



# Beyond Dependent Development? The Unlikely Emergence of an Upgrading Alliance in the Case of InoBat in Slovakia

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## Abstract

Semi-peripheral economies are reliant on foreign capital for innovation and upgrading into higher-value-added economic activities. This characteristic of dependent development is coupled with unreliable government support for domestic businesses, resulting in fragmented state-business ties. How then did a local electrical vehicle (EV) battery startup InoBat manage to build an upgrading alliance in Slovakia and capitalise on the accelerating automotive shift to electromobility despite these barriers being present in the semi-peripheral economy of Slovakia? By developing a network-based analytical approach and using the unlikely case study of InoBat, this paper argues that developmental entrepreneurship, the mobilisation of private sector resources by venture capital or a large domestic firm, and support by private-public institutions were key determinants for the emergence of the InoBat upgrading alliance. The findings underline that local firms can also be the drivers of upgrading efforts even in the absence of consistent government support and the heavy presence of large transnational corporations.

**Keywords** Interfirm networks · Upgrading alliance · Dependent development · East-Central Europe · Slovakia · Electromobility

## Introduction

Semi-peripheral economies are facing many obstacles to upgrading into new industries with higher-value added. Upgrading strategies require political will and cross-partisan support, broad societal consensus, strong state capacity, and business-government collaboration. These conditions have been shown to be key for developing the institutions that have supported upgrading into high-innovation economic sectors (Doner and Schneider 2016; Amsden 2001; Chang 2002). Semi-peripheral economies, however, lack domestic economic capabilities in mid- to high-technology

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sectors which are instead dominated by foreign-owned transnational corporations (TNCs). This reliance on foreign capital for major investment decisions and upgrading processes positions semi-peripheral economies on the trajectory of dependent development (Nölke and Vliegenthart 2009; Gereffi and Evans 1981; Evans 1979). Semi-peripheral economies also suffer from political instability, state institutions captured by particular political or economic interests, thus preventing the broad and inclusive institution-building required for coordinating the varied interests of key economic actors and forming enduring upgrading coalitions.

In this paper, we argue that local firms and entrepreneurs can overcome these structural and institutional obstacles at the sub-national level by building upgrading alliances through networks with other firms and non-firm actors. By developing a network-based analytical approach, we show that for an upgrading alliance to emerge in a semi-peripheral context, three conditions need to be present: (1) developmental entrepreneurship and cognitive diversity, (2) access to capital and mobilisation of private sector resource by a venture capital firm (VCF) or a large domestic firm, and (3) support by public-private institutions. Using the confirmatory crucial case research design (Gerring 2007) and qualitative social network analysis (Kollock 2013), we construct an egocentric network of the upgrading alliance that emerged around the unlikely case of EV battery manufacturing start-up InoBat in Slovakia to explain how structural and institutional obstacles of this semi-peripheral economy were overcome in the pursuit of upgrading.

To demonstrate the generalisability of our findings, we then apply our analytical approach to a cross-case comparison of the InoBat upgrading alliance to two other cases of upgrading alliances around EV battery start-ups in other semi-peripheral contexts: the negative case of the failed BritishVolt in post-industrial Northumberland, United Kingdom (UK) and the successful case of ElevenES in Subotica, Serbia. Similar to Fuentes and Pipkin (2023)'s analytical focus on "partial" growth coalitions, we are interested in the micro-economic motivations and strategies of start-up firms in the formation of innovation-supporting networks in semi-peripheral regions, which can also be found in post-industrial regions of advanced economies (see Hayter 1982), and thus do not argue that these subnational experiences are necessarily reducible to national trends.

The main theoretical contribution of our paper is that more attention should be paid to the motivations and strategies of local firm actors to support upgrading in the political economy. International political economy (IPE) literature has mostly focused on the activities of foreign TNCs, whereas the institutionalist comparative political economy literature has emphasised state actors and institutions as the main drivers of upgrading activities. By drawing on the inter-firm networks and technological innovation literature, this paper proposes a firm-centred network-based approach and shows how firms coordinate with other firm-level and non-firm actors to form upgrading alliances despite the obstacles facing firms in the semi-periphery.

## Explaining the Unlikelihood of Upgrading Alliances Emerging in the Semi-periphery

The structuralist view in the IPE literature emphasises the intractable barriers that peripheral and semi-peripheral economies face in their development trajectories into higher innovation economic activities. Early studies on the developmental effects of increasing presence of TNCs in the export sectors of dual economies raised concerns about the geographical concentration of external control by a few TNCs and the regional impact this would have for the socio-economic cohesion of host economies (Dicken 1976). Hayter (1982) cautioned that a high concentration of foreign ownership in particular sectors could stifle the growth of smaller domestic firms that is needed for investment in R&D activities. Furthermore, Young et al. (1994) found that if the company is characterised by spatially separated activities and if the level of technology transferred by the TNC is too high to be supported by the host economy, then only limited local upgrading benefits can be expected. Even if there is a small productivity gap between foreign investors and local firms, foreign-owned TNCs tend to crowd out domestic firms due to intangible advantages like branding, copyright, and patent rights (Rugraff et al. 2008).

Coming to a similar conclusion, but from the more contemporary global production network (GPN) literature, Coe and Yeung (2015) argue that the structural mode of coupling with production networks that can be found in many developing and semi-peripheral regions translates into a lack of indigenous technological capabilities and lead firms, which forces these economies to take the low innovation road to industrialisation. For example, while regions, such as Penang and Selangor states in Malaysia, the Bangkok Metropolitan Region in Thailand, the Mexican maquiladoras and the Bratislava region in Slovakia, are seen as successful assembly platforms in the production networks of big lead firms, they also suffer from divestment, financial risks, poor linkages with local firms, external dependency, exploitation of low labour costs, and social conflicts (Yusuf and Nabeshima 2009; Padilla-Pérez and Martínez-Piva 2009; Pavlínek 2016; Wheway and Punmanee 2017). The hierarchical control of production networks by foreign lead firms and their primary motivation to exploit local cost advantages makes it difficult for the semi-peripheral economies to upgrade to higher innovation economic activities, unless such a functional change of gears also benefits transnational capital.

The high concentration of foreign ownership in Slovakian automotive industry means that the decisions for technological upgrading are taken by original equipment manufacturers (OEMs) headquartered in core economies, leaving Slovakia on a continued trajectory of dependent development (see Nölke and Vliegenthart 2009; Coe and Yeung 2015; Nölke 2018). The automotive lead firms at the top of supply chains accrue the highest share of value capture in relation to specialised and generic suppliers in interconnected regional and global production networks (Pavlínek and Ženka 2010; Pavlínek and Žížalová 2014). In the context of the accelerating electromobility transformation at the end of 2010s, foreign

automotive lead firms have geared up the phasing out of production of ICE cars and announced new EV production lines in East Central Europe (ECE) (Pavlínek 2022). However, these manufacturing plants will serve as low-value-added assembly platforms of finalised cars with different car parts produced by established foreign-owned car suppliers.

For this reason, the literature that underlines the structural cleavage between foreign and domestic capital leads us to expect large foreign TNCs to make poor partners in a potential upgrading alliance. Doner and Schneider (2016) explain that although efficiency-seeking TNCs might have an interest in joining upgrading alliances, they also have the option to bypass state- or private-led coordinating initiatives and opt to solve the challenges they are facing by relying on their own network of foreign suppliers and locate higher-value-added activities in countries that already provide the necessary skills and infrastructure. While domestic firms might be willing to form alliances with foreign capital, TNCs usually keep most of their R&D activities in countries where they are headquartered (see Corredoira and McDermott 2014). The costly investment needed for building the necessary institutional infrastructure for upgrading disincentivises large foreign TNCs from joining local upgrading initiatives.

The state institutionalist view found in the developmental state and industrial policy literature offers a more optimistic view that state actors can improve the linkages between local business and foreign TNCs in semi-peripheral contexts. Focusing on the developmental experience of the late twentieth century industrialisers in East Asia, the literature on the developmental state emphasises the need for a strong and politically cohesive bureaucratic apparatus that has a close relationship with the dominant factions of capital and has the capacity to discipline them (Evans 2012; Wade 2018). State capacity instruments are devised by a small technocratic bureaucracy, modelled on the example of the Japanese pilot agency MITI, that plays a key role in policy formulation and implementation by keeping close institutionalised links with large domestic firms, which help to exchange information that is then fed into the policy-making process (Öniş 1991). While the developmental state literature emphasised the use of selective state capacity to support the upgrading of national industrial champions (see Woo-Cumings 1999), later state institutionalist literature recognised the need for adapting industrial policy instruments towards creating the conditions for local firms to link up with global production networks and supporting R&D activities of firms, including by foreign-owned manufacturing firms (Amsden 2001; Andreoni and Kattel 2023).

The kind of institutions and bureaucratic structures that are needed for supporting the upgrading of economies are normally absent in semi-peripheral contexts. Institutions are typically plagued by particularistic ties between bureaucratic officials and powerful groups, leading to weak state capacity and diversion of resources away from upgrading and innovation activities in productive sectors (Doner and Schneider 2016; Corredoira and McDermott 2014). Large domestic firms are usually found in commodity sectors, regulated services, and low-value-added manufacturing, and because of their entrenched position in domestic economy, they do not push for reforming institutions that would require the rebalancing of power relations between sectors. Many semi-peripheral economies are young electoral democracies

with high political uncertainty and turnover, which leads to fragmented state-business ties and the emergence of captured or fractured states with weak institutions and rent-seeking behaviour (Schoenman 2014; Kang 2002).

In the literature focusing on the ECE region, political economists underline the importance of institutional capacity of the state and the way state actors can link up local businesses with EU-level finance and business support programmes (Ban 2019; Medve-Bálint and Šćepanović 2020; Markiewicz 2020). On the case of Romania, Ban (2019) shows how the state continues to attract foreign TNCs with generous subsidies to setup their R&D activities and works with foreign investors to upskill the local labour force in face of labour shortages. In Poland, Markiewicz (2020) shows that state actors there used a variety of industrial policy measures, supported through different EU initiatives and structural funds, to influence the decisions of TNCs and improve the integration of local automotive component suppliers in regional and global supply chains. Comparing Poland and Romania, Medve-Bálint and Šćepanović (2020) again find that the level of state capacity explains whether EU-level funds are spent broadly across SMEs and foreign TNCs.

These studies, however, still show that foreign TNCs are the main beneficiaries of the R&D and innovation financial incentives available, with only crumbs falling to local firms here and there. The Europeanisation of R&D policy has resulted in many fragmented and overlapping policy instruments that are managed by generic innovation agencies that lack industry-specific feedback from domestic economic actors (Karo and Kattel 2015; Schulz 2019). Moreover, competition over FDI from large manufacturing firms has led to the emergence of corporate state capture in ECE. Structural weakness of the state is reflected in the massive transfers of public funds with little conditionality to large foreign-owned corporate actors to attempt to steward national economic dynamism (Bulfone et al. 2023), especially in those ECE economies that are excessively dependent on a single sector for most of their exports, e.g. Slovakia and Hungary. Furthermore, high levels of political uncertainty resulting from party competition mean that politicians cannot credibly commit to agreements with domestic business groups, which in turn cannot form expectations about the future and thus refrain from capitalising on potential business opportunities (Schoenman 2014).

Despite the dominance of transnational capital and unreliable state support, we argue in this paper that local firms and entrepreneurs can overcome these obstacles by building upgrading alliances with other firms and non-firm actors. In contrast to the statist institutionalist view, I argue that the predominant focus of this literature on solely state actors as the drivers of upgrading and economic development is limiting, and instead, our attention should also be on identifying the strategic capabilities of local firm actors to build and leverage existing institutions and networks to adapt to new environments and business opportunities. Using the case of the Slovak-based start-up InoBat below, we will demonstrate how it fell to ethnic Slovak private managers and EU-level executives to combine available sources of funding and establish the necessary links between relevant private and public actors. Instead of only focusing on the foreign TNCs in the automotive industry, we should look at other types of firms beyond the “foreign vs domestic ownership” binary with more complex organisational structures. In the semi-periphery, alongside TNCs, the largest

firms are diversified cross-sectoral business groups (Amsden 2009; Post 2014). This shift in analytical focus will help us understand better what types of firms, and with what organisational and network structures, are best equipped to drive innovation and wider economic upgrading in semi-peripheral contexts (see Phelps 2008; Puente and Schneider 2020; Fuller 2016).

## Building Upgrading Alliances in Semi-peripheral Contexts

In context of TNC-dominated production networks and fragmented domestic state-business ties, we develop an alternative analytical approach to further unpack the puzzle that Doner and Schneider (2016) have raised, *i.e.* why presumably self-interested economic actors in the semi-periphery would use limited resources to develop high-tech upgrading strategies. Drawing on insights from a network-based approach to innovation and inter-firm alliances literature, our analytical approach analyses the micro-economic motivations and strategies of start-up firms in the formation of upgrading alliances. We will understand innovation as a process of problem-solving to find a solution to an identified problem through discovery, creation, and recombination of old knowledge (Dosi 1988; Schilling and Phelps 2007). An innovating strategy pursued by a firm is considered an upgrading one when it produces efficiency gains or greater use of higher value skills and functions that lead to increased value added within the domestic firms and the wider economy (Schmitz 2004; Giuliani et al. 2005; Lowe 2009).

## Developmental Entrepreneurship and Cognitive Diversity

Effective firm leaders act as entrepreneurial actors that mobilise and enthuse relevant stakeholders to join the firm's networks and organisational structures (Khan 2019; Gartzou-Katsouyanni 2020). Gerlach (1992, 215-216) calls such ideational leaders "entrepreneurs" who are "the wellspring of ideas and the source of energy behind large-scale projects that animate economic development". While entrepreneurs have qualities such as spontaneous optimism and risk-taking about potential new technologies or products, the investor as the source of capital, on the other hand, bears the financial risks of new ventures and looks to hedge risk-taking decisions by rebalancing their portfolio and maintaining financial discipline. What is crucial when supporting innovative processes, therefore, is finding the right balance between entrepreneurial risk-taking and investor's managerialism in a potential business venture.

Whether firms remain locked in low-accumulation pathways depends on the strategic orientation of the firm leaders' cognitive capacities, *i.e.* they are consciously seeking to improve their social and market position (Gerlach 1992, 19). The adoption of developmental ideas by firm actors, either at the local, regional, state, or transnational level, offers one example of cognitive capacity. Developmentalism consists of "the ensemble of ideas that inform the mindset and shape the goals of state actors" and represents "a particular way of thinking about finance... to support

the *productive economy*” (Thurbon 2016, 8-9). While a developmental mindset or set of ideas is usually ascribed to state actors in the political economy literature, Fuller (2016) finds that the nationality of firm managers in hybrid firms with predominant foreign ownership can explain the employment of patriotic ideas and the continued commitment to the home economy when it comes to locating high-value-added economic activities.

The developmental orientation of mobilising entrepreneurs necessarily involves the building of networks by joining with other firm and non-firm actors from different institutional sectors to create upgrading alliances, thereby increasing their “cognitive diversity” (Fuentes and Pipkin 2023). The increase in cognitive diversity comes as a result of bringing new perspectives, experiences, and problem-solving skills that cross-cut geographical and organisational boundaries into the decision-making processes around key business decisions. They can include state actors, other manufacturing firms in complementary sectors, foreign investors, trade unions, research institutes, and universities.

### **Access to Capital and Mobilisation of Private Sector Resources**

Entrepreneurs that want to engage with new technologies and innovations before commercialisation of the product or service need start-up capital to finance the highly uncertain and high-risk early stage of technology development. The very uncertainty of the innovation process implies that the sources of capital have to be patient and willing to bear the risk of failure. Due to the speculative and short-termist nature of private finance, seed funding for innovation usually involves public sector institutions, such as government agencies, research institutes and universities, development banks, and international financial institutions. This has crowd-in and demonstration effects to attract funds from private investors (Mazzucato and Semieniuk 2017; Lazonick and Mazzucato 2013).

The go-to source of private finance for early funding of start-ups in high-technology sectors is VCFs. High-tech start-ups are less likely to use debt financing from banks because they normally operate with intangible or firm-specific assets that provide little collateral value, limiting access to bank loans that would be sufficient to finance operations at the desired scale (Colombo and Grilli 2007; Brown et al. 2012). Furthermore, whereas debt financing by banks involves monitoring of business accounts, but little technological monitoring, venture capital firms use their high level of expertise for technological monitoring and active management of start-ups they invest in via extensive control rights (e.g. sitting on the board, voting rights) (Landier 2003; Black and Gilson 1998).

Alongside providing early funding for high-tech start-ups, VCFs therefore provide their portfolio companies with (1) management expertise, (2) monitoring services, and (3) reputational capital (Black and Gilson 1998). First, because of their corporate organisational structure of portfolio companies, VCFs can use their market knowledge of other related industries they have invested in to help the start-up scale up. They do this by helping with the recruitment of managerial and technical personnel to move the start-up from the prototype to production stage, followed by

marketing and distribution. Second, the equity ownership VCFs have in their portfolio companies creates strong incentives for monitoring of the entrepreneur's performance through board control. And third, VCFs act as reputational intermediaries between other potential investors, suppliers, and customers. New firms often face obstacles such as difficulty retaining staff, poor knowledge of the business environment, and weak ties with customers and suppliers. With their international social and financial networks, access to investment funding, and managerial expertise, VCFs can play a leading role in building the legitimacy and commercial viability of new firm activities and developing the start-up's ties with other firms and willing financial partners to support technology development (Baum and Silverman 2004).

Where VCFs are not present, privately owned large firms in domestic ownership can also support high-tech innovation either through diversification into a new industry via an industrial spin-off or acquisition of assets abroad (Amsden 2009). Compared to small firms, large firms have the capital and the resources needed to invest in R&D, higher ability to diversify the risks and established market power (Nightingale and Coad 2014; Ortega-Argilés et al. 2009). Large firms in developing and semi-peripheral contexts often take the form of diversified business groups. They take advantage of low wages and better knowledge of the local business environment to compete with foreign competitors. Furthermore, the recognised brand and superior business-execution skills of established large firms can help start-ups to form international alliances with suppliers and firms with complementary assets (Paradkar et al. 2015).

### **Public-Private Institutional Support for Inter-firm Collaboration**

High-technology start-ups can overcome unreliable state support in semi-peripheral contexts by establishing and leveraging ties with other firm and non-firm actors. To encourage this type of cooperative behaviour towards the formation of what we call upgrading alliances, support by non-market or public-private institutions has been shown to be a key catalyst (Corredoira and McDermott 2014). While competition is a necessary force driving the innovation process in capitalist development, the sheer uncertainty surrounding the emergence of new technologies requires an enormous amount of resources and competencies that a single firm cannot provide. Especially at early stages of technological innovation where there is a higher risk of failure and technological uncertainty, firms are more willing to cooperate in interorganisational, cross-cutting networks between firms and non-firm actors (Rosenkopf and Tushman 1998; Garud 1994; Kim et al. 2023).

Innovation-supporting non-market institutions come in the form of universities, research institutes, industrial associations, or government and transnational public agencies and are often found together in collaborative industry-supporting institutional networks. They support innovation by building trust between cooperating firms, encouraging group learning, and information sharing, and this way reduce opportunistic behaviour among members in the network (Corredoira and McDermott 2014; Kim et al. 2023). They also help firms improve access to different forms of cutting-edge research know-how, experiences, skills, and technological expertise



needed in the discovery and patenting stages of new products (Baum and Silverman 2004; Clark and Tracey 2004).

Furthermore, these non-market intermediaries help start-ups in improving their social, technical, and commercial capital, in turn opening opportunities for partnering up with new collaborators and potentially industrial leaders (Baum et al. 2000). By being a member of an upgrading alliance, a young firm can gain higher legitimacy and commercial viability in the eyes of potential investors and financial institutions. Alliances with the institutional backing of public-private intermediaries in semi-peripheral contexts signal to more risk-averse potential partners that the project is viable in the long run. As the innovation system literature has shown, where the innovation supporting institutions that would take this coordinating role are not well developed at the national level, linking up and leveraging ties with supranational and international innovation systems can overcome this barrier (Asheim and Herstad 2005; Bruszt and Langbein 2020).

## Research Design

Using the confirmatory crucial case research design (Gerring 2004, 2007), this paper focuses on the unlikely case of an upgrading alliance that emerged around the EV battery manufacturing company InoBat in Slovakia. It applies the analytical approach developed in the previous section and analyses the main firm actors and entrepreneurs and their motivations behind constructing an upgrading alliance in an unlikely political economic environment, which is characterised by unreliable government support for domestic firms and concentrated power of foreign TNCs in the automotive sector.

The Slovakian state has weak upgrading capacity due to capture by interests of foreign automotive OEMs and lack of relevant linkages between private actors and institutional support structures (see Pavlínek 2016; Innes 2016; Innes 2014). While the Smer-led government under prime minister Peter Pellegrini (March 2018–March 2020) was initially supportive of the idea to establish a domestic EV battery manufacturing company in Slovakia, the state's priorities changed and were constantly shifting under the unstable governments of political newcomers Igor Matovič (March 2020–March 2021) and Eduard Heger (April 2021–May 2023). Between May 2023 and October 2023, Slovakian government was led by a technocrat Ludovít Ódor, and in October 2023, the previous long-time prime minister Robert Fico returned to power (Fitch Ratings 2023). Although foreign-owned automotive TNCs have announced new or the redevelopment of existing production facilities to assemble EVs in Slovakia, they are expected to import EV batteries from abroad, leaving Slovakia in a dependent position in its key export sector (Pavlínek 2022).

On this basis, we argue that the initiative to form an upgrading alliance in the area of EV battery manufacturing fell to ethnic Slovak private managers and EU-level executives. This was done by pooling transnational sources of funding, technology, and know-how across the acquired assets of the investment firm IPM Group, based in Slovakia, and the formation of networks with international investors, both private and public (see Phelps 2008; Puente and Schneider 2020; Fuller 2016). To build the

empirical evidence for the case study, we have drawn on annual business reports and press releases, LinkedIn profiles of entrepreneurs, government and EU documents, and specialised business press between October 2018 and February 2024.

We use qualitative social network analysis (Kolleck 2013; Granovetter 1983) to identify the evolving innovation networks around InoBat and investigate the actors, structures, and network boundaries of the InoBat upgrading alliance. We construct an egocentric network map (see Fig. 1) to depict the upgrading alliance membership and structural interconnections between different actors in the form of weak and strong ties. Interfirm contractual networks can take the form of strategic partnerships, exclusive purchase agreements, exclusionary manufacturing rights, technology swaps, joint R&D or co-development agreements, and co-marketing arrangements (Gerlach 1992; Clark and Tracey 2004; Teece 1992). We categorise market-based contractual networks between firms as weak ties, whereas organisational linkages that involve equity stakes and thus higher level of corporate control as strong ties (Cafaggi 2011; Pastore et al. 2020). Weak ties between firms are more conducive of new information and provide more flexibility for firms to adapt to changing circumstances, whereas strong ties are more effective at acquiring tacit knowledge, streamlined decision-making processes, and providing a means of direct monitoring and performance control between participating firms (Clark and Tracey 2004, 79-81; Schøtt and Jensen 2016).

In social network research, the boundaries of alliance networks are determined on the basis of attributes of actors, such as membership in an industry or access to tangible and intangible resources, types of relations between actors (direct and indirect,

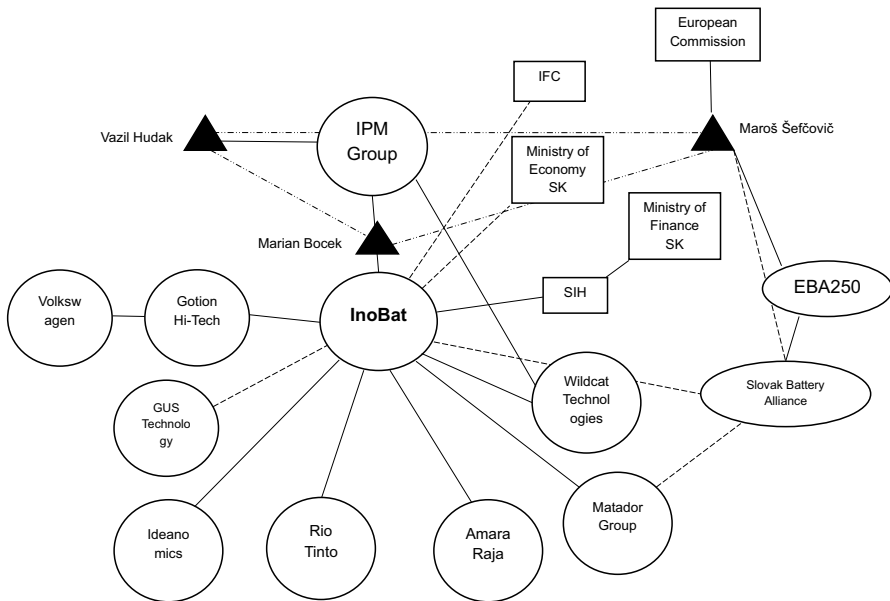


Fig. 1 Upgrading alliance surrounding InoBat

weak or strong ties), and interpersonal collaborative relationships for business purposes (Schilling and Phelps 2007; Laumann et al. 1983). We take into account both inter-firm networks and personal social networks between entrepreneurs as these, if strong, can develop into inter-firm networks (Sharafizad and Brown 2020).

To increase the generalisability of our main case study, we use analytic generalisation (Yin 2013) in the discussion section to compare our findings with two other cases of upgrading alliances in semi-peripheral contexts: one negative case, British-Volt in post-industrial Northumberland, UK, and another positive case, ElevenEs in the Subotica municipality, Serbia. Negative cases act as “control cases” in that they provide contrast with the selected “positive” case or cases on the dependent variable (Mahoney and Goertz 2004). We consider InoBat and ElevenEs positive cases because both start-ups managed to build upgrading alliances around them and bring their first battery cells to production. BritishVolt, on the other hand, is a negative case since it failed to construct an upgrading alliance and realise its plans of home-grown battery production. Furthermore, we will briefly refer to two additional positive, more well known, cases in core manufacturing regions, Swedish NorthVolt and French Verkor, which, due to their more favourable geoeconomic position, consistent government support and strong domestic manufacturing bases, were not facing the same limitations as start-ups in semi-peripheral regions. Analytic generalisation, using both positive and negative cases, in cross-case analysis helps us mitigate the issue of sample bias and representativeness arising from a single case study (see Gerring 2007).

## Case Study of the InoBat Upgrading Alliance

In October 2019, Marian Bocek, the Slovak born co-founder of the transnational investment firm IPM Group, founded a manufacturing and R&D start-up InoBat. InoBat’s mission was to establish an EV battery value chain, spanning from production of battery cells to recycling of used batteries and manufacture custom-designed electric batteries for global mainstream and specialist OEMs in the automotive, commercial vehicle, motorsport, and aerospace sectors (InoBat 2023a). Based in Bratislava, and with offices in London, Seoul, San Francisco, and Hong Kong, IPM Group combines transnational capital with localised knowledge of Slovakia. With a portfolio approach to investment, it is a typical diversified firm that manages assets worth around 1 billion USD across different sectors, from infrastructure to chip technology to energy storage (Post 2014; Amsden 2009; IPM Group 2023). Although the company is foreign-invested, it can be classified as a hybrid diversified firm because its ethnic Slovak managers exhibit “the characteristic commitment or positive bias towards locating core activities in the host economy” (Fuller 2016).

InoBat began the construction of its first R&D centre and production facilities in summer 2021 at a brownfield site of a previous TV factory in Voderady, Western Slovakia, a strategic location close to the existing and planned EV manufacturing plants by Porsche AG, Jaguar Land Rover, Stellantis, and Volvo Cars. While the proximity to regional and international supply chains was an important factor in the investment decision, Bocek’s patriotic ideas played a key driving role in why the

company chose Slovakia as the main location for the company (Grečko 2020; IPM Group 2019a). By positioning InoBat in Slovakia, Bocek wanted to put Slovakia on the world map and transform the Slovak economy into a knowledge economy, the same way that “Skype helped to transform Estonia” (Tomek 2022).

To bring the entrepreneurial idea to commercial reality, between 2019 and 2020, Bocek lobbied Slovakian state actors to support the start-up with initial capital support. Having worked as an investment analyst at Lehman Brothers and the International Finance Corporation (IFC), part of the World Bank Group) on big infrastructure projects in the global South, Bocek fulfilled the role of the mobilising entrepreneur, combining his transnational connections and social ties with different private and public investors together with his local knowledge of Slovakia (Post 2014; Fuller 2016). After intensive lobbying through informal channels and investment conferences, such as the annual Tatra summit organised by Slovak-based think-tank GLOBSEC (see Grečko 2020; UK Parliament 2023a; GLOBSEC 2023), in February 2020, the Slovak government committed 5 million EUR to support the construction of the Voderady R&D centre, the first phase of the construction of what was promised to be a 10 GWh gigafactory (InoBat 2020). This in turn helped the start-up to unlock investment from major private investors, such as Rio Tinto, Ideanomics, Amara Raja, and the International Finance Corporation of the World Bank (InoBat 2022b; Tomek 2022), forming the contours of an upgrading alliance around InoBat (see Fig. 1).

Despite the initial government support (Turza 2020), after the general election at the end of February 2020, a new coalition government was formed by prime minister Igor Matovič who had no previous government experience. Together with the COVID-19 pandemic, this change in government increased political uncertainty for previously comfortable informal business-state ties with the Smer-led government, which was in power for 12 years all together since 2006 (Innes 2014; Marusiak 2017). As a young firm, the social capital that was invested in establishing informal ties with government ministers of the previous government had to be rebuilt from scratch. In interviews and press releases, Bocek and InoBat have complained publicly that foreign governments are more interested in enticing Inobat with financial incentives, for example Serbia and Spain, than the Slovak government (see Tomek 2022; InoBat 2022c).

In the context of high political uncertainty and lack of further financial backing by the government, Bocek’s ethnic background and social ties helped him form informal ties with transnational public actors, such as Vazil Hudak, a fellow investment banker from JP Morgan, who later became state secretary and minister of the economy in Slovakia (2012–2016), and also as vice president of the European Investment Bank (EIB) (2016–2019), and Maroš Šefčovič, Slovak permanent representative to the EU (2004–2009) and vice president of the European Commission (2010), tasked with coordinating the EU Battery Alliance (EBA250). When the EU shifted gear in its industrial and innovation support strategy in the late 2010s and early 2020s, backed by additional funding from EU structural funds and Recovery and Resilience Facility, the long-term investment horizon encouraged these co-ethnic political and economic entrepreneurs to seek out new business opportunities, while building the firm’s long-term capacity and innovation that would also benefit the host economy.

Despite much bigger foreign-owned manufacturing firms vying for these funds, the cultural embeddedness of InoBat helped it overcome many of the administrative and procedural barriers that a young start-up would normally face. Framing InoBat's mission discursively in terms of the EU's objectives of relocalisation of battery supply chains and achieving strategic autonomy underlined the importance of the cognitive dimension of Bocek's entrepreneurship and the corresponding adjustment of the firm's profit-seeking strategy.

This narrative was also shared by Šefčovič. While he was the commissioner for the EU's energy union (2014–2019), Šefčovič was the key driver behind the establishment of the EBA250 in October 2017. EBA250 brings together more than 800 stakeholders from the public and private sectors in the EU involved in different parts of the battery value chain. Šefčovič has praised the fact that “the private sector is maintaining the momentum built up by the European Battery Alliance” and that InoBat “represents another significant stepping stone towards building a competitive, innovative and sustainable battery value chain here in Europe” (Billington 2021). On different occasions, Šefčovič has been a key advocate for positioning Slovakian InoBat at the heart of the EU's EV battery manufacturing capacity (see IPM Group 2019b; European Commission 2022). Where “the Slovak Ministry of Economy does not yet see the company [InoBat] as a symbol of the new, innovative Slovakia” (Tomek 2022), Šefčovič's political capital and connections have been a key resource for InoBat supplanting the lack of domestic institutional support mechanisms for innovative businesses. At the 2018 annual Tatra Summit, Šefčovič officially launched the Slovak Battery Alliance, together with Vazil Hudak, which brought Slovakian companies, including InoBat, IPM Group, Tier-1 automotive parts supplier MATADOR Holding, EV charging company GreenWay Infrastructure, and energy company Slovnaft, together with Slovakian universities and research institutes (GLOBSEC 2018; Lukova 2018).

Although Vazil Hudak's connections at EIB have also been instrumental for InoBat's success, leading to rumours in business press, fuelled by Hudak himself, that a financing loan from EIB to support InoBat's scaling up was forthcoming (Laukova 2019; Vavrova 2020), the loan agreement has still not been realised at the time of writing. The social ties between Bocek and the former vice president of EIB can be seen in Hudak's return to the business world by being appointed member of InoBat's advisory board and its co-founder, as well as the chairman of IPM Group's Avanae since November 2021, which is an asset manager for Infratech investments (Randall 2022).

In January 2021, the European Commission approved the second Important Project of Common European Interest (IPCEI) on batteries, involving 2.9 billion EUR of public support (European Commission 2021). InoBat successfully applied with its own project focused on the development of new generation battery cells with liquid electrolyte and the development of battery cells with solid state electrolyte and received a 2 million EUR grant in support of this project (Hornackova 2021). The EU-level public support for InoBat's research and innovation activities provided a powerful incentive to continue with the upgrading efforts (see Bruszt and Langbein 2020), while signalling to its investors the legitimacy of the upgrading alliance around it (Baum and Silverman 2004).

In the first phase of InoBat's lifecycle, which was focused on discovery of a business opportunity and validation of the start-up's business model, Bocek positioned InoBat within the EU's strategic autonomy mission by emphasising indigenous know-how and innovation to create an entire battery supply chain in Europe using Western technology and capital (IPM Group 2019a; Grečko 2020; Haluza 2020). Towards that end, IPM Group formed a strategic alliance with the San Diego based, advanced battery technology company Wildcat Technologies in July 2019 by investing 20 million USD, together with Flint Hill Resources, subsidiary of Koch Industries (Wildcat Discovery Technologies 2019). In September 2019, the largest family owned Slovak Tier 1 supplier Matador Group joined the venture to help InoBat construct the first 100 MWh production line in Voderady. Wildcat Technologies cooperated with big brands such as BMW, Daimler, Toyota, Samsung Electronics, and BASF, while Matador Group offered design and engineering services, mass production of car components, and production of press tools for major European car manufacturers (Haluza 2020; Matador Group 2020). This way, InoBat planned to transfer the latest technological innovation to Slovakia to manufacture customisable batteries according to different industrial sectors' needs as they underwent electrification.

However, in order to speed up the scaling up phase, which includes the ability to mass produce batteries within limited timeframes and make the business model commercially viable at a time of fierce competition by established battery manufacturers, InoBat opted to partner up with the industry-tested Chinese battery technology firm Gotion Hi-Tech in January 2023. Gotion Hi-Tech is the designated battery cells supplier for Volkswagen after Volkswagen acquired a 26% shareholding stake in Gotion in 2021, the first such direct investment by a global carmaker in a Chinese EV battery supplier (InoBat 2023d; Batteries News 2023; Volkswagen Group 2021). As stated in InoBat's press release announcing the strategic partnership with Gotion, it would enable the start-up to explore the co-development of a joint-venture gigafactory with battery cell and pack production capacity of 40 GWh. In the meanwhile, InoBat's strategic partnership with the Taiwanese Gus Technology would help InoBat to fulfil demand for new orders before the Voderady production facility in Slovakia becomes fully operational (InoBat 2022a).

In September 2023, InoBat announced that Gotion was acquiring a 25% stake in the start-up, which would give access to Gotion's R&D and its raw materials, including lithium. The companies also announced that the Gotion-InoBat-Batteries (GIB) would prioritise the localisation of the battery value chain in Europe and its proximity, with the focal location still being ECE, but also with a planned production site in Morocco where Gotion was building a battery factory (InoBat 2023b; Carey 2023). On his LinkedIn profile, Bocek praised the investment deal which "heralds a new era in significant value creation through collaborative win-win alliances, helping to close the gap between Asian battery leaders and the rest of the world" (Bocek 2023).

After Smer's return to power in October 2023, the Slovak government announced that it would provide land, subsidies, and connection of the electric grid to the GIB joint venture for the construction of a new gigafactory for the production of large volumes of standard performance cells in Šurany, Slovakia (InoBat 2023c). In January 2024, the Slovak Investment Holding (SIH), the ultimate shareholder of which is

the Slovak Ministry of Finance, announced that it invested 12 million EUR into InoBat. This investment would help finalise the R&D centre and pilot production line in Voderady and support the construction of a gigafactory next to the R&D centre to manufacture high-performance cells for premium customers, such as Lillium (SIH 2024; InoBat 2023e).

## Discussion

The first key condition needed for the formation of upgrading alliances is local entrepreneurs that act as the key nodal points that leverage knowledge of the local economy and social networks to bridge the gap between a business idea to commercialise a new technology and providers of risk capital (Gerlach 1992). In the case of InoBat, Marian Bocek acted as the main entrepreneur who gradually formed linkages with transnational private and public financial actors on the basis of ethnic social ties and the parent company's, IPM Group, international networks. Driven by economic nationalist and developmental ideas to upgrade the position of Slovakia in global supply chains, Bocek enthused the relevant local stakeholders about InoBat by constructing a compelling vision that fit the corresponding socio-economic and geopolitical needs of the local and wider EU economy, while emphasising the profit-seeking opportunities for financial investors that come with long-term investment horizons in the form of EU- and state-level funding.

Compared to our negative case in our cross-case analysis (see Fig. 2), BritishVolt lacked clear and consistent leadership. Established in December 2019, one of its cofounders, the Swedish automotive entrepreneur Lars Carlstrom stood down as BritishVolt's chairman only a year later, after his tax fraud conviction in Sweden became revealed (BBC News 2020). The CEO of BritishVolt, the Swedish investment banker based in UAE Orral Nadjari stepped down in August 2022. Under the leadership of the two entrepreneurs, who lacked social ties with the local business and political elites, BritishVolt suffered major management problems, including employing 300 staff with a monthly salary bill of £3 million, leasing of 2.8 million mansion for executives and hiring remote yoga classes in Dubai for staff (King 2023; UK Parliament 2023b).

In the case of another positive case of EV battery manufacturing start-up, Nemanja Mikać was the key nodal point of the upgrading alliance surrounding ElevenEs in Subotica, Serbia. In April 2023, ElevenEs opened its first R&D and production facility for the manufacturing of lithium iron phosphate (LFP) batteries (Murray 2023). Driven by his ambition to drive Serbia's energy transition, Mikać, a chemical engineer educated at the University of Belgrade and Imperial College London, established the start up in October 2019 as an industrial spin off from the family-owned aluminium packaging company Al Pack Group (Balkan Green Energy News 2021). Having worked in the management of the company for 10 years, Mikać led the acquisition of a subsidiary in Germany and then successfully executed its restructuring, achieving a turnaround in its poor economic performance in 3 years. In this way, Mikać represents both the mobilising entrepreneur and the innovator behind ElevenEs' success.

	Heavy presence of foreign capital in manufacturing*	Consistent government support	Developmental entrepreneurship	Access to capital and mobilisation of resources by VCF/large domestic firm	Public-private institutional support for inter-firm collaboration
<b>Inobat</b> (Slovakia) Est. 2019	Yes	No	Yes	Yes	Yes
<b>BritishVolt</b> (United Kingdom) Est. 2019	Yes	No	No	No	No
<b>ElevenEs</b> (Serbia) Est. 2019	Yes	No	Yes	Yes	Yes
<b>NorthVolt</b> (Sweden) Est. 2016	No	Yes	Yes	Yes	Yes
<b>Verkor</b> (France) Est. 2020	No	Yes	Yes	Yes	Yes

**Fig. 2** Cross-case analysis of the conditions for the formation of start-ups' upgrading alliances. \*Proportion of foreign-controlled EU enterprises in the manufacturing sector is over 50%, Eurostat, fats\_activ database, data for 2021; for Serbia, Inward and outward flows and stock, annual data, UNCTAD database, higher than 50% inward FDI stock as a percentage of GDP

Second, the mobilisation of private sector resources under the corporate direction of a larger and more experienced company is another key condition for the emergence of successful upgrading alliances in the semi-periphery. As a hybrid diversified firm, the IPM Group as the parent company was able to leverage its high-level expertise from its other portfolio companies in energy storage and infrastructure, and the corresponding international networks, to provide technical, recruitment, and active management support to InoBat in its early stage of development. Furthermore, IPM Group's 10-year track record and reputation both regionally and internationally helped InoBat with reputational capital needed for forming links with key early suppliers (e.g. Wildcat Discovery Technologies), customers (e.g. Slovak bus manufacturer Sor), and investors (Batteries News 2021).

When comparing the cases of InoBat and BritishVolt, the lack of access to proprietary technology to develop and manufacture EV batteries was another key weakness in BritishVolt's fledgling upgrading alliance. Unlike InoBat, BritishVolt was not established by a larger company or a VCF, which could provide the start-up with technological and management expertise. Instead, it was backed by a few early investors, including the mining firm Glencore, construction plant rental company Ashtead Group, and the real estate investment fund Tritax Group. BritishVolt also had preliminary agreements signed with premium car brands Lotus Cars and Aston Martin, with the help of which BritishVolt was hoping to co-develop battery technology; however, there was slow progress and the battery samples were never delivered by BritishVolt (Mullen 2022). Although BritishVolt was eventually acquired



by the Australian start-up Recharge Industries, which was owned by a VCF Scale Facilitation, the new parent company was only founded in 2021 and was led by a novice entrepreneur David A. Collard with little experience in battery manufacturing (Barrett 2023; Johnson 2023).

Similar to InoBat, ElevenEs was also established as a subsidiary of a larger domestic company, Al Pack Group, with a 25-year-long tradition. The parent company has operations in three countries and specialises in high-precision processing of aluminium, including coating, deep drawing, and slitting, which was then replicated in the manufacture of electrodes in the production of lithium-ion battery cells (ElevenEs 2024). The high level technical expertise provided by Al Pack Group was crucial in the development of ElevenEs proprietary EDGE battery cell in a matter of just 2 years (ElevenEs 2022). Alongside technological and operational support, Al Pack Group initially also provided the premises for R&D testing, before ElevenEs grew to a 50+ team of international and moved to newly constructed office space and helped with the recruitment of technical personnel (Turn Off Turn On Ventures 2023). While Al Pack Group assisted with sourcing the suppliers of raw materials, compared to the other two cases, it is not clear from public online sources which other private investors have provided the funding for ElevenEs.

When it comes to mobilising private finance for start-ups in our cases, the initial financial backing by respective governments for InoBat in Slovakia and BritishVolt in the UK was an important factor in bringing on board early private financial investors. However, government support was unreliable in that as the ruling party, or even the prime minister from the same party, changed at the head of government, so did the support for the upgrading alliances. Despite initially strong backing by prime minister Boris Johnson's government and the promised 100 million GBP subsidy from the Automotive Transformation Fund, the subsequent changes in government meant that the disbursement of the promised public funds never happened (UK Government 2022; Sillars 2022). In the case of InoBat, the start-up only received financial assistance and other forms of investment support from the government when Smer was in power—in early 2020, and then again in late 2023. ElevenEs, on the other hand, has received no financial support from the government.

The third key condition for forming a successful upgrading alliance is the support of public-private institutions, whether national, international, or supranational, for inter-firm collaborative innovation projects. As Rosenkopf and Tushman (1998) have argued, eras of ferment are characterised by high uncertainty and thus firms are more eager to form inter-organisational networks. Individual investors face a collective action problem when faced with uncertainty that comes with new technologies and structural economic changes. A public-private institution that brings together firms in complementary industries, facilitates the coordination of resources in different parts of supply chains, and links start-ups with potential investors and customers can reduce the risk and induce interrelated investments and innovations (Garud 1994; Gerlach 1992). The transnational industrial alliance European Battery Alliance and EIT InnoEnergy, established in 2010 and supported by the European Institute of Innovation and Technology (EIT), are two such public-private institutional infrastructures in Europe.

ElevenEs received its first public investment and support from EIT InnoEnergy in October 2021 to build a 16 GWh battery gigafactory in Serbia. EIT InnoEnergy was also the first investor in battery gigafactory ventures, such as the Swedish NorthVolt and the French Vektor, both of which raised 2.75 billion and 100 million of private financing, respectively, after receiving the public investment (InnoEnergy 2021). For ElevenEs, this partnership was of strategic importance as it gave European recognition to the project and offered potential to develop links with large OEMs (Bonta 2022). Additionally, both InoBat and ElevenEs are members of the European Battery Alliance, along with key suppliers of raw materials and large automotive firms (EBA250 2024). Because of the UK's exit from the European Union in 2020, BritishVolt could not benefit from the support of these transnational innovation-supporting institutions.

When you have different start-ups in the same industrial segment vying for the same funding in Europe, for example, Northvolt and Verkor, which are positioned in more familiar business environments in Western Europe, it appears that an ECE startup like InoBat can find it difficult to receive scale-up public funding. For example, it is notable that despite rumours of potentially securing a financing loan from the EIB due to connections with the previous vice-president of the bank Vazil Hudak, the company did not receive any financial assistance from EIB. Northvolt in Sweden, on the other hand, received a 52 million EUR loan to support the establishment of its demonstration line in 2018, and a further 350 million USD loan in 2020 to support the financing of Northvolt's first battery gigafactory (EIB 2020).

## Conclusion

We argued that rather than state actors or foreign-owned transnational corporations, it was the local entrepreneurs in Slovakia who took the lead in finding ways to capitalise on the accelerating shift to electromobility and form an upgrading alliance around the domestic EV battery start-up InoBat. These findings speak to the wider literature on upgrading and middle income traps in semi-peripheral contexts (Doner and Schneider 2016; Albuquerque 2019) and challenge some of the assumptions in the structuralist and institutionalist strands of the political economy literature presented earlier in the paper.

The structural view is pessimistic about the readiness of large foreign-owned TNCs to play a leading role in local upgrading business-state alliances in host economies. As we have seen with the parent company, the IPM Group in our InoBat case, a Slovak-based global investment firm with foreign owners, we need to look more carefully at the form of TNC activity in host economies—whether it is a wholly-owned subsidiary, a joint venture, an acquired company or an alliance—and the type of technological cooperation it brings into the host economy, e.g. a licensing agreement, joint R&I, or strategic partnership (Young et al. 1994). Research on technological spillovers in semi-peripheral contexts has shown that host economies need to have the absorptive capacity in the form of domestic private sector capabilities in respective sectors to benefit from the local presence of TNCs (see Cohen and Levinthal 1990; Criscuolo and Narula 2008; Bell and Figueiredo 2012). The

structuralist literature has so far failed to identify and analyse domestic companies that do have the absorptive capacity to benefit or even lead upgrading initiatives.

When looking at the cases of EV battery start-ups in core economies, such as the Swedish NorthVolt and French Verkor, the upgrading alliances around these start-ups benefited reputationally from their locational position in a core economy and that way more easily attracted early financial investment and supply agreements from key automotive OEMs (Volkswagen, BMW Group and Volvo Cars in the case of NorthVolt and Renault Group in the case of Verkor) (Automotive News Europe 2022; Verkor 2023). In semi-peripheral contexts, it is the diversified business groups with cross-sectoral presence which in the context of being behind the technological frontier in high-end markets allows them to move from industry to industry as business opportunities arise (Amsden 2009, 66). The IPM Group in our Slovakia case is one such diversified business group, which has acquired assets in different growing industries and then used the profits to venture into sectors of new technological frontiers, such as energy storage solutions. Moreover, despite the investment group being in foreign ownership, the firm represents a “global hybrid model” (Fuller 2016), with reliance on foreign finance and ethnic managers at the top of the firm who ensure continued commitment to positioning core firm activities in the host economy.

The institutionalist view, on the other hand, emphasises the importance of high-quality bureaucratic institutions to support R&D and innovation activities in the private sector and their autonomy when deciding which firms and economic sectors should receive financial and other types of government assistance. Both NorthVolt and Verkor were able to count on their governments and state agencies to provide consistent and reliable support, which in turn attracted more risk-averse private investment (Swedish Energy Agency 2020; EIB 2020; Electrive 2023). In semi-peripheral contexts, firm actors can overcome the lack of consistent and reliable government support by building networks and upgrading alliances with other firms and public-private innovation institutions. In the case of InoBat, Bocek’s social networks and ethnic ties with key contacts at the World Bank and the European Commission were instrumental in increasing the social capital and legitimacy in the early stages of InoBat’s gigafactory project.

What are the lessons for the possibility of emergence of upgrading alliances in other semi-peripheral regions and economies? Our paper evidently focused on the cases of start-ups and upgrading alliances in a particular industry in European semi-peripheral regions that are nonetheless very closely intertwined with the core regions. Echoing the infant industry argument in development studies (see Naudé 2010; Wad and Chandran Govindaraju 2011), early financial and non-financial support by national or transnational public institutions is key for giving credibility to new business ventures in semi-peripheral economies that are still viewed suspiciously by traditional and venture capital investors in the West. Large domestically owned firms diversified groups, rather than Western VCFs, are more likely candidates to establish or support existing start-ups in new industries on the semi-periphery, as was the case with ElevenEs in Serbia. Furthermore, the participation of non-market innovation-supporting institutions, whether at the national or transnational level, ensures that there is a balance between the private interests and profit-seeking

strategies of participating firms and the social benefits that accrue to the wider economy in cases of successful commercialisation of new technologies (Laplane and Mazzucato 2020). Driven by a geopolitical race for technological superiority in different high-technology sectors, a key challenge remaining in this debate is how to limit the excesses of a public subsidy bonanza and corporate welfare and ensure a more equitable socialisation of rewards coming from publicly supported business activities (Laplane and Mazzucato 2020; Bulfone et al. 2023).

## Declarations

**Competing Interests** The author declares no competing interests.

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