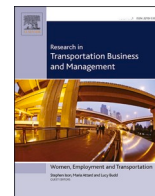


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Lessons from highway management reforms in a less developed province in China

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ABSTRACT

This article describes how national imaginaries of market reforms designed to accommodate fast-growing Chinese regions, collide with embedded formal and informal governance practices in less developed provinces. Whilst much of the literature examines the implications of new infrastructure on regional economics, the management of existing networks dominates decision-making in these more stagnant economies. Using interviews with key stakeholders involved in highway management in Heilongjiang across the provincial and local levels, this paper explores institutional change and persistence using path dependence and junctures as an organising lens. We find that the manner and timing of institutional changes are shaped by the need for political elites in the territorial governing body to reinforce their authority over the vertical functional systems within the jurisdiction. Institutional persistence beneath the changes demonstrates path dependence, related to (a) the vested interests due to power trading and interpersonal relationships and (b) the defence of personnel-related benefits derived from long-standing public institutions. Political and administrative factors rather than economic and technical factors are paramount in influencing transport management and institutional processes in China's less developed provinces.

1. Introduction

Infrastructure is becoming increasingly important from a conceptual, geographical and political perspective, and the corresponding provision can result in a range of endemic issues of access, expertise and governance (Addie, Glass, & Nelles, 2020). As a core of infrastructures, the provision of effective transport systems is evidenced to support prosperity in economic growth and regional development (Chen & Vickerman, 2017; Polyzos & Tsiotas, 2020; Prus & Sikora, 2021). There has been a rapid and large-scale expansion in transport infrastructure investments worldwide. In the OECD, transport infrastructure investments stabilised at around 0.7% of GDP in 2019; China reached 5.5% and was one of the fastest-growing countries (OECD, 2021). However, an assessment of numerous highway and rail projects in China reveals risky mismanagement problems endangering public finance in the so-called high-efficiency infrastructure investment model (Ansar, Flyvbjerg, Budzier, & Lunn, 2016). The core highway development (71.8% of total transport investments in 2021) (Ministry of Transport, 2022) is limited by a lack of funding and the complexity of management (Hu & Han, 2018; Xu, Grant-Muller, & Gao, 2015). These have stimulated national

reforms such as departmental streamlining, redundancies and increasing financing through Public-Private Partnership (PPP) (China News Service, 2008; Chinahighway, 2018; Ministry of Transport, 2015).

However, Chinese national reforms need to cover a vast range of very distinct regional circumstances. In the highway sector, much autonomy for provinces in infrastructure development has led to highly unbalanced highway networks between inland and coastal regions (Bai & Qian, 2010; Chen, Chen, Miao, Song, & Fan, 2016). As the highest level of administrative division in China, provinces have significant policy influence to dominate reform practices in subnational regions by operating various vertical functional systems (Brødsgaard, 2017; Jaros & Tan, 2020). The ability of provinces to implement a national initiative varies considerably across geographical regions depending on the development level (Wang, 2012). However, little attention has been paid to how infrastructure-related management reform is enacted in different Chinese regions. Although national policy and development models in China are often inspired by coastal developed provinces before transforming the practice to inland regions, in some policy domains less is known regarding the left-behind provinces that are unable to adopt the same consistent policy measures as coastal provinces to

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pursue the same reform initiatives (Ang, 2018; Chen & Qian, 2020; Yang & Gallagher, 2017). This study therefore focuses on inland left-behind provinces rather than more academically explored coastal developed models in order to understand if there are differences in reacting to a national harmonised initiative.

Given the increasingly complex multi-level and cross-sectoral challenges in transport decision-making (Clements, Alizadeh, Kamruzzaman, Searle, & Legacy, 2022; Kin, Verlinde, Mommens, & Macharis, 2017; Veeneman & Mulley, 2018), vital transport governance issues relating to context, resources, power and legitimacy need to be considered (Marsden & Reardon, 2017). Highway networks might be described as large socio-technical systems and therefore likely to exhibit significant path dependence given a key assumption that socio-technical systems are inert and rigid, resulting in incremental and path-dependent change and innovation (Fuenfschilling & Binz, 2018; Markard & Truffer, 2008). Numerous scholars have called for and conducted sophisticated analyses of institutional structures and change processes in socio-technical systems for a better conceptualisation of regimes to support theoretical advancement in transition research (Geels et al., 2016; Kotilainen et al., 2019; Lindberg, Markard, & Andersen, 2019). This study inspects highway institutional change over 30 years in Heilongjiang, an inland less developed province in Northeast China, to contribute to a novel debate on the management transition of such a large socio-technical system in the given region.

This focus makes several contributions. First, investigations into regional institutional structures and change processes of transport systems are lacking in the existing literature. The limited research in the West focuses on specific cities. Second, these studies have taken the dominant perspective that path dependence plays a vital role in institutional reform processes leading to lock-in and formalisation (Curtis & Low, 2016; Pallis & Vagelas, 2017; Parola, Ferrari, Tei, Satta, & Musso, 2017). However, it is not clear if this perspective is transferable to a Chinese context—a recent study adopted a similar perspective to explore institutional change in inland waterway transport on the Yangtze River, and identified the significance of institutional legacies and interest conflicts in the deviation of transport institutional designs under reforms (Li, Notteboom, & Jacobs, 2014). This leaves room for institutional investigations into other transport systems.

The concept of path dependence in the Western context could refer to processes where past events or decisions constrain later events or decisions (Mahoney & Schensul, 2006; Page, 2006). It has been suggested as the reason for the slow adoption of reforms in provinces in China (China News Service, 2017; Ministry of Transport, 2018; Reuters, 2020). However, it has been critiqued for being an empty signifier as precise definitions are rare and diverse interpretations of the concept abound when applying it to institutional change in the Chinese context that differs from the West. The concept of path dependence should not become an umbrella category for all theories to explain why institutions tend to persist over time (Kay, 2005; Vergne & Durand, 2010). In this paper, we argue that framing everything in terms of path dependence is too narrow to gain an improved understanding of regional variation regarding transport management and institutional change in less developed provinces of China. Three research questions are phrased to underpin our investigation:

1. How have national reform processes motivated by the potential of rapidly developing provinces been adopted or resisted in a less developed province?
2. What factors explain how institutional change has been enacted and what has persisted?
3. What does the evidence tell us about the future direction of institutional change and the importance of path dependence?

The remaining part of the paper proceeds as follows: Section 2 addresses path dependence interpretations in the Western context, existing research in China, and important administrative and political features to

develop a preliminary analytical framework. Section 3 is concerned with the study methodology. Section 4 presents findings and responses to research questions, concluded with policy implications in Section 5.

2. Literature review

2.1. Path dependence interpretations in the Western context

The path dependence concept originates in works on the economics of knowledge-intensive and high-technology sectors. The classic example was the QWERTY keyboard—although not the most ideal and efficient design at the time, it retained a dominant position as the first design of keyboards getting into the market (David, 1985). Path dependence here refers to how a suboptimal option can persist regardless of multiple possibilities which also existed initially. This attributes to contingent events which result in the engagement of a suboptimal option in a field at an early stage; the increasing returns promote the beginning of a popular trend that ensures continued dominance—generating path dependence (Arthur, 1989). Besides the economic arguments, the positive feedback effects for path dependence are strongly emphasised in theory from the perspectives of political science (Page, 2006; Pierson, 2000), historical sociology (Mahoney & Schensul, 2006), and management science (Sydow, Schreyögg, & Koch, 2009; Vergne & Durand, 2010).

North (1990) initially introduced this concept in the exploration of institutional change to imply the existence of path dependence in evolution. Two distinct interpretations of path dependence in this field were summarised in two metaphors by Ebbinghaus (2005). The first one is the *unplanned trodden trail* which appears due to the repeated use by subsequent actors of institutional arrangements chosen by previous actors. This deterministic model highlights the social diffusion of an institution by the repetition of one basic decision, entirely attributing the spontaneous evolution of an institution to external small chance events. The exclusion of endogenous elements such as individual actors, their strategies and the social context in which institutional processes take place is defined as the significant problem of this model. This view is consistent with critiques of the path dependence concept that recommend downplaying the importance of contingency in influencing institutional paths (Kay, 2005; Ma & Hassink, 2014; Martin & Sunley, 2006).

By contrast, the second metaphor, *road juncture*, makes use of the path dependence concept in a broader, non-deterministic sense. Actors choose a branching point from different optional pathways to continue the journey. Subsequent collective actors shape and adapt the long-term evolution direction taken by an institution or institutional arrangements. This more open developmental approach enabling identification of the interdependent sequence of events is believed to support analyses of various forms of institutional transformation involving both persistence and change, which includes three distinct scenarios: (a) path stabilisation: marginal adaptation to environmental changes without changing core principles; (b) path departure: gradual adaptation through partial renewal of institutional arrangements and limited redirection of core principles; (c) path cessation or switching: intervention that ends the self-reinforcement of an established institution and may give way to a new institution in its place (Ebbinghaus, 2005, p. 17). Given that highway networks play an important role in transport in the region of interest for this study and that the relevant institutional change has been incremental progress, the *road juncture* approach was applied to focus on the institutional transformation under the first two scenarios. The following section reviews how recent studies of path dependence in China have discussed institutional persistence and change.

2.2. Path dependence research in China

There has been little study of the role of path dependence on regional institutional change in the Chinese context. However, it is recognised that geographical variations lead to a more complex understanding of

regional and local institutional paths and process changes, especially given the large populations, vast areas, and unique characters of each province in China (Lim, 2017; Zhang & Wu, 2020); such diversities are equally significant in the Global North (Henning, Stam, & Wenting, 2013; Mendez, Van Der Zwet, & Borkowska-Waszak, 2021). If there is change going on in one part of the country, such as coastal developed provinces and not in inland provinces, an understanding of the role of context in path dependence is necessary. Therefore, relationships between path dependence and context-specific parameters should be established to assess the impact of relevant political and social-economic parameters on the institutional processes. This does not imply that place-specific paths of subnational regions are unique in the sense that the case study findings regarding path dependence are not transferable. On the contrary, these paths are not delimited to these regions, and the studies can contribute to integrating the path-dependence mechanisms into a more general theory of regional and local institutional adaption (Martin, 2010; Martin & Sunley, 2006).

Chinese research on path dependence in some policy domains has focused on institutional change and persistence simultaneously or respectively (Xu, Gorsky, & Mills, 2019, 2020). For instance, path dependence studies of tourism area development in China ascribe the emergence of junctures that lead to path departure from institutional process to endogenous factors which are considered economically relevant, such as markets and economic crises (Chen & Bao, 2014; Ma & Hassink, 2014). However, the factors differ from individual actors and collective strategies as defined as essential endogenous factors in the Western context, where the empirical literature review uncovers that the micro-level (individual) is indispensable in regional path dependence analysis, as well as the level of networks between the individuals (Henning et al., 2013). The significance of actors is grasped as one of the important forces influencing regional governance in two existing works on path dependence of regional institutional change in China—the quest by relevant actors to institute place-specific policy experimentation in the name of the national interest (Lim, 2017; Sheng & Han, 2022). In authoritarian states like China, political elites such as policy-makers rarely accept a loss of authority and play a decisive role in institutional changes following their preferences and choices (Wu, 2015; Yan & Yuan, 2020). The role of individual agency in affecting path-dependent institutional processes regarding this group of people is seriously underestimated in the Chinese literature, especially those in authority in their regional jurisdictions, something this study carefully considers.

Vested interests affect institutional processes in China, explained as institutional persistence. It has been demonstrated in the development of urban infrastructure financing in China that relevant vested interest groups exert pressure on policy-making regarding the institutional process to consolidate existing institutions and impede reforms (Zhan, de Jong, & de Bruijn, 2017). There may usually be multiple vested interest groups involved in the policy-making process, further complicating institutional legacies and conflicting interests, increasing the institutional costs and ultimately leading to resistance to reforms and institutional persistence (Li et al., 2014). Also, the existence of vested interest groups relates to the political, economic and social context of where the institutional process takes place. China's less developed provinces do not entirely follow the central mandatory environmental performance targets to change the previous policy path of prioritising economic development; otherwise, the performance and promotion of local officials are affected (Zhang & Wu, 2020). It can be concluded that vested interests in China are often strongly embedded in the political and administrative cadres, which is even more true in less developed provinces. Therefore, those tasked with effecting reform may also prefer to resist.

2.3. Administrative and political features in China

A review of administrative and political features on the Chinese ground helps enrich the understanding of the institutional context

relevant to this study and provides support for explanations of regional institutional processes and path dependence. China's administrative and civil service reform was initiated in the Reform and Opening Up era and was strengthened in the 1990s. A series of system reforms were aimed at resolving inefficiencies due to traditional bureaucratic and political problems, and the main measures included decentralisation and the separation of economic and administrative agencies and functions (Liou, Xue, & Dong, 2012; Shen & Cao, 2020; Wang, 2012). However, the implementation did not proceed as the centre had designed to achieve satisfactory reform outcomes.

First, the actual number of employees in China's bureaucracy has increased steadily and been severely *chaobian* (a phrase indicating that the workforce is exceeding the formally established posts), particularly at sub-provincial levels and among public institutions (Ang, 2012). Public institutions¹ usually refer to social service organisations established by the state for social welfare or other organisations with state-owned property (Shen & Cao, 2020). As an essential component besides the Party and government organs and enterprises, the number of people employed in public institutions has been roughly three times that of civil servants in China (Caixin, 2021; Ministry of Human Resources and Social Security, 2016). This phenomenon could be attributed to the strong public sector job preference of the young generation in China due to the job security and stable salary—known as the iron rice bowl (Ko & Jun, 2015). Also, post-setting at sub-provincial levels, especially among public institutions, is more flexible and less regulated where entry is easier, but the employed can receive benefits which apply to the privilege of a hierarchical system of superiority that will not be taken away at will, almost the same as civil servants at the same level of civil service hierarchy at the national or provincial level.

Second, in the context of decentralisation, the implementation of administrative reforms in China has varied significantly according to the development level of regions and localities, namely, the ability to bear the financial and administrative costs of undertaking reforms (Wang, 2012). As subnational governments usually have substantial autonomy during the implementation process, fulfilling regional and local instead of national needs would be a priority by interpreting central guidelines through their own means. Under the circumstance, empirical evidence reveals that the subnational implementation is not always carried out in line with national reform initiatives; on the contrary, the power which can influence post-setting and promotions is traded to undermine legal procedures, resulting in endemic corruption, potentially prevalent in lagging regions with low civil service pay (Brødsgaard, 2002; Burns & Wang, 2010; You & Zhang, 2016).

Third, the relationship between vertical functional systems and horizontal territorial governing bodies remains complex and has led to a range of governance issues, which were first identified in the study of energy policy-making in China (Lieberthal & Oksenberg, 1988). To be specific, *tiao*, a 'line', refers to a vertical system, which may stretch from a central ministry or provincial department/bureau to the local units, with a core of the hierarchy of directly subordinate bureaus and lower-level units (prefectural and county divisions). *Kuai*, a 'piece', refers to a territorial authority such as a provincial, prefectural or county government and corresponding components. In terms of the distribution of power, funding and resources, whether *tiao* serves *kuai* or vice versa is a vital issue with changes depending on specific systems and policy domains; the *tiao-kuai* conflict remains significant in modern China's administrative and political practices (Brødsgaard, 2017).

¹ There are three official classifications of public institutions: full appropriation, balance-appropriation and autonomous public institutions. Habitually, they are referred to as public welfare Category 1, 2, and 3 public institutions, respectively. The major difference between them is the extent to which the expenditure is financed by the state, which directly influences personnel treatment (salaries and welfare).

3. Methodology

This study tests path dependence and seeks potentially alternative themes to grasp mechanisms of regional institutional processes and governance in the Chinese context. Therefore, a qualitative case-study approach is applied to examine the phenomenon within its real-world context (Yin, 2017). This is appropriate to acquire a grounded and systematic understanding of institutional processes in less developed provinces of China rather than adopting the definition from a Western context (Flyvbjerg, 2006).

3.1. Study site: Heilongjiang Province

Heilongjiang Province is located in Northeast China (Fig. 1), with a total area of 454,800 km² and a population of nearly 32 million. Heilongjiang had a relatively high degree of industrialisation and urbanisation compared to other inland provinces during the planned economy period. However, since the implementation of the national marketization initiative, Heilongjiang has lost its original institutional advantages dominated by public ownership. Since the 21st century, the development gap between Heilongjiang and coastal provinces has gradually increased. By comparing with the averages for provinces in China, three critical indicators, GDP per capita, unemployment rates, and infrastructure investment, reflect the characteristics of Heilongjiang as a less developed province; highway investment has also been below the average for a long time, about one-seventh of the average in 2020 (Fig. 2). Therefore, this province was selected as a case study as the relevant research results were expected to be representative.

Despite national attempts to revitalise Northeast China, represented by the less developed provinces such as Heilongjiang and Jilin through state financial aid and corresponding preferential policies, studies reveal little success in this long-standing state policy enacted in 2006—urban shrinkage, population loss, and economic decline remain severe (Hu & Yang, 2018; Li & Mykhnenko, 2018; Xie et al., 2016). Against this backdrop, highway development and management in Heilongjiang is under enormous financial pressure, like other less developed provinces with less economic growth and, therefore, lower fuel duty income and are less profitable regions for companies to operate in. The contradictions between tremendous highway lane mileage and severe funds shortage constitute significant challenges in the highway sector, which requires reforms to smooth the transition.

3.2. Data collection and analysis

The research data was collected through interviews which facilitate the discovery of subjective meaning and interpretation and allow new understanding and theoretical advances (Mills & Birks, 2014). The recruitment process was complex due to the challenges of researching policy change in China, given the nature of accessing data about institutions and power (Groenleer, Jiang, de Jong, & de Bruijn, 2012). Through gatekeepers who had contact with the researchers, it was designed to cover as many layers as possible. The researchers discussed outlines of interview questions with potential interviewees in advance to minimise inappropriate questions that might trouble the interviewees. On this basis, 25 policy-makers and officials from Heilongjiang's transport and highway agencies across systems and levels were contacted, and 20 agreed to participate in this study to discuss the highway institutional process. Fifteen respondents had over 20 years of service in the highway sector. In-depth semi-structured interviews were arranged as appropriate for the accessibility of each interviewee's time and location. To reduce the risk of identifiability, only the administrative division to which the interviewee belonged was labelled, including 8 at the provincial level, 7 at the prefectural level and 5 at the county level.

Data collection took place in June 2020 in Heilongjiang. During the process, it was discovered that provincial policy-makers and officials were better informed about the objectives of national and provincial-

driven institutional reforms and the overall situation in Heilongjiang. Interviewees at the prefectural and county levels were more aware of the specific implementation of the reforms in their jurisdictions. Therefore, interview questions were adapted to each interviewee's position to help deepen the discussion. The interviews lasted, on average, 60 min (range 32 to 83 min). Given that this study was intended to investigate what underlying factors explain the institutional change and persistence in a left-behind province of China, an inductive research approach was applied (Thomas, 2006). The researchers did two rounds of manual coding in NVivo 12, in which two of the research team independently completed the process. A list of 203 nodes was generated. The researchers conducted several rounds of analyses to categorise nodes into themes, link themes, select quotations, and develop theories from the data. Three underlying themes emerged from the deep analysis: (a) power struggles and redistribution; (b) power trading and interpersonal relationships; (c) defence of personnel benefits derived from public institutions. The first relates to critical junctures leading to path departure. The last two themes concern highway institutional persistence, especially the personnel system.

4. Results

4.1. Institutional processes of the highway sector in Heilongjiang

According to the documents and interviews, the highway authority in Heilongjiang was established in 1945 with the regional regime's establishment and then went through the process of growing from small to large, from being subordinated to the civil administration and construction departments to the foundation of an independent functional department in 1958. The Highway Bureau (HB) developed a vertical functional system to sub-provincial levels for comprehensive highway development and management (planning, approval, execution, funding and personnel). Except for the cultural revolution period (1966–1976), the HB and subordinate local divisions constituted the only highway management system in this region, maintained until the 1990s. For many years, especially during the planned economy period, highway development was the only core of provincial transport development for political and military (defence) purposes. Even in the late 1980s, some interviewees evidenced that the highway construction-related decisions of the HB profoundly affected the development of local governments and the performance and promotions of their officials; the highway sector had an enviable reputation throughout the province. In contrast, other systems in the transport sector were late in their development and lacked the accumulation of resources such as funds and high-skill talents. Therefore, the HB held real power in the transport sector, compared to the direct administrative superior of the highway system, the provincial Department of Transportation (DoT).

However, the highway sector has gradually become fragmented since the 1990s, influenced by the reforms enacted and implemented by the DoT. The institutional process is summarised below (Fig. 3). The original sole highway management system was split into three functional systems—ordinary highway system (OH), road administration system (RA), and motorway system (M). The OH, originated from the HB² and local divisions, is responsible for ordinary highways-related construction, maintenance management, disaster prevention and emergency, and partial administrative works such as licensing. The RA, under the leadership of Transport Levy and Inspection Bureau (TLIB), was in charge of ordinary highway-related administrative inspection and law enforcement which have been upgraded to be responsible for the whole provincial transport sector in 2019. The M was operated by the former Toll Highway Administration (THA) and subordinate offices of motorway sections. Initially, they existed as government agencies, in

² The name was changed to Highway Business Development Centre (HBDC) in 2019.

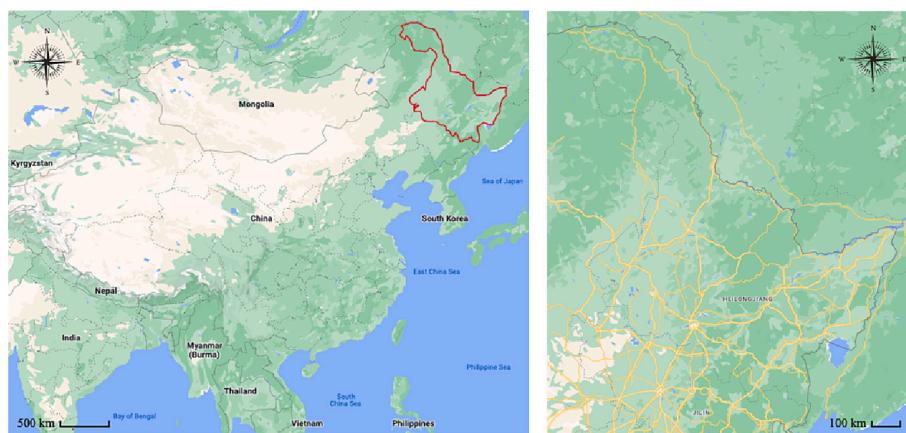


Fig. 1. Heilongjiang Province map (sources: Google Map and authors).

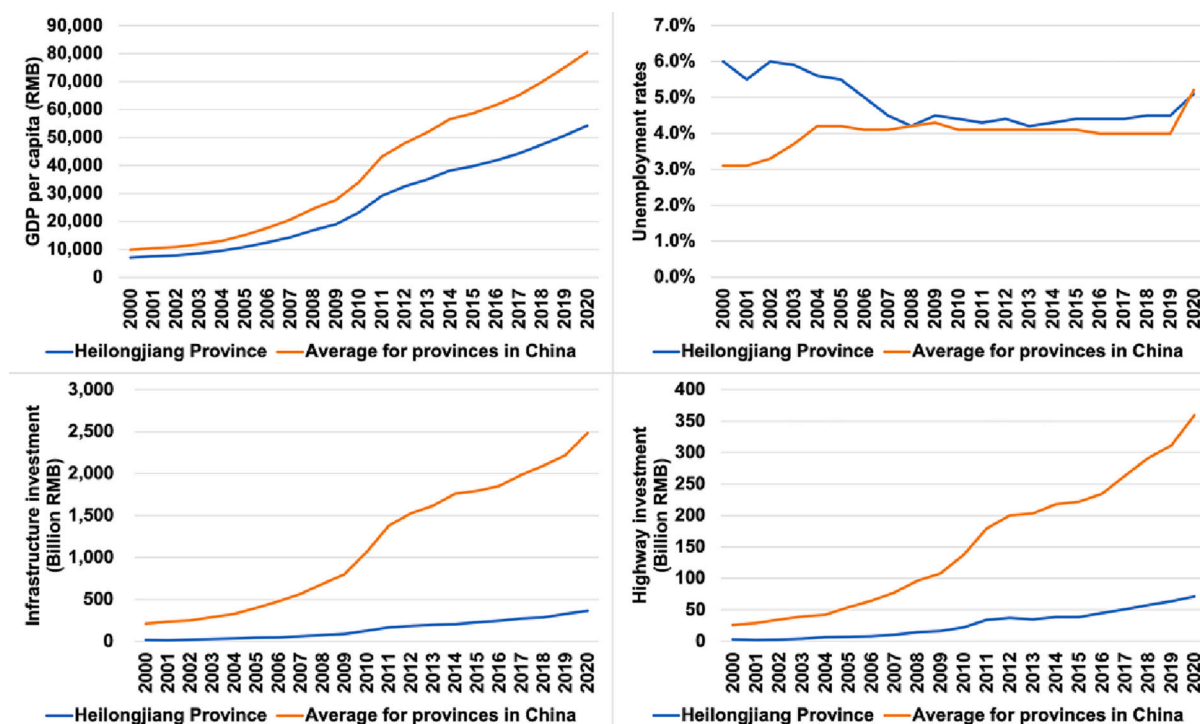


Fig. 2. Comparisons between Heilongjiang and the averages (sources: National Bureau of Statistics and authors).

charge of high-grade motorways only, similar in specific affairs to the OH but with independent administrative enforcement power to motorways. The main business of the M was reorganised into the provincial state-owned transport investment company for market-driven management in 2019.

4.2. Institutional change: power struggles and redistribution

We found that the highway sector in Heilongjiang has experienced three significant reforms enacted and implemented by the DoT, associated with *tiao-kuai* power struggles and redistribution. During the process, the highway sector has been disadvantaged by the reforms and incrementally fragmented. The first reform could be traced back to 1994. Interviewees indicated that, before 1994, the HB held the absolute planning authority over all roads in the province, including the authority to examine and approve all maintenance costs and quotas. This led to the HB usually bypassing the DoT on specific matters and reporting the DoT only after implementations. The DoT enacted the

1994 reform to restructure functions based on the completion of the first toll motorway in the province to take away the power above. Meanwhile, the DoT separated levy and inspection departments from the former HB system by establishing the TLIB and affiliated local units.

The provincial DoT's reforms in 2006 and 2019 were remarkably at odds with proposed national initiatives. There was a small agency managing newly built motorways which was merged into the HB system efficiently in 2002 due to the 'One Province, One Department, One Bureau' guideline issued by the central government the same year to avoid the redundancy of provincial highway management agencies. However, the new DoT director who was appointed in 2006 was reported to believe that the HB system had excessive power to affect the DoT's authority. The director thus sought support from the provincial Office of the Establishment Committee, an essential Communist Party body responsible for the configuration and adjustment of the functions and establishment of the various departments of agencies in the province. This director did not even demand more personnel establishment (posts) for the new agency and subordinate units; instead, only the

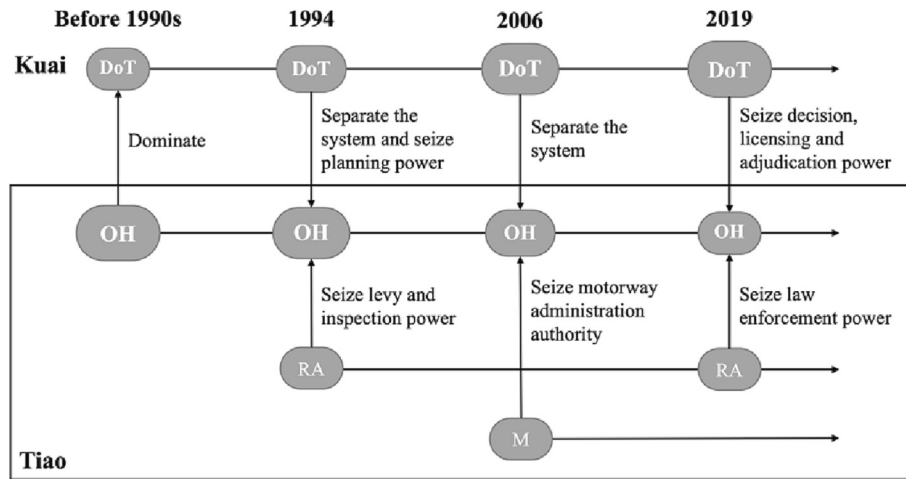


Fig. 3. Highway institutional change timeline in Heilongjiang (sources: authors)

system's independence from the OH was required to limit the HB's authority. Ultimately, it was successful in separating the motorway administration authority from the OH to form the THA and subordinate section offices.

The latest power redistribution was detected in the 2019 reform which stemmed from the public institutions reform initiated by the Communist Party in 2017. In view of the dominance of public institutions in the transport sector and the serious redundancy of public institutions jeopardising public finance, the transport sector was selected as the main pilot for departmental and personnel streamlining. However, our investigation revealed that Heilongjiang DoT's implementations did not involve actual downsizing of departments and staff. The DoT took advantage of the opportunity to redistribute power in the highway sector. Firstly, the DoT decided to retain the agency and staff of the RA and to raise the agency and the director in the administrative hierarchy to the same level as the HB by integrating enforcement departments of other systems within the transport sector. On the contrary, the RA should, in principle, be abolished according to the national initiative; the power should be delegated to the grassroots level, primarily at the county level. Secondly, a newly formed highway office within the DoT has taken away all the important administrative power of the HB, such as executive decision, licensing and adjudication. However, in practices of many coastal provinces, the authority was retained out of concern for reducing institutional costs and ensuring efficiency in the provision of highway public services.

Most interviewees deemed these implementations to have resulted in fairly ineffective outcomes. Specifically, the new highway office is a government department, and its staff must be civil servants recruited through a series of formal procedures. Experienced employees from the HB system who had the posts of public institutions could not be recruited directly into the new office; extensive training for new civil servants was required. Also, civil servants enjoy a better salary and benefits package than employees in public institutions, and the public purse spends more for the same number of people. Thus, the number of recruits to the new highway office was strictly controlled, and in 2020 there were only 10 people in the new office, whilst the administrative work was previously carried out by nearly 100 employees in the HB. This situation forced a significant decrease in administrative efficiency as decisions that could previously have been made directly by the HB now require iterations in communication and explanation with the highway office unfamiliar with the business in order to obtain approval. These same problems arose with law enforcement departments.

Overall, individual actors, mainly the DoT directors, have played a prominent role in institutional changes in Heilongjiang's highway sector. Three directors have fragmented the highway sector and

weakened the initial sole highway management system since the 1990s by gradually taking over the authority and separating departments from it to facilitate the formation of new functional systems. In order to achieve the target, they even sought support from the party body to bring about power distribution. A vital window of opportunity to begin this institutional path was that the motorway's completion required a new agency and restructuring functions. Throughout the institutional process, however, not all term DoT directors attempted to fragment the highway sector. This is because the preferences and choices of political elites are critical to when and how to initiate reforms resulting in institutional change (Yan & Yuan, 2020).

4.3. Institutional persistence

Underneath the institutional changes in Heilongjiang's highway sector is the dominance of personnel terms and conditions. Despite the central government's emphasis on departmental and personnel downsizing since the 1990s to relieve the financial burden, subnational implementations rarely achieved favourable reform outcomes. This is evidenced in the 2006 and 2019 reforms in the institutional process of Heilongjiang's highway sector. Besides being influenced by individual actors disrupting the formal procedures of reforms to reinforce their authority, our investigation showed that relevant policy-makers have been bound by vested interests due to power trading and interpersonal relationships and constrained to avoid abandoning previous institutional arrangements. Also, the corresponding beneficiaries at all levels in the highway sector reacted very strongly when faced with the prospect that the forceful implementation of the 2019 reform would downgrade the highway public institutions and reduce the personnel benefits package. Through the various efforts of the vested interest group, the extent of reform was eventually minimised, and the outcomes were mostly the same as in the pre-reform state.

4.3.1. Power trading and interpersonal relationships

It was uncovered that large numbers of people were able to enter a particular system in Heilongjiang's highway sector (ordinary highway, road administration or motorway) because those who already worked in the system have close or distant kin ties or pseudo-kin ties with these people, such as families, neighbours, classmates, and hometown folks. These relationships can be fortified by accumulating personalised obligations, face (*mianzi*),³ and emotional attachment to facilitate

³ The so-called face (*mianzi*) denotes an individual's social position or prestige, gained by successfully performing one or more specific social roles that are well recognised by others.

favouritism over formal procedures (Bian, 2018; Hwang, 1987). Due to the lack of regulation, the policy-makers have been able to adjust and create system-specific posts to facilitate entry within their scope of authority; the situation was worse at sub-provincial levels.

Those who were previously in charge created difficulties to mess up the reform. How did they simplify the issue? People were allowed to enter the units below by charging each RMB 50,000. Then certain people gave those in charge gifts through their interpersonal relationships to increase the (posts) ratio of the public institutions. [Provincial-level].

Under this circumstance, the highway sector has been experiencing severe overstaffing; for example, it was mentioned that Heilongjiang has nearly eight times as many provincial posts as Shandong, a coastal province with a high level of cooperation between two provinces' highway management systems. The power-trading benefits motivate those policy-makers to deliberately avoid institutional changes which would limit their power and shelter systems with deep interpersonal relationships. In the case of the RA, whilst highway maintenance fee inspectors and agencies were abolished and integrated into the HB system following the national initiative in 2009 (China News Service, 2008), the system's entities and posts were retained for ten years, with all personnel still enjoying the same benefits package and the system having additional functions in the 2019 reform. It was evidenced that most RA employees are relatives of the DoT officials. The DoT again sought support from the party body, the Office of the Establishment Committee, to apply for a new agency for their relatives to retain the establishment and benefits package. However, respondents indicated that the implementations, including upgrading the RA in 2019, have provoked widespread discontent among personnel in other systems of the highway sector. One example is presented here.

The levy team, stayed from 2009 to 2019. Basically, they had nothing to do. Those people are old. Also, they know nothing about the transport or road administration business. The result is that those who have the advantage of enforcement skills have not yet well settled. [...] This is why people have been quite resistant to it. Because those who stayed got better, but those who worked so hard had their authority taken away, and no one cared about their wellbeing. [Provincial-level].

4.3.2. Defence of personnel benefits derived from public institutions

The substantial resistance to the reforms in the highway sector was reported as being related to the regional socio-economic and institutional context, in which there have been high social preferences toward public institutions and public satisfaction with the benefits derived by employing in public institutions. The public institution system has been regarded as the symbol of an 'iron rice bowl' and a stable life since the planned economy in Northeast China, coupled with the closure of regionally dominated state-owned enterprises and the laying off of a large number of workers, making it difficult to re-enter the workforce in a subsequently depressed market economy (Cho, 2013; Wang & Xie, 2015; Xie et al., 2016). Therefore, the respondents primarily expressed concern about the last change (the 2019 reform) that practically threatened their personnel benefits, namely, their establishment and benefits package in public institutions. Some heads of highway agencies put actions into practice and reapplied for the pre-reform entitlement, which was approved by the relevant authority. It is worth noting that most of the respondents, on the one hand, criticised this long-inherited system and, on the other hand, articulated the desire to return to the pre-reform state and require institutional persistence. For instance,

1. *It is very difficult to accept this change in view of the fact that everyone is willing to have such a stable position, and no one would like to work in which like self-financing enterprises. [County-level]*
2. *The institutional reform did not understand the public institutions fully from the beginning. The government insisted on abolishing the public institutions, but they found that it would be impossible and decided to*

remain. Well, it is evident that, at least in the highway sector, civil servants were too few to carry out our functions and work. [Prefectural-level]

The contradictory positions reflect the profound influence of the vested interests derived from public institutions on individual actors and collective strategies, even though stakeholders are well aware of the rational path. In this paper, stakeholders are broadly defined as the relevant group of people enjoying benefits in the Chinese administrative and civil service bureaucracies rather than those employed in a specific functional system. The operation of inherited institutions preserves their benefits continuously. Therefore, where institutional changes are adverse to most privileged stakeholders, the will to require institutional persistence becomes a collective mind and prompts strong resistance to change in collective actions.

5. Discussion and conclusion

This study explores institutional change and persistence in reform processes of the highway management system over three decades in a less developed province of China, Heilongjiang, through the lens of path dependence and road juncture. This paper first contributes to understanding how national reform processes, motivated by the potential of rapidly developing provinces, have been resisted in a less developed province. In Heilongjiang's highway reform practices, we found a centralising initiative at the subnational level rather than a decentralising one. We can hardly see any real attention in the implementation to whether or how the institutional change would improve outcomes in line with the stated goals; 30 years of institutional processes have made highway management more fragmented and ineffective. Our work suggests that national reforms, based around the fast-developing regions, assume a certain regional imaginary—a process of development to which reform is a good fit. However, the embedded formal and informal governance practices of less developed provinces are usually against the imaginaries, leading to distinct regional realities. Compared to the coastal province developed model, we deem that political and administrative factors rather than economic and technical factors are paramount in influencing reforms in left-behind provinces.

However, we argue that the importance of keeping personal power through subnational institutional changes seems broader and not limited to less developed provinces or the transport and highway sector. This motivation can lead to resisting top-down restructuring and reform goals concerning the interests of local stakeholders who rely on relationships and established power to ensure favourable local implementations. Existing scholars' work across cities and regions in China, such as investigations into medical insurance policy reform (Huang & Kim, 2020), electricity sector transformation (Lin & Purra, 2019), water governance (Wang, Liu, & Dang, 2018), rural reform (Xue, Mao, Weeks, & Xiao, 2021), and urban redevelopment (Yu, Hamnett, Ye, & Guo, 2021), support our findings. Unlike in the West, where power is usually used based on much negotiation between networks of actors to drive change in infrastructure governance (Wegrich, Kostka, & Hammerschmid, 2017), officials in China have dominant power to independently underpin reforms so as to enable winning *tiao-kuai* conflicts in their jurisdictions. However, this is not conducive to effective regional reform outcomes in any sense. Little attention has been paid to this in the reform process. In an institutional context where decentralisation has granted subnational actors more manoeuvring spaces and increased their bargaining power with the centre (Jaros & Tan, 2020; Wong, 2018; Zheng, 2007), these actors use their power to implement reforms inconsistent with national initiatives, instead disrupting administrative efficiency and public service delivery. This situation of political elites being influenced by political power struggles rather than following legal procedures of reform step by step has been revealed in other authoritarian socialist countries (Thomson, 2017). Thus, we argue that one broad force driving regional institutional change in China can be

summarised as the quest by the actors to reinforce personal authority in the jurisdiction under the pretext of national reform initiatives, which modifies the quest by the actors to institute place-specific policy experimentation in the name of national interests as defined by Lim (2017).

This study fills a significant gap in the existing research on path dependence in the Chinese context: the underestimated role of the micro-level (individual) in regional path dependence analysis. The individual agency is capable of profoundly influencing path-dependent institutional processes and causing changes. However, institutional changes across time have never disrupted institutional persistence. Our findings support existing research grasping the importance of regional vested interests in increasing institutional costs and shaping critical resistance in the process (Li et al., 2014; Zhan et al., 2017). In less developed provinces, there were fewer alternative vested interests to the political ones, so these dominated. Therefore, the formation and growth of vested interest groups are relevant to the political, economic and social context in which institutional processes occur—higher potential for developing resistance in less developed provinces (Burns & Wang, 2010; You & Zhang, 2016; Zhang & Wu, 2020). In regional history, the effects of Maoist-communist ideology and inherited institutions dominated by the public sector have been reinforced in such provinces (Wang & Xie, 2015; Won, 2004). We argue that institutional persistence limits subnational institutional path breakthroughs beneath the surface of seemingly radical and complicated changes in institutional arrangements as the real driver of path dependence. Also, this informal social institution at the subnational level is fairly challenging to alter due to the various benefits derived from the bureaucratic and welfare system (Liu, Lucas, Marsden, & Liu, 2019). This is already evidenced by empirical tests of subnational implementation concerning the stated goal of national downsizing campaigns (Ang, 2012; Cheng & Lu, 2011).

The future direction of institutional change and the importance of path dependence should emphasise how regional management reform is enacted, which is never properly considered in the existing literature. Factors explaining institutional change and persistence contain substantial narratives about people in the given context. The stickiness of change in personnel terms and conditions leading to the defence of benefits by stakeholders in the public sector is an important part of the persistence narrative. Therefore, whilst path dependence research usually focuses on institutional processes of reforms, we suggest that how people are affected by the processes and in turn how they affect the paths should not be neglected. In current regional infrastructure debates, who drives the construction of regional imaginaries is important. Also, the reform questions are not just about what gets done and at what level but how it will be done, by whom and how many people that involved—it is a transition of people, not just of structure, ownership or practices. Indeed, there was comparatively little discussion of the what compared with the who and how it was organised. There is a need for more scholarly attention to the interaction between people and institutions in regional research on large socio-technical system infrastructure in China in order to better understand different development trajectories and management strategies between more and less developed provinces.

The role of people should also be emphasised in transport reforms. The comparative lack of engagement with policy-makers and the policy process is a severe concern of the existing transport policy literature (Marsden & Reardon, 2017). It remains under-studied in this context how decisions on infrastructure investment, planning, and implementation are made, what the drivers of policy-making patterns are, and whether and how policy-making patterns change over time (Wegrich et al., 2017). This study provides empirical evidence on reforming transport management based on country-, region-, and sector-specific contexts to recognise the importance of people in influencing institutional results. What is certain is that not all transport management reforms across regions of China are in the process of shifting as smoothly as the central government claimed, from a public administration and

bureaucratic approach to a new governance paradigm involving more market elements. This aligns with other scholars' findings on the decision-making process of large infrastructure projects (metro) in the less developed province: government actors are the primary decision-makers and rarely interact with actors outside the public sector (Groenleer et al., 2012).

This study has shown that porting the ideals of market reform from the West to the Chinese highway management sector has shown several weaknesses. Practically, the importance of understanding this institutional change as a major labour market reform suggests the need to focus more on how change is envisaged and the communities of actors who will be impacted. Indeed, in the absence of this, far more attention seems to have been focussed on the who and how rather than on the changes to efficient delivery of the services which was purportedly the aim of the reform. The study also suggests, although this would bear more in-depth comparison with other provinces, that the conditions for marketization are very weak in Heilongjiang with deficits in highway maintenance budgets and a very large network area which are not seen in more developed areas. It would be important to understand the extent to which the market is actually delivering more efficient outcomes, and for what kinds of provision, than its state equivalent. This may inform a modification of the reform programme.

This study was a single case in a developing province. Whilst our data collection was designed to cover critical provincial policy-makers and local stakeholders in major cities and counties in the province and provided good coverage of layers, we have to limit our generalisations to those which are supported elsewhere in the literature. Future research should build on this approach through comparative analysis across cases and mixed-methods work which ties together the how of the reform with the nature of the transport system outcomes. However, we also caution about the difficulty of reaching large samples of policy-makers in a range of contexts in China where access is sensitive and difficult.

CRediT authorship contribution statement

Siyi Lin: Conceptualization, Investigation, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Greg Marsden:** Conceptualization, Supervision, Writing – review & editing. **Kate Pangbourne:** Conceptualization, Supervision, Writing – review & editing. **Qiyang Liu:** Data curation, Formal analysis.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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