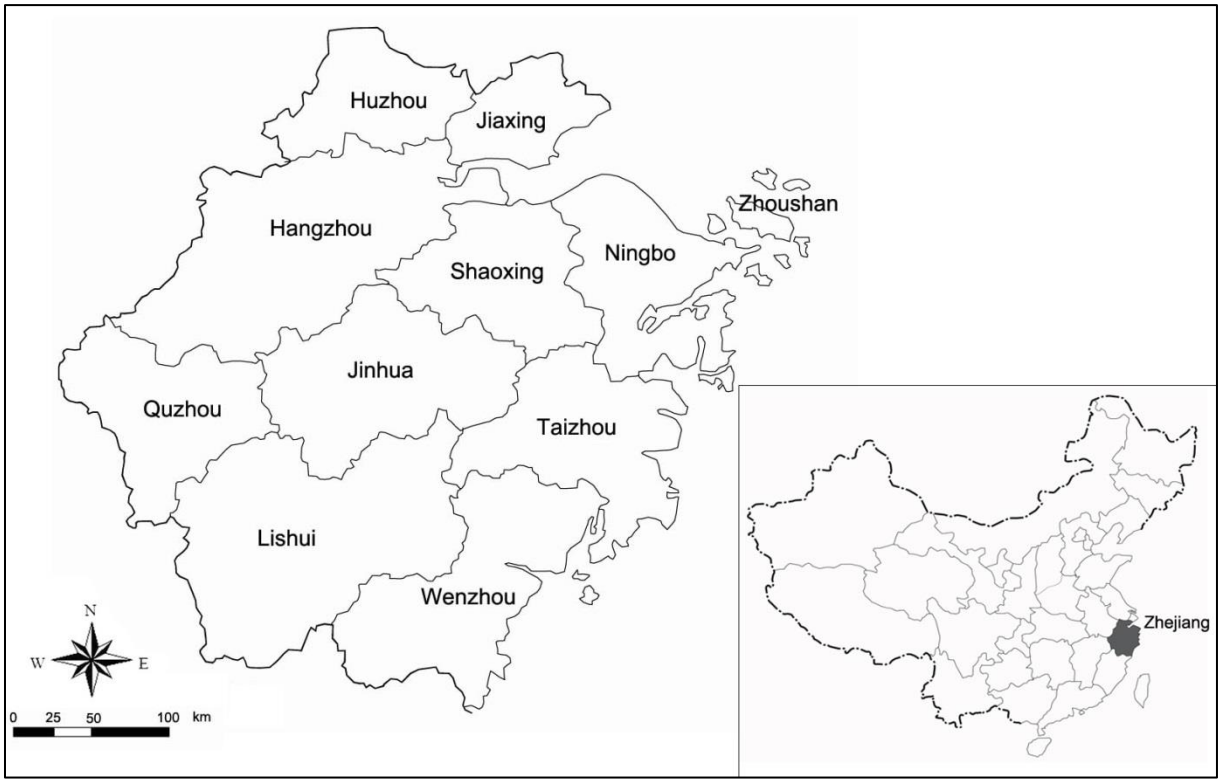
All in all, the above detailed review of strategic coupling and regional economic resilience has shown that both concepts are indeed relevant for a better understanding of regional development in times of uncertainty. To date, however, little research has systematically combined these two concepts to capture regional economic adjustment and the role of regional actors in reconfiguring GPN, particularly during or after crises (recent exceptions include Haley et al., 2017; Van Grunsven and Hutchinson 2016). Indeed, some GPN scholars have recognized the relevance of the resilience concept for GPN studies in the post-COVID world. Yeung (2021b, p.8), for instance, argues that "[T]he post-pandemic world economy will likely undergo another global shift towards less globalized production—through the massive restructuring of GPNs in search for more diversified production bases, supply stability, and network resilience." However, the specific strategies for how actors might respond to and facilitate such post-pandemic production network reconfiguration and regional economic recovery (resilience) are less explored. In the remainder of the paper, we will show how these two key concepts should be considered when analyzing regional transformation and resilience in times of high uncertainty. To do so, we will closely examine the ICCM proposed by Zhejiang Province in light of the US-China trade war and the current COVID-19 pandemic.

3 Case selection and research methods

3.1 Regional development in Zhejiang: contexts and backgrounds

Zhejiang is a coastal province in China (Figure 1) that has experienced rapid economic growth since reform and is known for its private enterprise-based Wenzhou model (Bellani and Lombardi, 2012; Wu et al., 2014). It often ranks first among the provinces in various indicators of the overall strength of the private sector in China (Wu et al., 2014). In terms of the impact of GPN, regions and industries vary greatly in the extent to which they are exposed to the effects of globalization. Some clusters (e.g., eyewear, apparel, socks, and hardware) have long inserted themselves as suppliers or original equipment manufacturers into the GPNs of brand-name companies based in Western countries and are therefore more sensitive to global market dynamics and international disruptions. In contrast, other clusters and industries (e.g., the pharmaceutical clusters) are less subject to the influences of TNCs, both in terms of production and innovation.

Figure 1: map of Zheijiang Province



In the last forty years, the booming of Zhejiang's economy was accompanied by the formation of three clusters, i.e. the emerging coastal Wenzhou-Taizhou cluster, the central Zhejiang cluster, and the traditional Hangzhou-Shaoxing-Ningbo cluster (Wei and Ye, 2004). The two selected industrial value chains are based in the emerging Wenzhou-Taizhou region, the representatives of the Wenzhou model. In that model, the production environment was organized on the basis of the division of labor among independent producers specialized in one phase or one component of the final product, resulting in the pattern of 'one township,

one product' (Bellani and Lombardi, 2012). Locally produced goods were then traded through specialized markets in which both domestic and international merchants could purchase products in large volumes.

In terms of the state-business relations, because of the tradition of private capitalism and the strong influence of business, the Zhejiang governments tended to take a benevolent attitude toward private enterprises. Local governments have been very active in facilitating domestic and global networks, promoting urbanization and economies of scale. In recent decades, there has been a shift in the perception of the role of governments, i.e., from "non-interventionist governance" (Wenzhou model) in the 1980s to "moderately active governance" (Yiwu model) in the 1990s to more recent "active effective governance" (Hangzhou model) (Hu, 2018).

Despite tremendous growth, companies in the Wenzhou-Taizhou region are currently struggling to improve their ability to move up the value chain. In labor-intensive industries such as textiles and apparel, global buyers tend to look for alternative suppliers and cheaper production sites to reduce costs (Zhu and He, 2016). A lack of innovation capability in knowledge-intensive industries has also hindered further development of the regional economy. The need to improve innovation capability has been increasingly emphasized by industry players in order to survive cutthroat competition (Wu et al., 2018). In particular, the recent US-China trade war and the ongoing COVID-19 pandemic have exposed the problems of many industry clusters in Zhejiang, such as low value-added, weak innovation capability, heavy reliance on polluting production, etc. In this regard, the efforts of enterprises and non-economic actors (governments) to improve the value chain seem to be extremely important. The emergence of the ICCM in Zhejiang can be seen to a large extent as one of the efforts of local actors to find better development opportunities in times of uncertainty. Before introducing the ICCM in detail, the next subsection will first introduce our research methods.

3.2 Research methods

This study is based on a mixed method of in-depth interviews, analysis of media articles, and participation in conferences and forum discussions. First, 21 interviews were conducted in Zhejiang between August 2020 and January 2021 (see Appendix 1). Specifically, we conducted fieldtrips to two EDZs in Wenzhou and Taizhou, which specialize in eyewear and pharmaceutical production, respectively. The eyewear EDZ is located in the Ouhai district of Wenzhou city and is characterized by a strong integration in existing GPNs, while the pharmaceutical EDZ is located in the Xianju district of Taizhou city and has so far been characterized by weak international influence but intends to strengthen its global and national links. In addition to these site visits, interviews were also conducted with provincial government officials and scholars and experts from various organizations. The interviews mainly focused on 1) the influence of the trade war and COVID-19 on local industrial activities, 2) the challenges and problems in industrial upgrading, and 3) the interpretation of the rationale for ICCM by different levels of policy makers, implementers, and relevant enterprises.

In addition to this first-hand data collection, application materials for the ICCM pilot program were provided to us by the two focal EDZs. In these application documents, detailed information about the EDZs, the key companies and their positions in the GPNs/GVCs, and the proposed working mechanism and operationalization of ICCM were outlined by the management committee of the respective EDZs. In addition, two of the authors have attended the '2020 China Development Zone Industry Chain Roadshow' and 'Industrial Chain Chief Model Forum' organized by the Zhejiang Department of Commerce (DoC) in December 2020. The results from these different sources were triangulated, compared, intensively interpreted and discussed by the authors to produce robust results.

4. Industrial Chain Chief Model in Zhejiang

4.1 Provincial-level guidelines

The ICCM is an institutional innovation that addresses the challenges of regional industrial chains in times of uncertainty. Based on the expectation that the US-China trade war would most likely lead to increased disintegration and segmentation of global value chains, in August 2019, the Zhejiang DoC issued a concrete guideline on “Suggestions on The Pilot Work in Implementing Industrial Chain Chief Model in Economic Development Zones” (Hereafter, Document 1) with the aim of strengthening, integrating and replenishing the local industrial chains in uncertain times. Since its publication, this guide has been implemented in many EDZs in Zhejiang, and has helped to create the awareness of chain-like thinking in the coordination and integration of co-located enterprises. In early 2020, the outbreak of the Covid-19 pandemic has led to severe fragmentations of many of the GVCs. EDZs in Zhejiang have been subject to different degrees of influence, depending on their dependence on export markets and foreign investments. In this context, the DoC issued a second document on “Notice on Further Implementing the Industry Chain Chief Model to Promote the Resumption of Production” (Hereafter Document 2) in order to support the resumption work in the EDZs during and after the pandemic.
According to Document 1 and 2, the main guidelines of the ICCM can be summarized as follows:

- Each EDZ in Zhejiang was required to identify an industrial chain with “strong characteristics, high international competitiveness and a comprehensive innovation support system”.
- In order to take advantage of the social capital of key officers in the specific regions, it was recommended that the main leaders of the territory where the EDZ is located, would play the role of “chain chiefs”, who aggregate and connect previously unconnected resources to serve the needs of the identified local industry. Key regional enterprises are supposed to be allocated the role of “chain owners”, who are supposed to be the main actors doing value chain adjustment and reconfiguration. Furthermore, directors of intermediaries such as industry

associations, are expected to play the role of “chain mentors”, who coordinate and interact directly with different enterprises along the identified industrial chain.

- Chiefs, owners and mentors should work together based on a set of shared goals and working mechanisms so as to increase the resilience of the local industry in highly uncertain times.
- The ICCM should be problem-oriented, targeting at solving challenges such as value chain ruptures, lack of directionality, low value capture, low innovation capacities, and untargeted business-attraction strategies.

While such an institutional innovation could have come from any region that is suffering from value-chain problems, the emergence of the ICCM in Zhejiang has been argued to be “organic” and “natural” by many of the interviewees (Expert 5; Government 1,2). On the one hand, the Marshallian-Industrial-District-like production networks in the EDZs of Zhejiang have provided the industrial foundation for this innovative model to emerge, as co-located firms have close connections from a value chain perspective (Expert 2; Government 3). On the other hand, the desire of local leaders to govern the economy actively and effectively, has made creative thinking on solutions to local problems a daily routine of the grassroots cadres (Expert 5; Government 2). Under the guidance of the DoC’s ICCM Documents, many of the EDZs in Zhejiang have specified their plans for the Pilot Program in 2020, in the next subsections, two of them, which show different degrees of globalization influence, will be introduced.

4.2 The ICCM in the eyewear industry, Ouhai, Wenzhou

4.2.1 Development zone introduction

The eyewear industry consists of eyeglasses, lenses, frames, sunglasses and contact lenses. Ouhai EDZ was founded in October 1992 and approved as a provincial-level economic development zone by the People's Government of Zhejiang Province in August 1994. There are more than 500 eyeglasses enterprises in the zone (all are privately owned), employing more than 60,000 people. From 2016 to 2019, Ouhai EDZ has added 36 innovative R&D institutions, including five eyeglass-related R&D centers and 1 technology center. There are 59 above-scale industrial enterprises, among which seven had an industrial output value of over 100 mn yuan in 2019. Within the EDZ, there are 15 foreign enterprises, and 150 of the local firms are focused on foreign trade. Around 90% of the glasses produced in Ouhai are sold to the European Union, South America, and the United States. Leading local enterprises include oKo, Tongda, Topsight, and Squacy Smart, specializing on multiple types of glasses.

4.2.2 Value chain disentangling

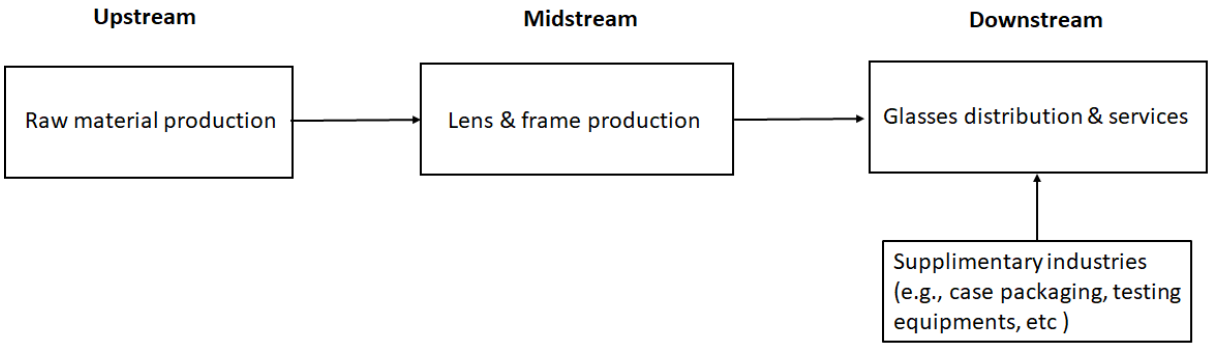
The value chain of the eyeglasses industry consists of upstream raw material production, midstream lens and frame production and downstream distribution and services (Figure 2). There are also closely related industries such as case packaging, testing equipment, etc. The upstream chemical and raw material producers for the eyeglasses industry are general chemical plants (providing parts such as screws, hinges, temples, rims, bridges, nose pads, pad arms, etc.). (Ouhai 4).

The midstream lens and frame design and production is the most profitable segment of the value chain. As an important part of eyeglasses, frames play a major role in supporting

lenses and aesthetics, and frames in different shades, styles and materials have gradually transformed eyeglasses products from instrumental necessities to fashion goods. The ideal lens should not only have perfect optical properties, but also be UV-absorbing, impact resistant and thin and light (Ouhai 1).

In terms of the downstream consumption segment, eyeglasses are semi-medical and experiential goods (Ouhai 4), consumers have a strong demand for experience before placing an order, so the main sales terminal is mainly offline retail channels, including large supermarkets, brand stores, hospitals, vision correction centers, etc. (Ouhai 5). With the development of the e-commerce, the online-to-offline (O2O) model has gradually emerged in the eyeglasses market in recent years, and the new retail model of "online + offline" comprehensive services has taken shape lately (Ouhai 2).

Figure 2: The eyeglasses value chain



4.2.3 GVC diagnosis and value capture evaluation

In terms of its position in the GVC, most of the Ouhai-based enterprises mainly produce low-cost, low-price and low value-added eyeglasses (Ouhai 1, 2). The main enterprises in the region, such as oKo, Tongda, Tornado, etc., all serve as OEMs for western brand firms, relying heavily on orders from foreign markets, although in recent years, some efforts have also been made in cultivating own brands in the region. The local glasses industry exhibits problems such as weak capacities in brand building, relatively weak R&D and design capabilities, shortage of talent and designers, etc. (Ouhai 2, 3, 4).

Increasingly, rising material prices and labor costs in Ouhai have caused the local advantages of eyewear production as a labor-intensive industry to dwindle (Ouhai 1). In addition, many of the local enterprises are heavily dependent on export markets, making the local industry more vulnerable to global market disruptions. Since the international financial crisis in 2008, the general downturn in the eyewear sales market in Europe and the United States, especially in the luxury eyewear market, has been clearly felt by local enterprises (Ouhai 2). In addition, the trade war between the United States and China, as well as the impact of the global COVID-19 pandemic, have posed significant challenges to the local industry over the past year and a half (Ouhai 1, 3). For example, problems such as the decline in foreign trade orders, delivery delays, hampered international distribution logistics, etc. during the pandemic were cited as the main recent concerns of local enterprises (Ouhai 2, 3, 5). In addition, the shift from export markets (which were shrinking) to domestic markets (which were growing stably) was not easy during the pandemic period, as it was extremely difficult

for OEMs to establish their reputation as brand names in an already highly competitive market (Ouhai 3).

4.2.4 ICCM in Ouhai

In order to increase the resilience of the local industry to the potentially threatening effects of the crises (e.g. trade war, pandemic, etc.) and to facilitate industrial upgrading to create and achieve higher value in the post-crisis period, the Ouhai EDZ has defined its ICCM for the eyewear industry. It contains a clear division of labor between enterprises and the government, the main objectives to be achieved, and the specific strategies and actions to be taken by relevant stakeholders.

Main goals and division of labor

The overall goal of ICCM in Ouhai is to strengthen the long-term resilience of the local industry in order to reinforce the Ouhai eyewear cluster as the "capital of China's eyewear industry" (Ouhai 1). Based on this goal, the project will focus on three main objectives: Replenishment, strengthening and optimization of the industrial chain to realize industrial upgrading and transformation. With the construction of the Zhejiang Eyeglasses Industry Innovation Service Complex, local stakeholders aim to further improve the innovation ability, intellectual production capabilities and clustering level of the co-located eyeglasses enterprises, ultimately promoting famous brands and well-known enterprise groups in the EDZ.

As for the division of labor, several chain chiefs with influential positions in the government are appointed to provide the resources needed for industrial upgrading and transformation. Ouhai County Party Committee Secretary Wang Zhenyong and county governor Zeng Ruihua have been appointed general chain chief and chain chief respectively to supervise and guide the industrial chain upgrading and modernization. The secretary of the Ouhai EDZ Party Committee, Xu Jianyu, is the deputy chain chief in charge of the concrete work on the ground. In addition, various government departments within the county have been assigned different tasks. As for the value chain owners, the leading regional enterprises such as Tongda, oKo, Topsight, Tornado, Squacy Smart, BD, Zhengda, Hengda, CARA, etc. were expected to actively adjust and transform their supply relationships to improve the overall resilience of their production networks. The director of the Management Committee of EDZ Ouhai, Chen Hanyan, has been appointed as the mentor of the chain, as deals with local enterprises on a daily basis and knows the problems and challenges of the industry well.

State and firm strategies and actions

Targeted measures and strategies are required to achieve the above objectives. Specifically, such measures target three key aspects, including value enhancement and capture, value chain adaptation and market formation.

I) Value enhancement and capture

In order to increase and capture value, companies (i.e., chain owners) strive to cultivate indigenous innovation capabilities, train and attract talent, build a common technological innovation platform, and increase the level of digitalization of their own companies (Ouhai

3.5). In addition, local authorities and officials (e.g., chain chiefs) provide services and promote regional innovation in areas such as talent attraction (providing better living and working conditions, establishing an eyeglass academy and business incubator, organizing professional skills competitions and startup competitions) and providing funding during the crisis (offering interest-free loans, subsidies, rent waivers, etc.) (Ouhai 1). Furthermore, the industry association is expected to strengthen its role as a coordinator to encourage enterprises in the industry to strengthen cooperation and joint ventures, and explore the mode of "multi-factory alliance" to strengthen networks among co-located firms (Ouhai 2). Through the association platform, the industry aims to achieve the exchange of information and resources, change the traditional resource allocation model to enable the sharing of machinery and equipment, booths and production lines, and the construction of common technology platforms, etc. (Ouhai 1, 2). The local government is also encouraging local enterprises to acquire global tier-one brand names in the form of government-enterprises-association cooperation to localize the global brand names and leverage the value created by these leading enterprises in the region. Ouhai enterprises are gradually moving to project-based cooperation with international brands, while vigorously cultivating their own brands and constantly improving complementary industrial chains (Ouhai 3, 4). The local government is also actively soliciting relatively mature enterprises from Shenzhen, Hong Kong and Taiwan to locate in Ouhai. Finally, the three relevant parties are focusing on advancing the local industry by introducing smart glasses manufacturing. Here, high hopes are pinned on 5G technologies to fully promote digitalization and intelligence (Ouhai Pilot Program, 2020).

II) Value chain adaptation

Value chain adaptation is another area where different stakeholders can work together. In the context of ICCM, such value chain adjustment has both short-term and long-term dimensions. During the COVID-19 crisis, local production was significantly disrupted, first by the Chinese government's lockdown measures and later in other parts of the world (Ouhai 3). As a result, local authorities and associations had to make efforts to help enterprises to coordinate the supply of raw materials and key parts at different spatial levels. As an example, a company in the region manufactures mid- to high-end optical eyewear, and its supplier for frames and lenses is located in Japan. Due to international logistics disruptions, the company's supply chain was severely disrupted. After finding out about the problems, local officials and the association turned to another industrial park in Guangdong to ask for temporary supply of critical parts (Ouhai 2). This type of temporary replacement of global suppliers with domestic ones was not uncommon in many industries in Zhejiang during the pandemic (Expert 3). Moreover, such supply chain restructuring also occurred at the local level, as inter-provincial transportation was also disrupted for a period of time (Government 3). Such short-term supply chain restructuring also showed d the vulnerability of the just-in-time logic prevalent in the modern GVC configuration (Expert 2). However, it is less clear to what extent firms in Ouhai's eyewear industry will resort to the just-in-case logic in the long run (i.e., more redundancy, more substitute suppliers, etc.), as this implies higher costs for local firms, thus weakening their competitiveness in the market (Ouhai 6). In addition, some small companies in Ouhai that used to be OEMs for global companies have become OEMs for

domestic companies based in Guangdong, Jiangsu, and other places in China, as shrinking demand in the Western market during the pandemic has greatly reduced orders from abroad (Ouhai 1). Again, only time will tell if such decoupling is a short-term phenomenon or if it will become something permanent.

III) Market formation

In terms of market formation, as mentioned above, the local industry has suffered from declining demand in the more mature markets in the global North since the financial crisis of 2008. In order to cope with the shrinking market in the global North and strengthen its competitiveness in the emerging and developing markets in the South, local players have adopted various strategies and measures. First of all, the development of e-commerce platforms (both at home and abroad) has led to fundamental changes in the marketing mode of the traditional manufacturing industry (Ouhai 2). Ouhai-based eyewear companies are now using various marketing channels such as networked retail "offline + online", "internet celebrity marketing" or "live streaming commerce" (Ouhai 2, 4, 6). In addition, many domestic companies have used the “Belt and Road Initiative” to reach markets in the less developed countries in Southeast Asia and Africa, where demand for sunglasses and fashionable optical products is expected to increase (Expert 2). Many companies are also using the pandemic to specialize in high value-added niche markets and cultivate their own brands at home and abroad (Ouhai 3). In addition, some companies also see product diversification (e.g., from traditional glasses to AR/VR glasses) as a potential growth opportunity (e.g., the AI+AR smart glasses used in the COIVD-19 pandemic for remote assistance, accurate recognition, and touchless interaction). During the pandemic, efforts have been made on the part of the government to organize online events to expand marketing channels for local companies.

4.3 ICCM in the pharmaceutical industry, Xianju, Taizhou

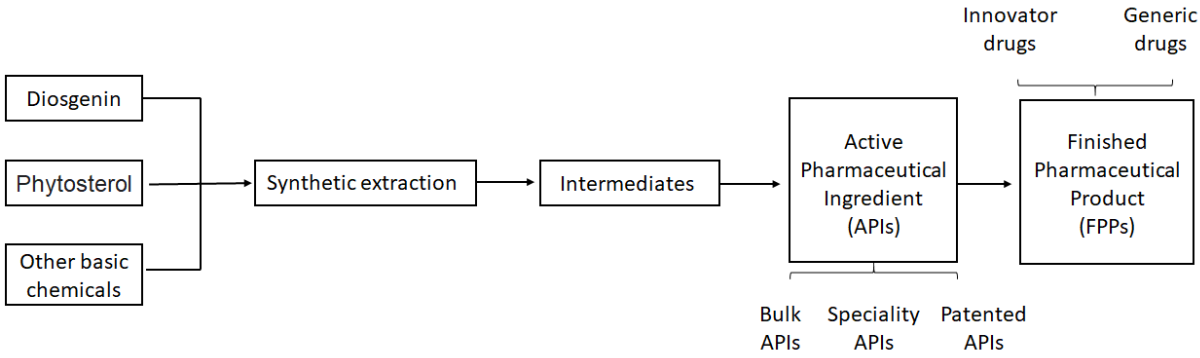
4.3.2 Development zone introduction

The pharmaceutical industry is one of the most research-intensive industries in the world. After more than six decades of development, Xianju has specialized in the production of steroidal drugs and intermediates, and become the largest steroidal pharma manufacturing base in China. In 2019, the region's steroidal drug industry reached a production value of 7.377 bn yuan, an increase of 21.88% from 2016. In addition, the export value of the steroidal medicine industry in the EDZ was 2.158 bn yuan, with an average annual growth rate of 17.9% over the past four years, accounting for about 40% of the export volume of similar products in China (Xianju Pilot Program, 2020). Four local enterprises have been listed on the stock market, and more than 5,000 employees have been hired in the whole industry chain (Xianju ICCM Pilot Program, 2020). In terms of innovation capacity, R&D expenditure of steroid pharmaceutical enterprises in the development zone reached 350 million yuan in 2019, with an average annual growth of 13.7% over the past four years. There are 12 national high-tech enterprises in the EDZ, and local leading enterprises include Zhejiang Xianju Pharmaceutical, Starry Pharmaceutical and Junye Pharmaceutical (Xianju ICCM Pilot Program, 2020).

4.3.2 Value chain disentangling

The pharmaceutical value chain comprises several segments (Figure 3). The first is the production of basic chemicals such as diosgenin, phytosterol and other chemicals. These basic chemicals are then synthesized into extracts and intermediates that are used in active pharmaceutical ingredients (APIs). APIs are the main components of a drug that produce an effect. This production is chemical intensive and requires reactors to produce APIs. Substances known as excipients are then combined with the APIs to transform a drug into a final pharmaceutical product (FPP) that is in a consumable form. Depending on their added value, APIs and FPPs can be classified into different types. For example, APIs can be divided into bulk APIs, specialty APIs, and patented API, with patented APIs generating the greatest profit, and bulk the least. In the case of FPPs, a distinction could also be made between innovator drugs and generics. While the former refer to newly manufactured drugs that enjoy patent protection (up to 20 years) and substantial profit margins, the latter refer to drugs manufactured from the same active ingredients when the patent expires. Generic drugs are cheaper because their manufacturers do not have to prove their efficacy and safety through clinical trials, as these are also conducted by innovators.

Figure 3. The pharmaceutical value chain



4.3.3 GVC diagnosis and value capture evaluation

Due to relatively weak R&D capabilities, much of the pharmaceutical production in Xianju is in the form of raw materials and intermediates used by downstream pharmaceutical companies. The local industry has long been locked into low to medium value-added activities (Xianju 3). Although there are some important local companies specializing in APIs, most of their products are bulk APIs, while there are few specialty APIs (Xianju 2). Therefore, the overall value added is limited, and competition in the market is fierce. In addition, in the field of FPP production, there are only two local companies - Xianju and Starry - which have managed to produce some generic drugs (Xianju 1). The overall weak innovation capacity of local companies remains one of the main bottlenecks to a breakthrough in FPP manufacturing.

When asked about the impact of the COVID-19 pandemic, respondents said that despite the short-term challenges the COVID-19 pandemic posed to the overall healthcare sector (Xianju 3, 4), industry demand for innovative and effective therapies continues to drive long-term growth (Xianju 6). Respondents indicate that local companies' supply chains have remained largely stable during the pandemic. On the one hand, upstream raw material suppliers are

primarily large domestic manufacturers of basic chemical products, and there is not much risk of supply disruption as the pandemic in China was well controlled shortly after its outbreak in Wuhan (Xianju 1). On the other hand, major local companies have established extensive cooperative relationships with well-known downstream pharmaceutical companies at home and abroad, such as MSD, Merck, Hengrui Pharmaceutical, etc., and hence the sales market was not severely influenced. Although some companies' export market has been affected to some extent due to transportation disruptions, this has not led to a comprehensive adjustment of the supply chain as the pandemic situation improves (Xianju 4, 5). However, from a value chain perspective, it is very difficult to break the existing value capture patterns, which are dominated by the world's leading companies (Xianju 1, 3, 5). Most local companies are small and therefore have little ability to compete directly with their global or domestic competitors in terms of R&D spending and capabilities.

4.3.4 ICCM in Xianju

In order to facilitate the upgrading of local industry and free local enterprises from low value-added activities in the post-crisis period, Xianju EDZ has developed its ICCM in the pharmaceutical industry.

Mail goals and division of labor

The development goal of Xianju medicine industry is to build competencies in the whole value chain of "key intermediates - speciality APIs - high-value FPP" (Xianju Pilot Program, 2020). The focus is on strengthening the existing intermediates and API production, scaling up the production of high-value FPP, and building a new value chain for innovative drugs, such as high value-added biopharmaceuticals. In terms of strengthening existing intermediates and API production, efforts have been made to further improve the controllability of core technology and supply chain stability of key medical intermediates, increase the proportion of green products in bulk APIs, and achieve significant breakthroughs in higher value-added specialty APIs. In scaling up high-value FPPs, the focus is on realizing "APIs+FPPs" upgrading by supporting large-scale mergers and acquisitions of leading local companies on the one hand, and launching and developing generics whose patent protection has recently expired on the other. Finally, in building new value chains for emerging biopharmaceuticals, it is acknowledged that the site does not have all the prerequisites needed to create such a new pathway due to the high-tech, high-investment and high-risk characteristics of biopharmaceutical products. Therefore, a dual innovation strategy of "innovation in central cities and industrialization in Xianju" has been promoted. Specifically, Xianju has established innovation enclaves (i.e. R&D centers) in Shanghai and Hangzhou, the two central cities of pharmaceutical development in China, to benefit from the knowledge spillover there (Xianju 2). Efforts will be made at the local level to attract promising projects with high market demand, good development prospects and urgent clinical needs.

The ICCM in Xianju pharmaceutical industry is under the direct management of the county governor Lin Hong, who acts as the chief of the chain and pools all kinds of resources required for local industrial upgrading. The Xianju EDZ, together with many other county-level departments, is the main body for the execution and implementation of the ICCM pilot

program. Chain owners, i.e., leading local enterprises such as Xianju and Starry, are expected to strengthen their R&D capabilities and move up the value chain for higher profit. They are also expected to further integrate their production networks in Xianju to increase the knowledge spillover and innovation performance of the local industry as a whole. Finally, the President of the Xianju Pharmaceutical Industry Association has been appointed as the chain mentor of the ICCM, and an expert advisory committee, composed of well-known domestic and foreign scholars, technical experts, well-known entrepreneurs, think tanks and other institutions, has been established to provide suggestions to local players.

Main goals

State and firm strategies and actions

i) Value enhancement and capture

The occurrence of the "patent cliff," i.e., the potential sharp decline in revenue following the expiration of a company's patent for one or more leading products, has created opportunities and impetus for continued rapid growth in the generics market (Xianju 3). For Xianju-based pharmaceutical companies, this represents a potential opportunity for value enhancement. To realize value enhancement and capture, equal attention has been paid to improving indigenous capabilities and introducing exogenous anchor tenants. On the one hand, Xianju enterprises (i.e., chain owners) invest more in improving their own innovation capabilities, training and attracting talents, etc. (Xianju 4, 5, 6). It is argued that "...continuously enriching and expanding product lines and expanding market size" is the only way to stay competitive in the market (Xianju 5). On the other hand, high hopes are set on exogenous linkages and connections to improve local value creation. Emphasis is placed on the introduction of downstream high-end drug and FPP manufacturers making targeted investments, as well as attracting a number of well-known domestic and foreign pharmaceutical companies and overseas returnees to enable local innovation breakthroughs (Xianju 2, 3). Following the two innovation enclaves in Shanghai and Hangzhou, the Xianju government also plans to organize ten joint R&D demonstration projects each year. Emphasis is also placed on technologies such as Big Data and artificial intelligence to reduce costs and increase the speed of drug development (Xianju 5). To facilitate value enhancement and capture, the local government and officials also support leading local listed companies to take advantage of the capital market and conduct cross-regional and overseas mergers and acquisitions, patent introduction, and investment cooperation (Xianju 3).

ii) Value chain adaptation

Pharmaceutical is a highly globalized industry (Horner, 2014). Although Xianju is the main site for steroid APIs production in China, there is no international company in the region yet (Xianju Pilot Program, 2020). Although the pandemic has not caused serious disruptions in the production networks of local companies, local industry has come under severe pressure due to the lack of key players in the downstream high-end segments of the value chain (Xianju 3). Therefore, the main goal of Xianju-based actors in terms of value chain adjustment is to attract leading enterprises from home and abroad to the region to fill the

missing segments in the core value chain. To realize this goal, Xianju EDZ has carefully complied a panoramic map of the steroidal medicine industry chain that comprehensively shows the distribution of leading enterprises, key platforms, and well-known research institutes at home and abroad (Xianju Pilot Program, 2020). Based on a deep understanding of the local conditions, relevant stakeholders also calculate the degrees of match between these external organizations and Xianju's industrial development, and thus carry out "targeted business attraction". Moreover, local stakeholders also continuously innovate their business recruitment models. For instance, through the matchmaking of local export-oriented enterprises, and by holding international pharmaceutical conferences, exhibitions and forums, etc. the Xianju EDZ is now negotiating with some multinational pharmaceutical companies to locate part of their production in the region (Xianju 2). The local business attraction team also aims to introduce a number of Indian, American, European, and Japanese firms to carry out contract manufacturing in Xianju (Xianju 1).

iii) Market formation

In terms of market development, the local government encourages enterprises to continuously optimize their product export structure and strengthen their competitiveness in emerging and developing markets (Xianju 2). At the same time, local enterprises also aim to improve their ability to export more value-added specialty drugs and preparations to more demanding markets. Nowadays, export-oriented local companies also actively participate in international pharmaceutical industry forums and other exchange activities to gain access to new products, key technologies, production licenses and distribution channels, and other information that will strengthen their ability to enter foreign markets (Xianju 3, 6). Considering the ageing population and the increasing improvement of the healthcare system in China, Xianju-based companies also aim to increase their market share in the domestic market by developing and launching more generic drugs. In addition, the COVID-19 pandemic can be seen as the opportunity of the century for biopharmaceutical developments, as it could increase the demand for prescription biopharmaceutical drugs and vaccines, thus boosting the development of the biotechnology industry. In this context, Xianju-based players are actively seeking biotech contract manufacturing at home and abroad (Xianju 3).

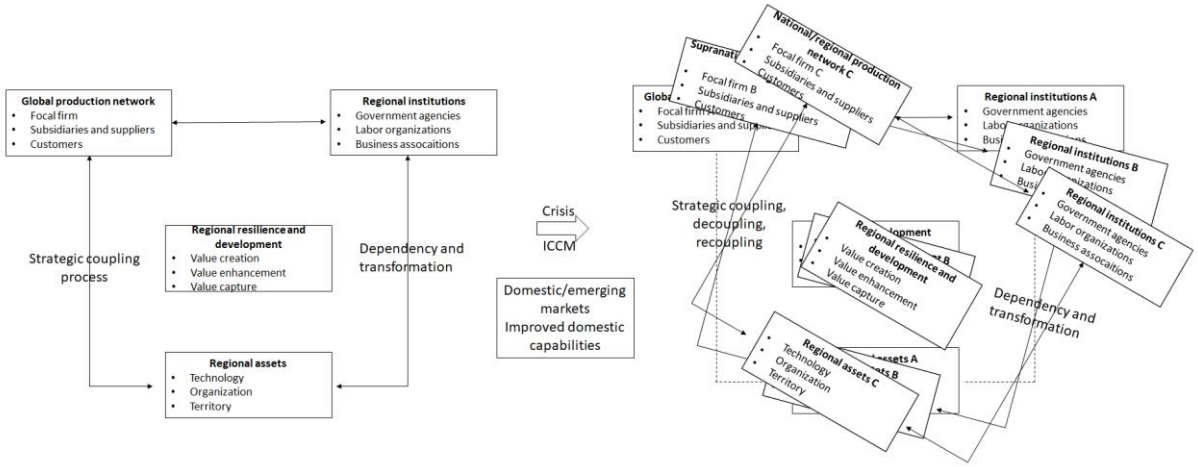
5 Theorizing ICCM from an economic-geographic perspective

Based on the analyses above, we now theorize the ICCM in Zhejiang from an economic-geographic perspective. We focus on two key aspects, namely, the relevance of strategic coupling, and regional economic resilience, for regional economy in times of uncertainty.

5.1 Production network reconfiguration: moving beyond classic strategic coupling perspective

In terms of applying strategic coupling concept in explaining Zhejiang's regional industrial development and upgrading in times of uncertainty, we share the criticism of previous scholars' (e.g., Wei, 2010, 2011) that the strategic coupling perspective alone cannot fully explain regional development in Zhejiang. As it has been shown in the cases of Ouhai and Xianju, their upgrading and resilience capability building are not solely dependent on TNCs/MNCs. On the contrary, regional upgrading can be realized through introducing and cultivating production networks that are organized at different spatial scales ranging from the global, to the supranational, the national and regional levels. In addition, large home market as well as booming emerging markets (e.g., countries along the Belt and Road Initiatives) offer tremendous potential for regional upgrading, as has been reported in the two studied cases. Therefore, we argue here that the conventional static strategic coupling proposition suggested by leading GPN scholars (left half of Figure 4, adapted from Coe et al., 2004) needs to be revised in the context of China and many emerging economies in times of uncertainty (right half of Figure 4). In the case of Ouhai, which is characterized by a deep integration into an established GPN (led by brand names based in industrialized countries) and a strong focus on mature markets (North America, Europe), the directions of adaptation are to domestic and other emerging/developing markets along the 'Belt and Road Initiative'. In contrast, Xianju pharmaceutical industry is characterized by a lower degree of global integration, and weak R&D capabilities in the downstream FPP production. The direction of adaptation, therefore, is to attract leading domestic and foreign (both in developed and emerging countries such as India) players to the locality. This reconceptualization is important, as it broadens the scope of agency and possible opportunity space (Grillitsch and Sotarauta, 2019) for local actors in host regions. While inserting into the GPNs that are organized by global lead firms could potentially bring developmental opportunities for emerging and developing regions, it is not the only way in which regional industries could realize their upgrading and resilience-building goals (Wei and Liao, 2013; Zhou, 2008). This reconceptualization also has implications for the discussion of regional development in the post-crisis world, as it provides more development scenarios (i.e., multiple recoupling mechanisms) that a region could consider based on regional preconditions as well as global, supranational, national, and regional post-crisis industrial dynamics. Moreover, such a reconceptualization of regional development links GPN theory to the study of regional resilience, as the diversified modes of coupling that a region could potentially pursue (right half of Figure 4) are likely to increase the resilience of the regional economy to future crises and disruptions.

Figure 4. Reconceptualizing coupling in times of uncertainty

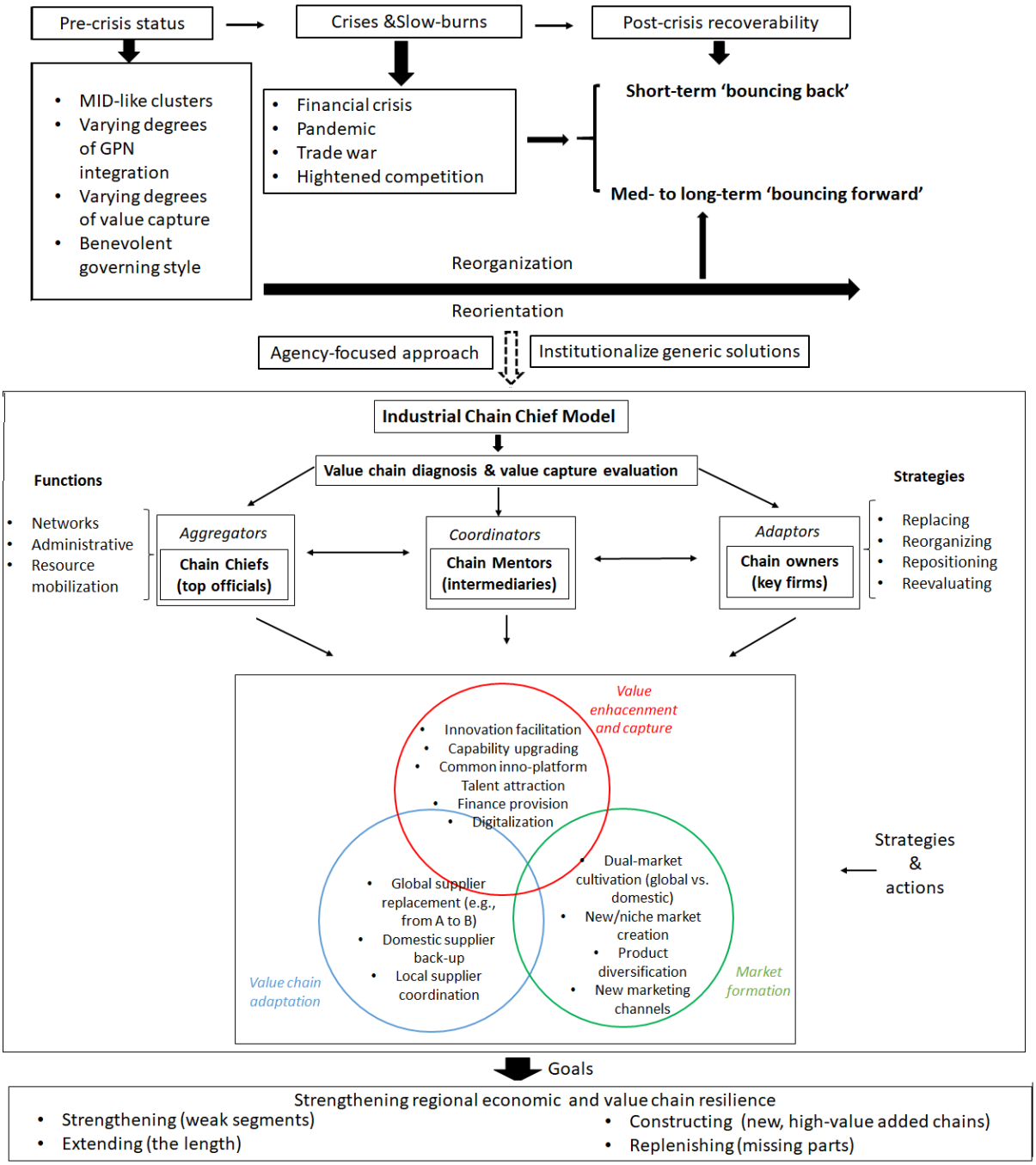


5.2 Regional economic resilience: taking into account of human agency

Our study also shows the relevance of value-chain thinking for the conceptualization of regional economic resilience (Figure 5). While previous studies highlighted the preexisting regional economic structure in influencing a region's resilience in times of crisis (Boschma, 2015; He et al., 2021; Martin, 2012; Webber et al., 2018), the two illustrative cases have shown that an agency-focused perspective is also valuable in disentangling the concrete reorganization and reorientation processes.

While the eyeglasses industry in Ouhai and the pharmaceutical industry in Xianju resemble the Marshallian Industrial Districts and share similarities in terms of the benevolent governing style of local politicians, they have different degrees of GPN integration and value creation and capture. They have also experienced various crises over the past two decades. In terms of their ability to recover from shocks, a relatively rapid short-term "bounce back" has been observed in both cases due to very quick responses by companies and local governments. However, more time is needed for a comprehensive assessment of the long-term (bounce forward) transformation potential, as the relevant stakeholders are still in the process of identifying the most appropriate practices. What we believe is highly relevant to other regions in the ICCM pilot programs is the agency-based approach being taken by various local actors to reorganize and reorient regional industrial development with a value chain perspective in mind.

Figure 5. Regional economic resilience and ICCM working mechanisms



The two ICCM pilot programs examined in this paper have clearly stated the division of labor amongst different actors according to their resources possession and capabilities. In this regard, governments/officials, businesses, and intermediaries are assigned the roles of aggregators (chain chiefs), adaptors (chain owners), and coordinators (chain mentors), respectively. The state is particularly important not only because of its considerable resources and powers in various fields (financial, legal, symbolic, and intellectual), but also because it is uniquely positioned to potentially facilitate networking and interaction and to make appropriate institutional arrangements (Bristow and Healy, 2014; Evenhuis, 2017).

Firms, on the other hand, are the main adaptive agents in times of crisis (Hill et al., 2011). Such a clear division of labor is helpful for coordinating the different groups of actors, as each actor involved understands the role of the other and knows who and where to turn to when new problems arise.

The different roles assigned to the various groups of actors are also relevant to the core of the ICCM, i.e., the specific strategies and actions in the processes of value enhancement and capture, value chain adaptation and market formation. Importantly, there is a consensus among the involved parties that companies should be the main actors adapting their activities in times of uncertainty/crisis. In the end, it is the aggregated capabilities of individual companies in innovation (and thus value creation and capture), value chain reconfiguration, and new market formation that determine whether or not a regional industry can be successfully transformed. The state, on the other hand, should support and facilitate such adaptation and transformation. As shown in the case of Ouhai eyeglasses industry, the supportive role of the regional state was very important for the short-term recovery, as politicians could use their networks and resources to restart local production as soon as possible. Local governments can also provide services and important resources such as funding and social capital, and facilitate collaborations.

In a sense, we could see that three main forms of change agency, i.e., innovative entrepreneurship, place leadership, and institutional entrepreneurship (Grillitsch and Sotarauta, 2019), are exercised by different actor groups and are comprehensively combined during the regional industrial reorganization and reorientation process against the background of globalization and crises. Such an agency-based approach is essential in achieving the resilience goals set by local actors for the regional economy and value chains, including strengthening the weak segments of existing activities, extending the value chains, replenishing the missing pieces, and building new chains and networks with higher value added (Figure 5).

6 Conclusion

The question of how regions can remain competitive and resilient in times of uncertainty and related globalization in reverse has been a key concern for economic geographers. To date, two key concepts—strategic coupling and regional economic resilience— have been used, largely in separation from each other, to explore regional economic dynamics in times of uncertainty. Through a careful examination of the ICCM working mechanism in Zhejiang province and its implementation in two EDZs with different degrees of integration into the existing GPNs, this paper argues that both of the two concepts are essential for better exploring the topic of interest. They offer complementary insights when it comes to strategies and measures that local actors could take when adjusting and upgrading regional economic structures. However, the original conceptualization of strategic coupling and regional resilience suffer from some limitations when applied to explain regional industrial dynamics in the context of increasing globalization and the increasing frequency of crises of all kinds. Thus, a reconceptualization of the two key terms is needed if economic

geographers are to offer policy recommendations to local policy-makers. Specifically, we argue that the conventional, static conceptualization of strategic coupling, in which a region, based on its assets and institutions, is suggested to couple with a global leading firm based in the North, is problematic, because it limits the scope of agency and possible opportunity space (Grillitsch and Sotarauta, 2019) for local actors. Looking more closely at the directions of value chain adjustment of the eyewear industry in Ouhai and the pharmaceutical industry in Xianju, it is clear that the scope of action for local actors is much larger than the conventional thesis of strategic coupling would suggest. Regional actors can not only insert themselves into a fixed GPN, but also proactively reconfigure production networks on several levels, from the global (insertion into another GPN) to the supranational (introduction of inter-national production networks) to the national/regional level (cultivation of domestic production networks).

On the other hand, scholars working with the concept of regional economic resilience have increasingly argued the importance of paying attention to the human agency that lies behind regional economic reorganization and reorientation (Bristow and Healy, 2014). So far, however, little has been said about what kind of agency is essential, and where actors could (re)act. The studied ICCM pilot programs are highly relevant to other regions, as they have detailed the division of labor among different actor groups, the goals, directions, and strategic actions that are needed by different actors. Especially, the 'trinity of agency' (i.e., innovative entrepreneurship, place leadership, and institutional entrepreneurship) suggested by Grillitsch and Sotarauta (2019), has proven to be important for the strategic actions taken by actors. More importantly, the ICCM brings a value-chain perspective to the discussion on regional economic resilience, as all reorganization and reorientation activities are based on the diagnosis and assessment of identified industrial chains.

All in all, although the long-term (bounce forward) transformation of the regional economy still requires longer period of time to observe, we believe the insights drawn from this paper can be relevant to other regions in the post-crisis era. The idea of combining strategic coupling and resilience thinking should be promoted in future research on regional industrial/economic dynamics in times of uncertainty and globalization in reverse.

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Appendix 1. Basic information of the interviewees

Interviewees	Functions
Provincial level governmental departments	
Department of Commerce of Zhejiang Province (Government 1)	Division of Economic Development Zones, director
Department of Commerce of Zhejiang Province (Government 2)	Division of Economic Development Zones, sector member 1
Department of Commerce of Zhejiang Province (Government 3)	Division of Economic Development Zones, sector member 2
Department of Commerce of Zhejiang Province (Government 4)	Division of Foreign Exchange, sector member
Glasses value chain, Ouhai, Wenzhou	
Ouhai Economic Development Zone Management Committee (Ouhai 1)	Director of Business Attraction
Ouhai Glasses Industry Association (Ouhai 2)	Deputy director
Hengda Optics (Ouhai 3)	Marketing director
Kaadas (Ouhai 4)	PR manager
ZonZen (Ouhai 5)	Senior manager
Tongda (Ouhai 6)	Senior engineer
Pharmaceutical value chain, Xianju, Jinhua	
Xianju Economic Development Zone Management Committee (Xianju 1)	Director
Xianju Economic Development Zone Management Committee (Xianju 2)	Deputy Director
Xianju pharmaceutical Industry Association (Xianju 3)	Director
Zhejiang Xianju Pharmaceutical (Xianju 4)	Marketing manager
Starry Pharmaceutical (Xianju 5)	PR member
Zhejiang XinNong Chemical (Xianju 6)	Engineer
Experts	
Zhejiang Gongshang University (Expert 1)	Professor in Management
Zhejiang University (Expert 2)	Professor in Regional Economics
Zhejiang Planning Institute (Expert 3)	Senior planner
Zhejiang Business Research Association (Expert 4)	Executive Chairman

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