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Abstract: This paper addresses the question: why have China’s SMEs managed to thrive and innovate within a national institutional environment that is arrayed against them? We find that the global fragmentation of production and a tacit alliance with local government make it possible for SMEs to innovate. The fragmentation of production creates opportunities for firms to enter the mobile handset industry in a variety of niches, each of which affords certain capabilities for innovation. The tacit alliance mitigates uncertainty, making it possible for firms to incrementally innovate in the niches provided by the global fragmentation of production. However, the tacit alliance only partially counters the condition of structured uncertainty facing SMEs. As a result, firms remain incentivised to seek short-term profits and minimise long-term R&D risks, thus limiting potential for novel-product innovation.

Keywords: China; uncertainty; fragmentation of production; innovation; mobile phone industry.

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1 Introduction

Much attention has been paid to the emergence of China as an economic and technology superpower (NSBPRC, 2016; RS, 2011; WIPO, 2012). There is also increasing interest in the role that small and medium-sized enterprises (SMEs) play in national innovation systems and as employment engines (OECD, 2004, 2010, 2015). Researchers continue to study SMEs to see how to foster innovation by SMEs, which is the source of their sustained development (Nikolaidis et al., 2012). For example, Shapira et al. (2011) explore the role of technology extension and transfer policies and programs in improving SMEs’ innovation performance. In the European Union, there is increasing emphasis on promoting innovation by SMEs through promoting regional-level policy making which better targets policies to SMEs’ needs (Rinkinen, 2015).

With this in mind, we consider the case of Chinese SMEs. Policy makers and scholars acknowledge China’s SMEs, which employ 80% of China’s workers, are an increasingly important driver of economic growth (NSBPRC, 2016; Liao, 2011; Wang and Yao, 2002; Yao, 2005). Nonetheless, China’s SMEs face great obstacles to innovation, most importantly a climate of ‘structured uncertainty’. Structured uncertainty is an institutional environment in which formal institutions designed to mitigate uncertainty actually exacerbate it (Breznitz and Murpheee, 2011). Using this concept, this paper also expands our understanding of it by providing evidence from a specific industry (mobile handset manufacturing) of how structured uncertainty shapes firm behaviour and performance.

Despite the environment of structured uncertainty, SMEs remain China’s engine of economic development. Leading high technology firms, such as Huawei, Tencent, and BYD grew from entrepreneurial start-ups, not restructured SOEs. China’s current SMEs also innovate in a variety of ways (Gu, 2007; Zhang and Chen, 2009). The ability of
Chinese SMEs to innovate and thrive in spite of their uncertain environment and the lack of effective uncertainty-reducing institutions raises a critical research question: ‘why have China’s SMEs managed to thrive and innovate within a national institutional environment that is arrayed against them?’

Using the results of an inductive case study, this paper argues that SMEs’ ability to overcome structured uncertainty and innovate successfully is the product of two forces: the global fragmentation of production and a tacit alliance between SMEs and local government. Fragmentation of production, the process of standardisation, outsourcing and offshoring of discrete stages of the production process in goods and services (Arndt and Kierzkowski, 2001; Athukorala and Yamashita, 2006; Baldwin and Clark, 1997; Ernst, 2005; Gourevitch, 2000; Sturgeon, 2002), is the defining feature of global production networks. As firms no longer need to master and compete in all stages of production, fragmentation provides opportunities for entrepreneurship and technological innovation. The tacit alliance (Crosbie, 2015; Kim, 1998; Michelotti and Nyland, 2008; Swenson, 1991) with local governments provides SMEs with the necessary uncertainty mitigation for innovation to take place.

The paper proceeds as follows. We first review the literature on uncertainty and the fragmentation of production noting their impacts on innovation. We then explain our theoretical model of innovation by Chinese SMEs as facilitated by the fragmentation of production and tacit alliance. This is followed by a summary of the research methods used in this paper. We then present the case study of the Chinese mobile handset manufacturing industry before drawing our conclusions.

2 Literature review

2.1 Uncertainty

Unlike risk, uncertainty is unknowable and unquantifiable ex ante (Knight, 1921). Entrepreneurship and innovation are highly uncertain activities as attested to by the numbers of failed businesses and products: 56% of businesses fail within four years; up to 95% of new products are unsuccessful (Campbell, 2005; Burkitt and Bruno, 2010). Entrepreneurship and innovation thus require, as a minimum, the certainty that should a venture succeed, the rewards of this success can be reaped. Institutions such as the ‘rule of law’ and clear property rights can help to lower uncertainty and encourage entrepreneurship (Zhou, 2014). R&D, the first step toward technological innovation, is similarly uncertain as the results and their potential commercial value cannot be known in advance and there are inherent problems with both appropriability and indivisibility of the knowledge gained (Arrow, 1962). Institutions such as patents, which grant temporary monopoly rights to the inventor, are one such formal institution designed to decrease these uncertainties (Khan, 2005; Wright, 1983), and hence, increase innovation.

However, in the case of China, the institutions prescribed to mitigate uncertainty and encourage innovation such as rule of law, property rights, and patents do not function as they do in the West (Lieberthal, 2004; Nee, 1992; Oi and Walder, 1999; Wang, 2000). Institutions fail to effectively mitigate uncertainty as a result of China’s political economy (Breznitz and Murphree, 2011). Rather than a system of rule of law where rules and regulations are uniform and enforced in the same way for all actors at all times,
China has developed a system of ‘rule by law’ where formal regulations exist but their implementation is uneven and seemingly arbitrary (Li, 2015; Ortmann and Thompson, 2016). This system evolved from the personalised nature of power in China wherein authority is vested in an individual more than in a specific office (Baum, 1994; Shirk, 1993). Second, chains of authority can be opaque making it difficult to know whether the state or communist party apparatus is responsible or has decision making capabilities in a given situation (Lieberthal, 2004). There is also often unclear jurisdiction in different functional areas: meaning multiple agencies – at multiple levels – may choose, or not, to enforce laws or regulations. Thus, a lack of organisational and administrative coherence and clarity faces Chinese firms. While there is a formal administrative order, the actual channels of authority and power at any given time are shifting and unclear.

Taken together, these systemic conditions produce an institutional condition of ‘structured uncertainty’ (Breznitz and Murphree, 2011). Under structured uncertainty, formal institutions for mitigating uncertainty are present, but their operation and effectiveness remains opaque on purpose, therefore actually increasing uncertainty. Structured uncertainty thus makes it very difficult for firms to innovate as there is no guarantee that even if a project is successful that the market space or rights will be enforced enabling innovators to benefit from their labours.

2.2 The fragmentation of production

The fragmentation of production may be seen as the delineation and codification of specific tasks in a production system, creating discrete modules that can then be outsourced (Gourevitch, 2000; Arndt and Kierzkowski, 2001). Fragmentation makes it possible for different production activities to be dispersed globally (Athukorala and Yamashita, 2006; Baldwin and Clark, 1997; Ernst, 2005; Sturgeon, 2002). Different activities no longer necessarily have to be co-located or performed within a single firm. The ability to widely disperse different activities makes it possible for different countries or regions to specialise in specific stages of production within industries (Breznitz, 2007). Regions also have the ability to enter industries at specific stages without having to develop the capabilities or marshal the resources to perform all stages of production (Baldwin and Clark, 1997; Langlois, 2002).

When regions specialise in specific stages of production (such as high-end R&D, product development, component production, or final assembly), specific opportunities become available to entrepreneurs (Breznitz, 2007). As a region specialises in a given range of tasks, local human capital and business experience accumulates which facilitates start-ups, provision of capital and access to global sales and sourcing networks (Berry et al., 2002). For entrepreneurs, fragmentation thus creates opportunities.

Specialisation in specific stages of production also shapes innovative capabilities. Intimate knowledge of a single module facilitates innovation within it (Breznitz, 2007). A firm or region is less likely to innovate outside their production niche as their capabilities have evolved to suit their specific stage of production. Research has shown this approach to innovation yields sustainable competitive advantage through deep specialised innovation in the stage in which a firm has achieved expertise. However, if a firm or government seeks to develop innovation capabilities outside the niche in which the firm or region has specialised, it may be quite difficult to do so (Breznitz, 2007).
Model: tacit alliance and innovation

We argue that Chinese SMEs innovate thanks to two variables: the global fragmentation of production which facilitates entrepreneurship and niche-based innovation and a tacit alliance between local government development bureaus and SMEs which mitigates uncertainty, and the global fragmentation of production (see Figure 1). We then elaborate on this argument utilising an inductive case study method focusing on the mobile handset industry.

Figure 1  Mechanism of innovation by Chinese SMEs under structured uncertainty

Tacit alliances are mentioned in diverse fields including labour-management, state-firm, class, and international relations (Michelotti and Nyland, 2008; Kim, 1998; Swenson, 1991; Crosbie, 2015). However, the term is not fully defined. Therefore, we define a tacit alliance as a recognition of mutual interests leading to sustained support for industry by government actors even in contravention of law or policy. For a temporary alliance to exist, both parties must recognise their mutual benefit and work to realise it.

In this paper, we focus on incremental and second generation innovation. For that reason, we define innovation as improvements in manufacturing processes as well as reintegration and recombinantion of existing components with an emphasis on production (Abernathy and Utterback, 1978). For example, innovation for Chinese mobile handset SMEs may be defined as the introduction of new handset models or increased output for the same level of resource or labour input. This definition is similar to the self-reported innovation studied by Ulusoy et al. (2015) who consider imitation, process improvement and introduction of new products as forms of innovation. This is in contrast to alternative measures of innovation such as patents (Carvalho et al., 2015) since most incremental innovations are not patentable.

For SMEs in China, the fragmentation of production offers start-up opportunities and fosters specific innovation capabilities. Opportunities arise because entrepreneurs need no longer marshal the human or financial capital necessary to compete across the entire production chain. Rather, they concentrate on a single stage. Innovation capabilities are specific to the stage in which firms specialise. In the case of Chinese mobile handset companies, most are primarily component integrators or final assemblers. Consequently, innovations are likely to cluster around assembly, time to market and market niche exploitation. The fragmentation of production is a necessary but insufficient condition for
innovation to take place. China’s SMEs still face ‘structured uncertainty’. Hence, despite fragmentation, Chinese SMEs still must mitigate it in order to innovate.

This is where the tacit alliance with local government is essential. This tacit alliance offers SMEs local state protection and support. This provides certainty regarding the viability of their chosen industry niche, entrepreneurial venture, and business status. Local government bureaus responsible for economic development, industry regulation and labour provide the certainty that SMEs need in order to invest and innovate. The alliance is necessary as financial, taxation, regulatory, and policy instability are the greatest challenges facing SMEs in China (Schiffer and Weder, 2001). Given structured uncertainty, maintaining the alliance with local state actors helps alleviate firms’ fears of appropriation, rapidly shifting policies, exclusion from the formal financial system, or prosecution by the central government. The alliance is mutually beneficial as local government officials increase their odds of promotion by encouraging economic development, employment and social stability. The local state protects its SMEs and the ensuing growth is rewarded through promotion for responsible officials.

However, there is a limit to this approach to overcoming structured uncertainty. China has a unitary government; the central government retains the authority to enforce laws locally when it chooses to do so. Local government protection is thus only a partial means of mitigating the structured uncertainty facing SMEs. SMEs remain susceptible to legal, and legally justifiable, crackdowns or expropriation. This means that while the tacit alliance gives firms the security they need to embark on investments and new innovative ventures, time horizons remain short. Firms invest in short-term projects to capitalise on their competitive advantages and local state support while it is still available. Thus, while the tacit alliance with the local state enables innovation to take place, firms remain incentivised to seek short-term profitability and avoid long-term high-risk R&D projects. Our empirical section details how this results in incremental innovations building on the capabilities learned through niche specialisation. The local handset industry is thus constrained from novel innovation even as it manages to thrive.

4 Methodology

For this project, we adopted the inductive case study approach (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). We incorporate in-depth interviews and field observations (Hall and List, 1999). For the interviews, we used an open interview format based on a set of seven research themes: firm and founder history, labour force, technology, finance, products, institutional and economic environment, and government relations. These themes allowed interviewees to expound on the innovation climate, challenges, and strategies in the mobile handset industry. In total, 34 interviews were conducted in the summer of 2011 and spring of 2013 including 24 firms and ten government bureaus and innovation scholars. To validate data from different sources and interviews, each interview touched on all of the same themes, enabling us to triangulate responses. Whenever possible, we tried to confirm interviewees’ statements with data from other interviewees or published sources. Relying on English and Chinese websites and previous studies on this topic, we first constructed a list of prospective interviewees and requested their participation. Upon conclusion of an interview, we asked participants to nominate other individuals to participate, thus using the snowball method to increase
participation. Finally, as we guaranteed anonymity for all interviewees, statements from interviewees are cited as ‘authors’ interview’.

5 Case study

5.1 Background

China’s mobile industry is the world’s largest with over 1.8 billion mobile phone accounts, and producing over 80% of all handsets (MIIT, 2013). The 10th, 11th and 12th five year plans all promoted novel innovation in mobile telephony, mostly related to the Chinese mobile telephony standards of TD-SCDMA and TD-LTE. Despite the government focus on such ‘core innovation’, the greatest – and arguably most surprising – success has been the growth of China’s small handset manufacturers. Producing ‘good enough’ phones with specific features designed to appeal to niche markets – such as large speakers so farmers can hear their phones while working in the field – China’s SMEs succeeded in taking market share from dominant global and national brands in the 2000s (Barboza, 2009).

As the SME mobile handset sector relies on local government support and is generally outside the purview of central government plans, this sector is a good illustration of China’s broader SME innovation capabilities. SMEs have not been strongly promoted at the central level; indeed they were officially barred from the industry until 2007. Their success in carving out market niches makes the mobile handset manufacturing sector an ideal case for examining how innovation occurs under structured uncertainty.

There has been much research interest on the emergence and evolution of the Chinese mobile handset industry in recent years. Existing research has explored factors contributing to the emergence and evolution of the Chinese mobile handset industry in general (Kao and Lee, 2010; Sun et al., 2010; Zhu et al., 2009). Our case looks specifically at the innovative capabilities of SME mobile handset manufacturers under the climate of structured uncertainty.

5.2 The environment of structured uncertainty

Our interviews confirmed the initial findings of Breznitz and Murphree (2011) that Chinese firms operate under a climate of structure uncertainty. This climate should inhibit innovative and entrepreneurial activities. Interviewees revealed three major areas of uncertainty that inhibit innovative or entrepreneurial activity: central authority uncertainty, regulatory uncertainty, and reform implementation uncertainty. The first relates to concerns over the ambiguous or arbitrary nature of central government power over firms. The second two pertain to lack of clarity over the status or future of state policies concerning the mobile handset sector.

The essence of structured uncertainty is that formal institutions exist but responsibility for them is unclear and shifting. When this is the case – as with competing levels of authority in the Chinese state – strong institutions actually increase uncertainty for firms since institutions provide legal cover for strong but unpredictable government intervention. Central government authorities can arbitrarily and unexpectedly intervene in local markets. A frequently cited example was the 2011 crackdown on the industry before
the Summer Universiade, when in preparation for the games, the central government cracked down on unlicensed handset firms:

“Since early this year, under pressure before the 2011 Shenzhen Universiade, the government implemented stricter regulations on unlicensed production. Several CEOs from unlicensed firms were arrested, and the total number of firms was reduced from several thousand firms to hundreds of firms.” (Authors’ interview)

Many firms were forced to close or relocate out of Shenzhen – and away from the benefits of concentrated networks of supplier firms – the main attraction of Shenzhen in the first place. Such dispersal will negatively impact innovation performance, at least in the short-term, as co-location plays a major role in encouraging innovation (see Storhammar and Tohmo, 2013).

Second, interviewees noted that even where institutions seemed clear, implementation was uneven and shifting. Firms noted frequent shifts in central government policies concerning the mobile handset industry. Before 2007, central regulations mandated that firms had to have 300 million RMB in registered capital in order to receive a license to manufacture mobile phones. Further discouraging entrepreneurship, the application process for a license cost between 100,000 and 300,000 RMB and could take up to a year to complete (authors’ interview). These regulations limit the ability of entrepreneurs and SMEs to enter the industry. Showing the conflict between central regulations and local reality, the local government promoted investment in mobile handset manufacturing, even in contravention of central regulations. This forced firms to operate in a legal grey area.

Recognising the reality of the SME handset industry, the central government changed licensing requirements in 2007. However, the overall legal status of SME handset firms as well as the market space in which they could compete remained unclear. Barriers still existed which made it difficult for small firms to advertise, sell their goods and gain permits for export (authors’ interviews). Thus, the central government sent mixed messages by only partly reforming the sector. It remained unclear whether or to what extent the sector was open to SME participation.

Third, interviewees noted that the durability of reforms and policies was unclear. When asked about the greatest challenges facing their firms, interviewees were unequivocal. Four interviewees, including two firm CEOs pointed out that lack of clear and consistent central policies for the handset manufacturing sector is a big concern for their firms. As stated by an industry researcher:

“Many firms are still ‘illegal’ in the sense that their products have not been tested and certified through central government testing labs. Legal phones sold in China have a sticker inside which certifies the model and its components have been tested. Before 2002, companies making phones without getting them tested would get shut down. The central government no longer really enforces the testing rule. Small firms’ phones are not completely legal, but they aren’t violating the rules in practice.” (Authors’ interview)

The potential for regulatory shifts remains. As an example of shifting policies and the uncertainty this creates, a local official explained de facto changes in the years leading up to 2011. While preferential support was once available for many mobile firms and different activities within the production chain, the requirements have become increasingly restrictive. According to the official:
“Our department’s policy regarding phones is that they must include some independent inventions in order to get support. Central regulations mean we cannot support phone companies just because they are in the right sector. There is still some support and preferential policies available from other local departments but not the high-tech bureau...Phones are no longer really part of the central government’s core technology development plans. Four or five years ago they were, but not anymore because they lack core technology.”
(Authors’ interview)

Lack of consistency in support is a major barrier to firms. Moreiera et al. (2008) found that SMEs in Portugal, despite their human capital and other competitive advantages have struggled to internationalise their business because of the lack of government support. With formal regulatory barriers to entry, capricious enforcement and fluctuating policies, innovation is constrained.

5.3 Importance of the fragmentation of production

In mobile telephony, the global fragmentation of production affords myriad opportunities. By lowering the financial and human capital barriers to entry and offering avenues for developing and exploiting skills in specific niches, the fragmentation of production acts as a catalyst for the mobile handset industry.

New firms are able to rapidly develop and produce new phones as they need only to specialise in a single skill or stage of production, such as the design of the phone or production of a single component. Fragmentation means that unlike pioneering mobile firms in the 1980s, SMEs need not develop the capabilities to produce digital signals processing chips for their phones. Instead, these can be sourced, usually from Taiwanese chip-maker MediaTek, which will also sell them the complete chipset needed for a mobile phone. Indeed, a Beijing-based design firm noted that the easy availability of MediaTek chipsets made it possible for small firms to aggressively compete by designing new phones:

“In 2007, Mediatek began flooding China with chips. This allowed a swarm of competitors in the Shenzhen area to rise up against our company. This (the availability of chips) also meant that otherwise less capable firms could develop their own phones. We had to diversify our business and change our pricing structure in order to stay competitive.” (Authors’ interview)

Another interviewee described his firm’s relationship with MediaTek and how this enabled it to concentrate on the design and style aspects of their phones:

“MediaTek’s chipset is convenient since they use an open system. This makes it easy for us to build upon that platform. We also can communicate back and forth easily. Generally speaking, MediaTek understands and suits Mainlanders’ needs. With the chips taken care of, we concentrate on the external appearance and stylish design for our phones. Since we use the same platform as everyone else, our design needs to be distinctive.” (Authors’ interview)

“Not just chips, but the entire range of inputs has been made available. With the development of the electronics industry based on offshoring and outsourcing from the US, Japan and Europe (and later Hong Kong and Taiwan), hardware components can be sourced locally. Building upon the MediaTek chipsets, there are dedicated manufacturers in Shenzhen which produce chipset motherboards, providing the functional core hardware of mobile handsets in a single turnkey solution. Thus, with production fragmentation, small firms in Shenzhen can concentrate on design innovations and re-combinations of
existing technologies without having to develop core component design or production capabilities in-house. The chips, motherboards, screens and other hardware components are readily available.” ( Authors’ interview)

Other tasks such as software development, phone assembly and sales can be purchased as outsourced services from other dedicated firms. As one representative interviewee noted:

“In Shenzhen, there are only a handful of companies which produce whole phones, but many doing cases, components and accessories. There are few branded phones but several large companies making components or doing final assembly. The handset industry works in Shenzhen because each actor can completely specialize in a tiny niche since the entire production chain is very complete here.” (Authors’ interview)

Fragmentation of production provides Chinese firms with many opportunities to survive and thrive. Specialised locally available designers, component suppliers, integrators and final assemblers account significantly for the rise and success of China’s mobile handset industry. The founder of a small branded handset firm described the local availability of a complete ecosystem:

“The complete production chain (in Shenzhen) is an indigenous innovation. Shenzhen is a design and production base for the world’s mobile phone industry. Everything we need to make phones is produced here. All of these capabilities are in Shenzhen which is an advantage for us.” (Authors’ interview)

Small companies or even individual merchants are able to manufacture their own cell phones. As pointed out by four interviewees, all of the components necessary to make mobile phones are available within a radius of two to five kilometres from Shenzhen’s Huaqiang Bei neighbourhood – the centre of the SME handset manufacturing industry. A researcher with the State Intellectual Property Office explained:

“The advantage of Shenzhen is the existence of a mature production chain. From initial raw materials and all the tiny parts of handset including the display screen, speakers, battery, camera, and dust-covers, to R&D, assembly, and sales, there are specialized firms and personnel within a two km radius of the Huaqiangbei area.” (Authors’ interview)

The smallest firms take existing components and snap them together into basic functional phones, adding a few unique features to meet the needs of targeted markets – such as digital Qurans and compasses for phones destined for markets in the Middle East. Describing the process of securing components but then combining them in innovative ways, a chief engineer in a mobile firm noted: “Each of the components alone may be unremarkable and commonplace, but together they make a valuable product” (authors’ interview). A researcher at Fudan University explained further:

“SME innovation is a modular innovation instead of systemic innovation. To put it in other words, by nature, SME innovation is a combination of functional module innovation, that is integration & assembly and marketing innovation. Most of the innovation is external or functional, not core.” (Authors’ interview)

With the ready availability of critical inputs, SMEs can be highly specialised in the types of phones they design and produce, able to make multiple models in short periods of time. Relying on the de facto standard of MediaTek’s chipset allows for rapid changes and upgrades to phone products, enabling new generations to be rapidly released.
Although fragmentation of production affords opportunities, China’s climate of structured uncertainty still poses a challenge. Our research finds that firms have been able to both invest and innovate, partly thanks to the local government acting as a catalyst. In China, local governments and entrepreneurs in the mobile handset industry have entered a tacit alliance.

Why should officials ally with the mobile handset industry? Because the mobile handset industry contributes hugely to local economic development. The scale of the industry makes its promotion politically important. For example, a conservative estimate from 2009 found that Shenzhen’s mobile handset industry generated 40 billion RMB in annual sales (Dong, 2009). The Shenzhen Mobile Phone Industry Association estimated that there were over 100 firms employing between 300,000 and 500,000 workers in the Shenzhen area in mobile handsets or related component production in 2011 – 6.5% of the entire industrial workforce (authors’ interview). The industry is also a valuable source of tax revenue: manufacturing firms pay a 17% value-added tax (VAT) which is kept by the local government. The larger the sector, the larger the VAT income for the local government.

District-level officials bragged about the success of the industry and its contribution to the economy, especially in terms of job creation. SMEs create large numbers of jobs for both low and high-skilled workers. A majority of the employees hired by Shenzhen handset firms are migrants from China’s interior provinces whose temporary residence permits are linked to their employers. If handset firms shut down due to intellectual property rights (IPR) disputes or enforcement of national handset manufacturer registration laws, tens of thousands of workers would become unemployed. Sudden unemployment surges are seen as a major risk for social stability. Apart from economic and job growth as ends in themselves, local officials are rewarded for their ability to preserve social stability and are loath to enforce policies that are likely to negatively impact employment.

Further, local officials personally support the industry because they have better odds of being promoted to higher level offices or ministries or receiving further career advancement and bonuses within their own units. Promotion is mostly decided on the ability of officials to demonstrate their ability to promote economic, job and export growth. Hence, it is in their direct interest to promote SMEs’ growth whether or not it fits with central government plans.

How does the alliance benefit firms? Our interviewees all cited incentive policies including tax breaks, innovation rewards, project funding, and reduced land use fees, similar support is available throughout China. However, the real benefit of the tacit alliance is in the increased certainty it offers the industry. The tacit alliance helps SMEs overcome concern about shifting policies, regulations and enforcement from the central government. Since many SMEs in the handset industry lack the proper registration to produce mobile handsets, local government shielding is essential for reducing the uncertainty to a degree that makes innovation a viable path to follow. One interviewee explained how government support has worked to support the industry:

“Getting central government certification for every new phone model costs too much money and time. Small firms don’t bother to get the certification. It is the local government that enables the industry to get away with this. They turn a blind eye.” (Authors’ interview)
In addition to selectively ignoring national registration laws for handset manufacturing SMEs, the local government also accepts lax IPR standards in the handset sector. This is a pragmatic acceptance of the industry as it exists. In interviews, officials did not emphasise problems from knock-offs or trademark infringement. When asked for their opinions regarding IPR protection, all government interviewees took a rather tolerant tone toward firms which bend or break IPR protection laws. SME handset companies received praise for their contribution to the local economy and innovative characteristics. They were seen as encouraging competition which pressures all firms to innovate by improving their production processes to maintain low prices or to improve the quality of their products and offer more sophisticated phones. Two Shenzhen firm representatives specifically mentioned that micro-interventions from the local government include passive protection via lack of enforcement of IP infringement and manufacturing permit laws. In general, the local government was seen as fostering a climate favourable to entrepreneurship in the sector.

To help combat the challenge of uncertain central policies, particularly as regards tax rebates and domestic market access, Shenzhen’s Government has been instrumental in encouraging local mobile handset firms to expand their presence overseas. Interviewees mentioned that through trade fairs, the local government explicitly encourages them to pursue exports rather than rely on the increasingly competitive and regulated domestic market. This both avoids central government restrictions and opens new revenue streams since the domestic market for mobile phones is nearing saturation (MIIT, 2015).

When asked for the most important support they have received from the government, one general manager reflected that the local government has been active in promoting local manufacturing by fostering a competitive labour market: “The greatest support from the local government is attracting diligent workers to Shenzhen. Without them, there would have been no development in the mobile phone industry” (authors’ interview). Maintaining ease of migration, securing employment and residency permits – even in contravention of China’s hukou (residency permit) system – has been essential to development of the sector. Indeed, another firm mentioned that high-value talents who join the firm enjoy access to a coveted local hukou. According to the interviewee, this preferential policy has significant benefits in attracting skilled talent, some of whom had previously worked for Motorola or Nokia. Local state support thus helps build the capabilities of the firm.

When compared to other regions of China, interviewees also noted that the level of support in Shenzhen was exemplary. There are direct connections between firms and the local state (Park and Luo, 2011; Wong and Chan, 1999). Specific firms are thus able to increase the benefits they receive as part of the local ecosystem. To maximise their benefits from the interested local state, some companies hire dedicated employees or teams whose job is to seek out support opportunities from different levels of the government. For instance, one interviewed firm setup two divisions: the Enterprise Planning Department and the Communist Party Member Department to manage local government affairs. In other firms, similar bodies actively cultivate relations with the local government and seek state support. One small firm described its approach:

“The government can provide some resources and tax breaks on R&D activities. We have a dedicated employee whose job is to look for and pursue incentive policy opportunities. Our efforts have generally paid off. We get a 17% tax break for our exported mobile phones. Generally, the government provides good assistance.” (Authors’ interview)
Emphasising the local nature of the support they receive, another firm noted:

“The development zone we are in gives some support. For example, we can get R&D investment grants of 200,000-300,000 RMB to support small innovations like GSM and CDMA joint-signal phones, where the system switches based on the number being called. We have also gotten grants for work with basic GSM and PHS phones. Our Communist Party Member Department makes it easy to secure these types of small grants.” (Authors’ interview)

Interviewees with experience in both cities noted that in contrast, Shanghai’s Government tended to follow national rules and regulations closely. However, as these were uncertain and unclear, it made the environment for the handset industry unfavourable. The tolerance for ‘heretical’ business practices in Shenzhen meant this industry was both welcomed and actively promoted.

5.5 Innovation outcomes

Although there is strong local government support, it does not, and cannot create stable long-term conditions that fully mitigate the prevalence of structured uncertainty. In the absence of enforcement of property rights, especially IPR, constant changing of rules and regulations, and their somewhat arbitrary application, and the strong preference for large SOEs, SMEs continue to face constraints. The political economic constraints interact with the specific enterprise capabilities of specialisation in a narrow niche induced by global production networks to define the types of innovations pursued by SMEs.

Interviews revealed that firms structure their investment and R&D programs in response to the overall condition of structured uncertainty. Concerns over policy stability and administrative coherence disincentivise novel-product R&D investment and long-term planning. At the same time, the local state supports some activities – mostly short-term R&D projects producing incremental innovations and improvements on existing technologies. Concerns over institutional and political ambiguity keep many firms from investing in long-term projects, limiting the ability of firms to upgrade out of their current industry niches, but not their ability to improve and innovate in their current stage of production.

In interviews, SME managers stated that their approach to incremental innovation was based on identifying specific customer needs and tailoring their products to meet them. Being able to do so rapidly was considered a crucial competitive strength. Rather than just concentrating on offering a low-priced product, our interviewees emphasised that innovation was necessary for sustained competitive advantage: “New technologies have greater cost and risk, but making small rapid changes keeps us ahead of our competitors” (authors’ interview). Interviewees saw commodity phones without distinguishing features and relying on low costs to ensure market share as losing strategies.

Since all of China’s SME handset firms procure the same standardised components, they must work diligently to ensure product differentiation. One method of innovation used by SME mobile firms is to target niche consumer groups and offer unique incremental improvements of established product lines tailored for that group. For example, one of the firms we visited focused on catering to senior citizens, development phones with characteristics such as a simple interface, large keyboard, hearing aids and FM radio functions.
For consumers in Africa, SME handset makers offer phones with multiple SIM cards; users can make inexpensive calls by selecting the appropriate card to avoid interconnection or roaming charges. The first multi-SIM capability was one of the more successful innovations of China’s small handset manufacturers. This technology is quite sophisticated but is a hidden innovation, not clearly visible when only looking for core technology or branding innovations.

A third example of niche innovation is marketing phones with built-in television antennae, which make it possible to watch broadcast TV live for free. This caters to customers who want to watch TV on their mobile phone but cannot afford the costs of data-streaming, do not wish to pay for smartphone features they are unlikely to use, or live in areas with poor mobile data service. Such phones are particularly popular in Latin America. While the basic technologies for SIM and TV reception capabilities have been available for hand-held devices since the 1980s, China’s SMEs integrate these existing technologies in new ways to create highly marketable and cost effective mobile phones.

SME innovation strategies share some broad similarities. First, innovations emphasise improvement over invention. Indeed, one interviewee explicitly rejected the suggestion that novel innovation was necessary for competitive advantage:

“There is great cost and risk in making any new technology. With high speed changes in technology, who can predict which way will be a dead-end? For us, there is no need to develop fundamental innovation on chips considering the opportunity cost. We can utilize existing advanced chips and earn profits building around this platform.” (Authors’ interview)

As a result, many of the innovations produced in the SME handset industry are difficult to quantify as most of them cannot be patented since they only represent small improvements or modifications on current technology. The larger firms tend to hold limited portfolios of invention and design patents. Two of our interviewees mentioned their firm’s patent counts: more than 1,000 for one and more than 100 for another. However, these portfolios are tiny in comparison to those held by established mobile telephony firms for which receiving thousands of new patents annually is commonplace. While able to patent some of their R&D output, the majority of SMEs’ R&D efforts are devoted to modifying existing cell phone models or adding new features.

Second, all of the interviewed handset firms’ innovation strategies are heavily reliant on availability of MediaTek’s chipsets. Using these chipsets which ensure reliable voice, text and data capabilities, Shenzhen mobile firms are able to design, build, test, and manufacture a wide variety of phone models in short period of time, confident in the phones’ ability to work with existing mobile networks. With readily available and workable core technology, research and development thus focuses on peripheral aspects of the phones designed to make them more appealing to various customer niches.

All respondents indicated that technology forecasting uncertainty was a persistent obstacle to innovation. To cope with the uncertainty of technology trends, firms tend to develop multiple product models within a short period. One small interviewed company, for example, released more than 20 new cell phone models in 2010, out of which approximately two thirds were profitable. By rapidly introducing new models, the firm hopes it can capture niche markets. Such rapid turnover, however, means each generation of phones is only slightly improved over earlier ones.
Emphasis on speed and diversity of models also limits the ability to concentrate the resources necessary to achieve technological breakthroughs. There is a constant race to stay ahead of imitating firms. As one interviewee noted: “We don’t bother patenting or litigating to protect our innovations. We just innovate faster. By the time we are copied, we have moved on to something else” (authors’ interview). Another CEO claimed that core innovation or platform development is extremely difficult and time consuming; hence, making rapid small, incremental changes makes sense for his organisation. He believes that it is risky for a company to spend too much money on a product only to have it fail. His emphasis was consistently on quick innovation and rapid time to market:

“We make rapid small changes to keep up with the market such as changes to the shape, screen, keypad, etc. Our marketing department has a planning and research branch which tries to figure out what people want like bigger screens or other features. We also get our vendors in different cities to send feedback. The design team makes a non-functioning model to see if that appearance would be popular. If 15 out of 20 cities like it, then that new design will go into production.” (Authors’ interview)

Where capital is short and uncertainty high, it pays to find innovative solutions and market niches which can be realised quickly. This affords a competitive advantage, even if the products are not novel or based predominantly on self-owned intellectual property.

6 Conclusions

This paper offers better understanding of how China’s innovative SMEs have been successful when the institutional climate is arrayed against them. Using an inductive case study method, focusing on the mobile handset industry, and elaborating on the theory of structured uncertainty, we developed our argument of how structured uncertainty constrains and shapes the innovation strategies of Chinese firms.

As our case study shows, SMEs’ innovation in an environment of structured uncertainty is shaped by two additional variables: the global fragmentation of production and development of a tacit alliance with local government. First, fragmentation first allows SMEs to enter the handset industry with lower capital or human resource requirements. Fragmentation also provides narrow niches in which SMEs can specialise, fostering the development of stage-specific innovation capabilities. Second, and critically, the tacit alliance with local government provides the institutional stability necessary for firms to conduct the shorter-term R&D and project planning that fits with these stage-specific capabilities. Taken together, the uncertainty reduction of the tacit alliance creates a space for innovation and the fragmentation of production creates market opportunity. However, together, they channel innovation toward incremental rather than novel outcomes.

While many Chinese SMEs manage to prosper under this system, this is not a sanguine situation. First, while the fragmentation of production certainly encourages entrepreneurship and builds specific capabilities for innovation, specialisation in very narrow niches does inhibit the ability of firms to develop the skills necessary for novel product innovation. The skills developed remain highly specific to the firms’ industry niche. Further, since fragmentation encourages specialisation, the cross-fertilisation benefits of having a firm engaged in activities throughout the production chain are less readily available. Lastly, all these Chinese companies are completely reliant on essential
platform components supplied by a handful of foreign firms. If MediaTek, for instance, were to abandon the production of chipsets, the entire Chinese SME handset industry might not be able to survive.

The paper also sheds light on how countries’ administrative climate strongly affects the causal influence of institutions, changing their effectiveness and outcomes. While existing research has clearly established that institutions are useful for reducing uncertainty, this is predicated on a western-centric assumption of uniform institutional application, stability and predictability. In emerging economies where the administration of institutions is highly uneven due to the political structure of the state, institutions can actually enhance uncertainty.

We see this paper as a first step in determining how the different political economic environments in rapidly developing countries affect their innovation trajectories. Currently, the literature urges emerging economy governments make reforms that pertain to formal property and IPR, as well as adopt other OECD-centric institutional arrangements such as developing a venture capital system. The assumption is that such institutions will influence entrepreneurs’ and firms’ behaviour in the same way. Instead, by elaborating on the concept of structured uncertainty, our research shows that the actualities of institutional implementation on the ground are at least as important as the institutions themselves. Further, since structured uncertainty is prevalent in most major emerging economies including Brazil, Russia, and India, more research needs to be done to make the concept into a useful and generalisable theoretical construct.

Two main venues are especially promising. First, comparative studies across industries and countries on how structured uncertainty is mitigated would allow for the building of a typology and systematic set of hypotheses to be tested. Secondly, studies should be conducted that take advantage of regional variety within national systems. Comparing the varied centre-local treatment of innovators and policy environments should yield both theoretical insights and applicable policy implications.

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