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The regional dimension in GPN – Mapping value creation and governance of the Bavarian beer sector

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ABSTRACT

Contemporary crises have stimulated a new political and scientific interest in economic power structures and regionalisation. In particular, this concerns the local–global nexus, a key argument within the Global Production Networks (GPN) literature. This addresses the question of how global governance concepts help us understand regional production networks within multiscale production processes, mostly linked to transnational corporations. We contribute to this question with a focus on value creation and governance structures beyond, or 'in the shade' of, the often-prevailing dominance of transnational lead firms.

Here, we present an analysis of value creation and governance in the Bavarian beer sector, building on comprehensive statistical data and expert interviews. The interpretation is based on a visual value creation mapping. We draw on three analytical dimensions from the GPN debate: corporate, institutional and collective power. The analysis shows that the local level can be a hub for multi-layered dynamics in value creation and governance. We find strong local lead firms, which succeed in linking global dynamics and protecting local networks. In this process of segmentation some local firms build a strong regional network that is economically rather independent from larger firms.

Institutional governance plays an important role, and regional assets such as education facilities or cultivation contexts come into play. Our results indicate that the 'local' might be a stronger part of the local–global nexus than often assumed.

1. Introduction

Regional economies have regained popularity in the contemporary debates on sustainability and food sovereignty in the political and academic context (King et al., 2022; Linkov et al., 2020). The COVID-19 pandemic and the geopolitical shock of the war against Ukraine have shaken longstanding globalisation dynamics, that were long considered paradigmatic (Gereffi, 2023; Yeung, 2021). The global value chain (GVC) and global production network (GPN) concepts address globalised and often fragmented economies and their governance (Gereffi, 1994; Gereffi et al., 2005; Ponte et al., 2019). The global view within the GPN debate particularly considers the territorial dimension of production processes. The local–global nexus is a key argument regarding the specific conditions of successful regions in globalised economies. Nevertheless, existing concepts usually deal with specific transnational companies (TNC) as lead firms and their role for regions. However, a focus on strong regional sectors with little influence of global TNCs allows for a different perspective within the local–global nexus. Regional and global production networks are both characterised by similar underlying institutional structures but differ due to the spatial proximity which tend to reduce the anonymity of market relationships. Regional economies and their successful players can be interlinked with, but must not necessarily depend on TNC lead firms. This complex facet of the GPN debate can provide relevant insights in regional economies. In questioning the local predominance of transnational lead-firms, we raise two central questions. How can global governance concepts help us understand regional production networks within multiscale economies? And how can global governance concepts be applied to regional production processes? We examine the value creation and governance patterns across stages and scales – beyond, or 'in the shade' of, the often-prevailing dominance of transnational lead firms (Yeung, 2021).

We operationalise this with the case of Bavarian beer production which is an excellent example to study the local–global nexus. It involves a limited, yet critical number of ingredients and stages, allowing for an empirically comprehensive overview. The Bavarian beer industry combines a relevant set of global (Hána et al., 2020) and local interlinkages

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(Argent, 2018; Maier et al., 2020) and has a rich analytical tradition in economics (Gammelgaard and Dörrenbächer, 2013) and geography (Glückler and Eckhardt, 2021; Patterson, 2014). Small-and-medium-sized enterprises (SMEs) and large companies operate on two strong markets, the regional and the global ones. Both tend to be characterised by concentration trends steered by few mother companies at the global level. The complexity, economic strength and territorial embeddedness of the sector is exemplaric for other food and non-food networks, with a strong dualism of global and regional production.

2. Conceptual framework

2.1. Production processes between local and global scales

Conceptual postulates and empirical studies within GVC and GPN debates focus on linkages between transnational lead-firms and manifold regional actors across the globe (Yeung, 2015). They rest on the assumption of the fragmentation of production contexts. The concept of fragmentation emerged in geography as the globalisation debate intensified in the 1990's (Jones and Kierzkowski, 2005). It explains the division of production locations due on varying labour costs and competencies (Whitford and Potter, 2007). Fragmentation offers for regional economies either the opportunity of positive involvement in global dynamics or the risk of being 'hollowed out'. In that sense, fragmented production systems can shape or manifest spatially uneven development. Beside this horizontal dimension, the relationship between localities and the global level is a central element of GPN (and to a lesser extent GVC) debates. The global–local nexus describes the linkages between global and local markets. However, the focus is usually on the global level (Hervas-Oliver and Boix-Domenech, 2013). Following Giuliani (2017), we will therefore refer to these linkages as local–global linkages to emphasise our focus on the subnational level. This nexus is a key element within the following three concepts, even if they treat the local level as a strategic location or market niche rather than as a solid market of its own.

First, *strategic coupling* describes firm engagement on the local level as an intentional tactic to benefit from both global markets and specific 'regional assets', including institutional thickness or traditional knowledge and skills (Coe and Hess, 2011; MacKinnon, 2012; Yeung, 2016). While strategic coupling might bridge different spatial scales, it does not dissolve the local–global dichotomy. In contrast, strategic coupling processes may lead to regional frictions when they rather benefit TNCs and subordinate the local level (Coe and Hess, 2011). Moreover, reciprocal power relations for the benefit of both the global and regional economies, are a rather subtle matter of debate (Coe and Hess, 2011; MacKinnon 2012). Empirical studies of strategic coupling approaches usually focus on the single TNC unit (MacKinnon, 2012), and specific geographical contexts, including port cities (Jacobs and Lagendijk, 2014) or gateway cities (Breul and Revilla Diez, 2018; Yang, 2009).

Second, *embeddedness* considers the longstanding relationships that global businesses maintain with local networks in their original location (Hess, 2004, 2008). These networks not only concern specific places (territorial embeddedness) but also social systems (Brinkley, 2017). As a response to increasing fragmentation, younger and more dynamic approaches suggest *adaptive embeddedness*. This focusses on the ability to complement local linkages with non-local networks (Salder and Bryson, 2019). Both, local and transnational linkages, are considered crucial for a firm's global success and regional economic growth (Granovetter, 1985; Sonnino, 2007).

Third, *upgrading* is a bottom-up strategy for local actors to increase economic profits within the global economy (Gereffi and Lee, 2012; Gereffi, 2011) . This includes strategies of innovation, efficiency increases, exploitation of new industries or skill enhancement (Humphrey and Schmitz, 2000; Tessmann, 2020). However, the concept mostly focusses on single business adaptation strategies to increase value capture rather than with specific local contexts. Empirically, linkages between the Global South and lead firms from the North are at the centre of debate (Giuliani et al., 2005; Gereffi and Lee, 2012; Tessmann, 2020).

All three concepts acknowledge regional economic strength in globalised markets through endogenous resources. These include the ability to create and enhance value through networks, although they can also be hampered due to existing power structures. To a much greater extent than the GVC debate, the GPN concept considers the impact of non-economic stakeholders (such as state institutions or NGOs). A prominent strand of discussion is whether the involvement of TNCs within GPN benefits regions, or whether hollows out the local level (Hess and Coe, 2006; Coe et al., 2008; Coe and Hess, 2011; Yeung, 2016). In this respect, we address the concern that GPN reflections understand the regional level as rather reactive. We provide an empirical example to discuss the fine line between reciprocal power and regional benefits on the one hand and the hollowing-out of regions on the other.

2.2. Value capture and governance

Value creation is the process of enhancing the value of inputs through processing. It serves as an output indicator for the performance of an economy or a sector (Bowman and Ambrosini, 2000; Lepak et al., 2007). By contrast, value capture describes the share of the value that is retained at a specific production step. From a managerial perspective, value capture describes the share of value added that an organisation is able to appropriate through processing or trading their resources (Chesbrough et al., 2018; Dyer et al., 2018). The concept of value capture is a central element within the GPN debate and for the positioning of small local economies in a global context (Yeung, 2016). Yeung and Coe (2015) refer to value capture as an explanatory market imperative within GPN. It describes the ability to benefit from regional assets, ownership structures, and – finally – power Blažek and Holická, 2022; Weller and Rainnie, 2022; Yeung and Coe, 2015). The relationship between governance and value capture has been described as reciprocal. Higher degrees of value capture afford the ability to raise corporate bargaining power, while 'bargaining relationships determine the capture of value" (Bowman and Ambrosini, 2000, p.9; Henderson et al., 2002; Dallas et al., 2019; Ponte et al., 2019). However, some empirical studies have found that this relationship may differ on the local level due to specific regional assets or non-firm actors' governance (Crang et al., 2013). Most recently, the 'Norwegian Model', proposed by Lund and Steen (2020), was brought up in the context of oil industry reshoring. Given the strong state involvement within the oil sector, this model highlights a strong role of institutions in commercial terms but also in providing a beneficial set of regional assets including knowledge generation and dispersion, or employee rights (Bergene and Bonde Hansen, 2016)

Due to governance patterns, lead firms, their suppliers, and regions benefit from globalisation in an uneven manner (Gereffi et al., 2005; Pietrobelli and Saliola, 2008; Strange and Humphrey, 2019; Kano et al., 2020). The focus is on power relationships and how they affect the organisation of chains and flows of materials, finance, and knowledge (Kano et al., 2020), which includes coordination of relationships as well as the choice of market partners (Carbone, 2017). Here, GPN debates consider both, firm and non-firm actors that impact value creation in production networks. They acknowledge power asymmetries, the role of global lead firms, and dynamic linkages across various actor groups (Hess, 2008; Galanis and Kumar, 2021). Henderson et al. (2002) suggested emphasising power rather than distinguishing degrees of hierarchy. They propose the distinction between *corporate* (economic actors), *institutional* (state actors) and *collective* (social groups) power. In our study, we adapt these elements as the central dimensions of our analytical governance framework (see Fig. 1).

Corporate power sub-divides into intra- and inter-firm governance. We focus on inter-firm dimension and respective mechanisms like business expansion or the coordination that results from outsourcing.

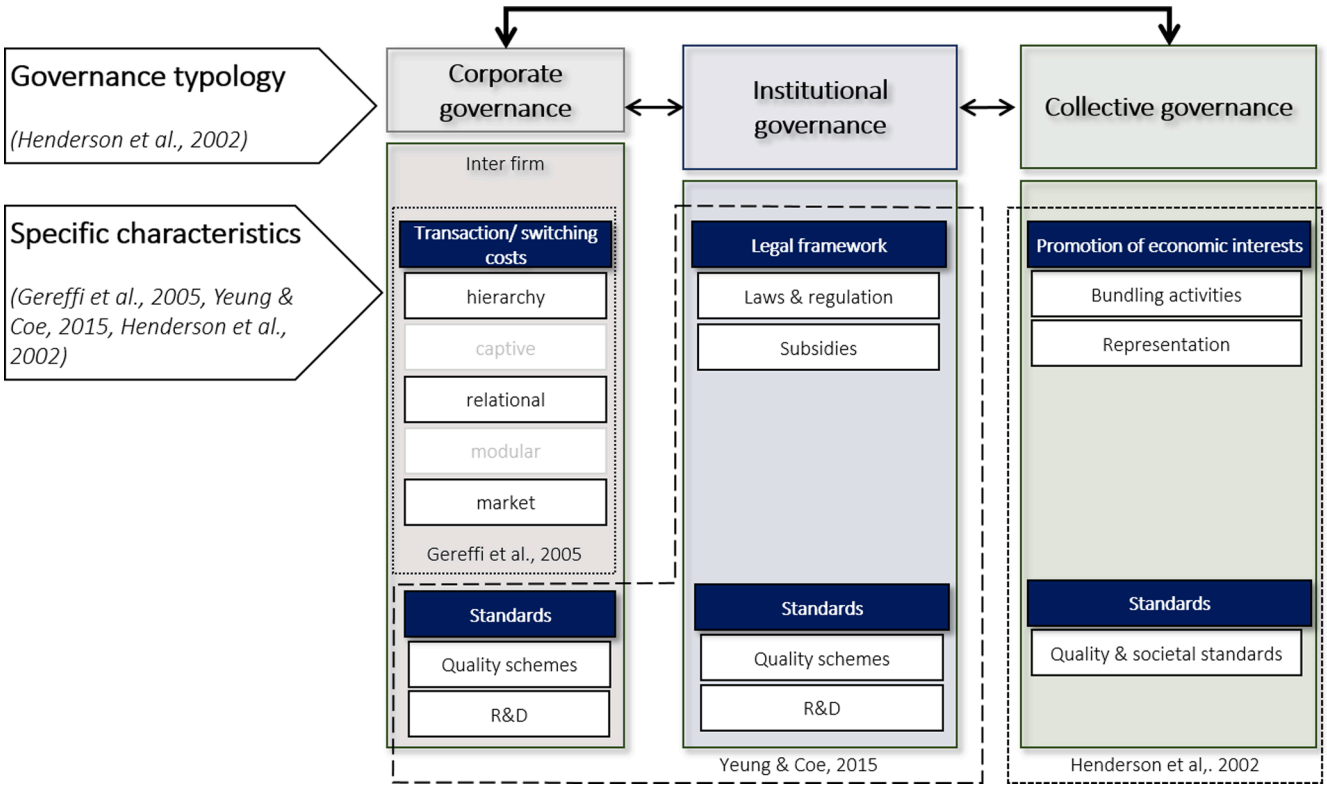

Fig. 1. Analytical framework.

For the operationalisation of corporate power, we go back to earlier concepts. Gereffi et al. (2005) developed a seminal typology of value chain governance ranging from market via relational through hierarchic governance, based on arguments of costs and the codifiability of transactions. In our study, we consider the three most distinctive ones:

a) *Market* linkages are characterised by low switching costs and easily codifiable transactions.
b) *Relational* linkages are coordinated through trust relationships, reputation and proximity.
c) *Hierarchical* linkages include high levels of control through internalisation and top down management.

Institutional power includes state institutions at different scales, international agencies, financial and trade institutions that aim to influence firm development (Henderson et al. 2002). The usual mechanisms include regulations and quality standards to control markets inwards and outwards, as well as financial tools like subsidies (Horner, 2017; Levy, 2008).

Collective power include trade unions and organisations that represent employers', economic, environmental or social interests. They may perform as a counterbalance to existent (corporate and institutional) power structures through representation, bundling or own standards.

2.3. Governance in food production

Recently, global governance debates have increasingly focused on food production. Many studies analyse products from the Global South, like coffee or cocoa (Kano et al., 2020; Tessmann, 2020). Empirically, the interest is in farmers' positions within supply chains (Busch and Spiller, 2016; Carbone, 2017), bargaining mechanisms (Jarzębowski et al., 2020), or how innovation and upgrading affect governance (Wittman et al., 2012). These studies fit rather well the GPN assumption of prevailing lead firms, which usually assume that market power is accumulated by processing and retail companies (of the Global North; Sexton, 2013; Sorrentino et al., 2018).

By contrast, these debates have dealt with prevailing local food concepts only in a limited way. In parallel to GPN discussions but without prominent linkages, the concept of short food supply chains (SFSC) has developed. It concentrates on economic patterns on the local level and is based on normative postulates searching for alternatives to globalised food production (Marsden, 2000; Ilbery and Maye, 2005; Renting et al., 2009). However, the empirical focus of SFSC research is on the single business level. Few studies have looked at power in local food contexts but more concentrate on producer / consumer relations (Trebbin and Franz, 2010, but see Carbone, 2017 for an exeption). Against this background, our study operationalises the link between governance and value creation from the GPN perspective, as described above.

3. Methodology

3.1. Data

Our approach combines two types of data: we use secondary data from official statistics and reports at the national and federal level. We complement these with primary information from expert interviews.

We include several data types, including employment, area and production statistics, as well as business statistics (Table 1). Concerning data availability, there are three main challenges. First, monetary values within official sector-specific statistics (2, 4, 6–10) are usually only available at higher (national or federal) spatial scales. Second, regional databases often do not provide a differentiation of the economic activities (6–10). For example, value-added is available for the beverage sector, but not for sub-groups (beer). Finally, data privacy regulations constrain small-scale, industry-specific data availability (1, 4–6–7). Consequently, industry reports helped complement official statistics (i.e. German Bewers' Association, 2020; BarthHaas GmbH, 2021; Bavarian State Ministry for Nutrition, 2022). Additionally, a regionalisation approach supports the small-scaled analysis of value added (see Bertram

Table 1
Statistical data for value creation mapping. The results apply to average values (reference year: 2018).

	Sources	Time coverage	Spatial level
Area	1. **Agricultural Landuse:** Integrated Administration and Control System (Invekos, Bavarian State Institute for Agriculture, 2020)	2016, 2018, 2020	NUTS-3
Input Costs	2. **Contributions and costing data:** (Bavarian Research Centre for Agriculture, 2021)	2016 – 2020, 5-year-average	NUTS-1
Agricultural returns	3. **Harvest statistics:** Harvest quantity: Federal states, years, types of vegetables in the open field (DESTATIS, 2019a)	2018	NUTS-1
	4. **Economic Accounts for Agriculture:** Value added of agriculture (Federal Ministry of Food and Agriculture, 2019)	2018	NUTS-1
Employment / business	5. **Employment statistics:** Employees subject to social insurance at the place of work according to the Classification of Economic Activities (Federal Employment Agency, 2019)	2018	NUTS-3
	6. **Quarterly production survey:** production value, quantity, weight and enterprises of the Quarterly production survey: Germany, years, goods register (42131–0003, DESTATIS, 2019b)	2016, 2018, 2020	NUTS-0
Processing	7. **Cost structure survey in manufacturing:** persons employed, turnover, production value and value added of enterprises in manufacturing: Germany, years, economic activities (42251–0003, DESTATIS, 2019c)	2016 – 2018	NUTS-0
	8. **Manufacturing production:** in Bavaria (Bavarian Office for Statistics, 2023)	2016, 2018	NUTS-1
	9. **Turnover tax statistics:** Districts, taxable turnover, turnover tax, recoverable input tax, turnover tax advance payments, economic sectors, 2009–2019 (Bavarian Office for Statistics, 2020a)	2018 – 2019	NUTS-1
Trade	10. **Trade statistics:** Annual survey Bavaria (Bavarian Office for Statistics, 2020b)	2016, 2018, 2019	NUTS-1

et al., 2021).

Additionally, 19 interviews in the context of beer production helped to complement, differentiate and validate the statistical analysis. The semi-structured interviews, in person or by phone, took between 30 and 60 min (1 interview in written form). For each stage, the experts were chosen by their affiliations (associations, chambers, single businesses, see Table 2) and their sector expertise.

All interview partners provided information and estimates for the entire stage instead of single business context. The following thematic fields were discussed: a) Inputs and sales, b) upstream and downstream hierarchical linkages, c) spatial relations, d) value creation variables, e) market trend, f) employment, g) logistics, and h) political context.

Table 2
List of experts interviewed (with in-text ID). *Stakeholders who participated in another validation interview. Interviews conducted in person unless indicated differently.

Stage	Institution	ID
CultivationHops	Cooperative*	C11
	Sales Intermediary Company	C12
	Bavarian State Research Institute for Agriculture (phone)	C13
CultivationBarley	Association for Malting Barley	C21
	Bavarian State Department for Food, Agriculture and Forestry	C22
	Bavarian State Research Institute for Agriculture	C23
Malting	Malting plant, Upper Franconia	P11
	Bavarian Maltsters' Association (phone)	P12
	German Maltsters' Association (phone)	P13
Brewery	Association of Private Breweries in Bavaria	P21
	Bavarian Brewers Association *	P22
	Medium-sized Brewery, Middle Franconia	P23
	Small-sized Brewery, Middle Franconia	P24
Trade	Regional Consultancy	T11
	Bavarian Trade Association, Middle Franconia	T12
	German Retail Company, Regional Products Department	T13
	German Beverage Retail Association	T14
Gastronomy	DEHOGA, Bavarian Hotel and Restaurant Association (written)	T21
Institutions	Weihenstephan-Triesdorf University of Applied Sciences	I1
	Bavarian Institute for Plant Production and Plant Breeding	I2

Moreover, all personal and written interviews contained a graphical element (see Fig. 2) that was not included in phone interviews. Fig. 2 shows the graphic tool was employed during the interviews to operationalise Inputs and sales.

3.2. Mapping and interpretation

The data interpretation is based on a value creation mapping approach (Bertram et al., 2021). We develop schematic visualisations of production processes, considering spatial patterns of input and output markets as well as value creation (Gereffi, 1994; Coe and Yeung, 2001; Henderson et al., 2002; Strasser et al., 2013). Our approach combines both and visualises quantified value added by stage and localisation of flows across as shown in Fig. 2.

The basis of the mapping is a multi-scale perspective, which is represented by grey background layers. They range from the regional level to the global level from the inside out. In the following, we refer to

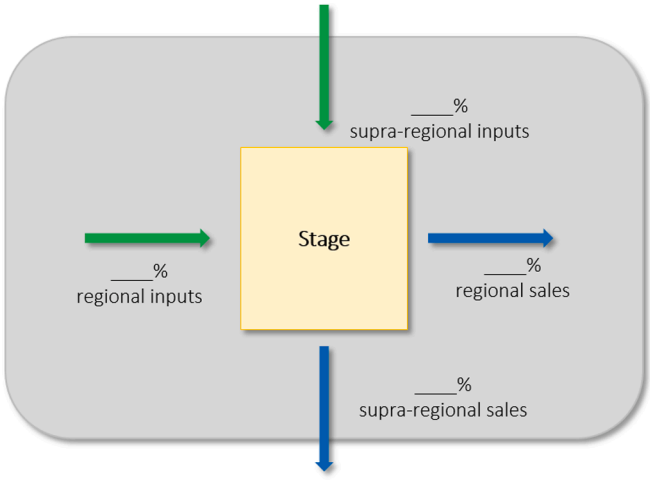

Fig. 2. Schematic logic of the interviews (own visualisation).

regional as the subnational federal state level. First, we identify relevant stages of direct value creation along cultivation, production, and trade. The total value added reflects the economic productivity of each stage and is represented by the height of the yellow boxes. Based on the actual quantities produced or processed we consider production costs, taxes and revenue from regional survey data to derive average production costs. By contrast, value capture is ascertained by the relative share of value added in total turnover, indicating the relative benefits and offering a starting point for vertical comparison (see Dyer et al., 2018). Secondly, we concretise intermediate transactions, like services (i.e. consultation, plant care), production material (i.e. fertiliser, machinery) and actual commodity flows (raw and processed products). These are differentiated across spatial scales (regional to global). Based on sector reports, statistics and interview findings, we quantify the shares of regional and extra-regional product flows (upstream and downstream). The responses of the graphical element (Fig. 2) and the underlying arguments build the basis of Fig. 3.

In terms of governance, we conducted in-depth analyses of interstage linkages based on interview findings as well as institutional and collective involvement. A focus is on market mechanisms that allow deductions on different forms of governance. We base our analysis on the types and mechanisms of power as visualised in Fig. 1. On this basis, we develop a schematic visualisation of governance that follows the multiscalar logic of the value creation mapping in Fig. 3. By contrast, it visualises linkages beyond commodity flows and positions different types of stakeholder groups in terms of location and power. Exemplaric sections from the interviews are included in the text.

4. Results

4.1. Sector overview: Bavarian beer industry

Bavaria has a long history within the beer industry, as a relevant economic branch in terms of output, value added and employment. This makes it a very strong regional part of the global market, which is increasingly characterised by concentration tendencies. On the global scale, the four biggest brewing corporations account for 49. 4% of the market globally, whilst the German market is controlled by about ten companies.

The Bavarian sector generates an average turnover of € 11.8 billion across all stages of value creation, with a value added of € 5.4 billion. With an average output of approximately 25.5 million hectolitres per year, the Bavarian beer industry is the largest within Germany (26%), only closely followed by the state of North Rhine-Westphalia (Destatis, 2018). The Bavarian stages (subsequently referred to as the regional level) are prominent for a small-scaled market of high density, subordinate relevance of international competitors and particular regulatory settings (Glückler and Eckhardt, 2021). This economic strength rests at least partly on a traditional consumer awareness the production stages and identification with the product.

Fig. 3 maps the value creation and regional flows for the production process of beer. The grey background layers represent spatial dimensions from regional to global, while the height of the yellow boxes show the value added at each stage. The arrows visualise input (green) and output flows (blue) by their relative amount (size) and spatial dimension.

The mapping illustrates the Bavarian beer sector as a strong regional part of globally integrated economy. As such, it can be characterised as a non-fragmented regional network that benefits from a variety of endogenous factors. However, the patterns differ largely across the value creation stages.

First, there is a vast agricultural availability of hops (17.000 ha) and barley (90.000 ha), which positions the Bavarian producers among the biggest supply markets of these raw materials on the international scale (Bavarian Research Centre for Agriculture, 2021). The Bavarian hops cultivation follows an international strategy with an export share of 90%, consequently, accounting for 95% of the German and a third of the global demand (C13). Hop cultivation generates a turnover of €206 million and a value added of about €107 million, which is a value capture rate of about 57%. The sector benefits from a high yield per hectare and high product reputation through geographical indication measures. By contrast, spring barley is dominant in terms of area but rather weak in economic terms. The production costs of spring barley exceed the approximate turnover of €63 million by €20 million. However, regional inputs (75%) and sales (70%) suggest a strong regional network (C21, C23), whereas the export volume does not indicate a high international

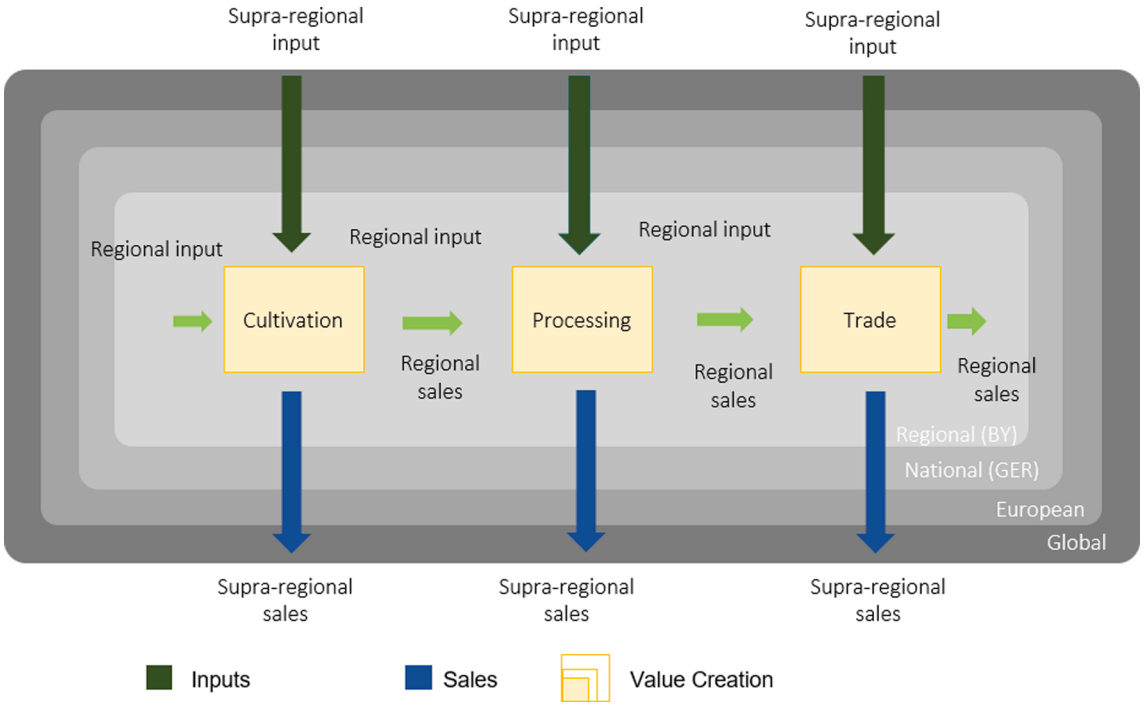

Fig. 3. Schematic overview of value creation mapping.

relevance of Bavarian barley (C21). Second, the knowledge base of the malting and brewing processing stages is traditionally anchored and supported by public R&D. This led to a multiplicity of family-led companies that offer a high number of jobs. While the overall turnover at the malting stage is an estimated €218 Million, the sector only retains 19% of it and capture a value added of €34 million. The breweries generate a sector turnover of €2.9 billion, while the value added of almost €1 billion indicates a capture rate of 39%. At the same time, both malting and brewing are embedded in regional trade networks. Barley is predominantly sourced regionally (65%, P11, P12, P13), while processed malt is mainly sold within the region (85%) and only a slight share is exported to the United States or France (P11, P12). Similarly, 95% of the inputs for beer are of regional provenience and about 70% of processed beer are also sold within the region. Despite an ongoing decline in beer consumption since the 1980's (−37%, 1980–2021), Bavaria has the highest sales per capita in Germany. This demand is covered mainly by Bavarian beer with a share of 75%, while 25% comprise German or international products (T11). In total, wholesale and retail amount to approximately €2.8 billion for beer, but a low value added of not more than € 330 million (14%). The gastronomic sector is another central sales channel for Bavarian beer, having the highest turnover values amongst all stages (T21). Roughly speaking, about 70% of beer sales are of Bavarian origin, while 30% are from other regions. The calculation of value added is hampered due to the variety of gastronomic units, as well as the relevance of staff and real estate costs.

4.2. Corporate governance

Figure 5 shows the governance mapping of the Bavarian beer sector. Again, the sizes of the yellow boxes show the absolute value added. In addition, the crosshatched areas symbolise the relative monetary value captured as a share of the value added in the proportional size (not available for gastronomy). The green colour symbolise positive value capture and red colour represents negative value capture. The arrows indicate the degree of governance symmetry and the 'direction' of power. For breweries, there is an important distinction between bigger and small firms due to different market logics. Additionally, wherever relevant, dashed lines show state intervention. The following section discuss the patterns for each stage .

4.2.1. Hops cultivation

The cultivation of hops is an agricultural market shaped by concentration trends. Stable area and yield figures face businesses that have decreased by a quarter in ten years (1,121 businesses as of 2018). Nevertheless, the hops market has been profitable, with a high degree of value capture due to a variety of regional competitive advantages. Within the main cultivation area of the Bavarian Hallertau region, the businesses largely developed in spatial and organisational proximity to upstream markets. For instance, nurseries have a particular role in providing seedlings meeting the newest standards and demands of local hop farmers. This link provides a particular regional asset and competitive advantage (C12). By contrast, proximity or specific relations do not play a role in machinery purchases (C11, C12). Meanwhile, sales comprise two main channels. 90–95% of hops sell on the relational contract market, which secures stable and long-term relationships of ten years (C12), mainly with intermediary traders. By contrast, the spot market accounts for approximately 5% with volatile but often more profitable prices on a day-to-day-basis. Intermediaries developed due to fragmentation processes in hop cultivation in the 18th century but have taken a critical bargaining position due to their gateway position between farmers and regional or global markets (C12, 13).

> *"[In the case of contract hops], the hop grower has made a preliminary contract with the cooperative for a certain area. In return, he must deliver a safe contractual quantity after harvest and receives the promised price. If more than the contractually "promised", harmless contractual quantity is produced, for example in good harvest years, then the grower can market these surplus hops as "free hops". Sometimes at much higher prices - but also with a certain risk!"*.
> (C13, own translation).

> *"Proximity to farmers is important for intermediaries, including the purchasing centre of the Hop Processing Cooperative (HGV) in the Hallertau region. The buyers are connected via worldwide distribution networks."*.
> (C12, own translation).

We interpret this as an exemplaric form of adaptive embeddedness at this stage, where market actors benefit from strong regional networks, territoral assets and cultural embeddedness (including traditional knowledge) as well as from international linkages (i.e. export, Withford & Potter, 2007). Another regional asset consists of strong linkages with

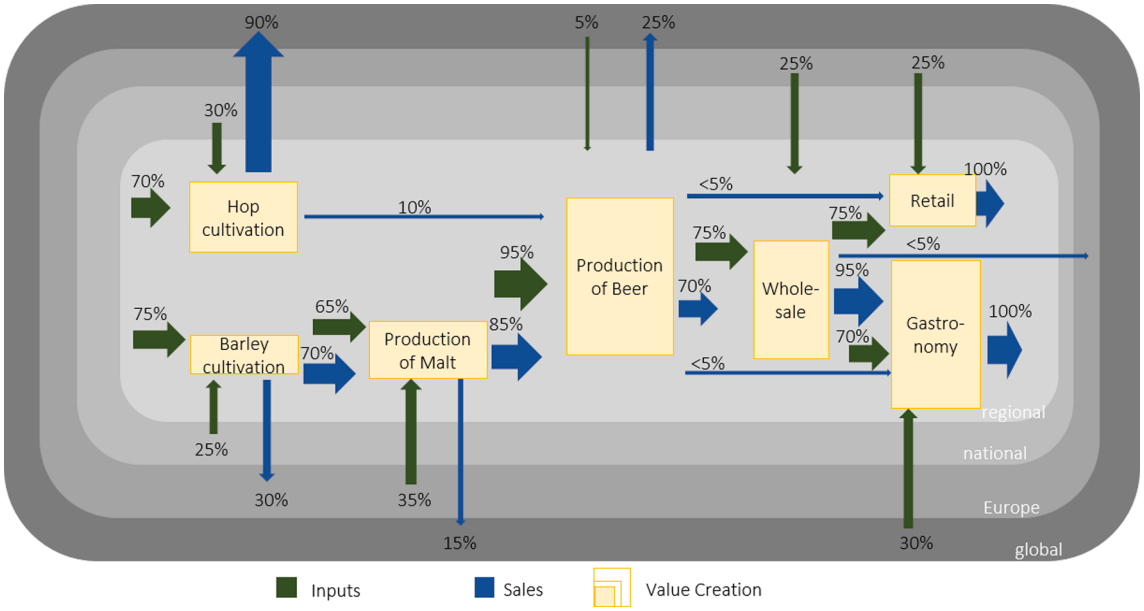

Fig. 4. Value creation mapping.

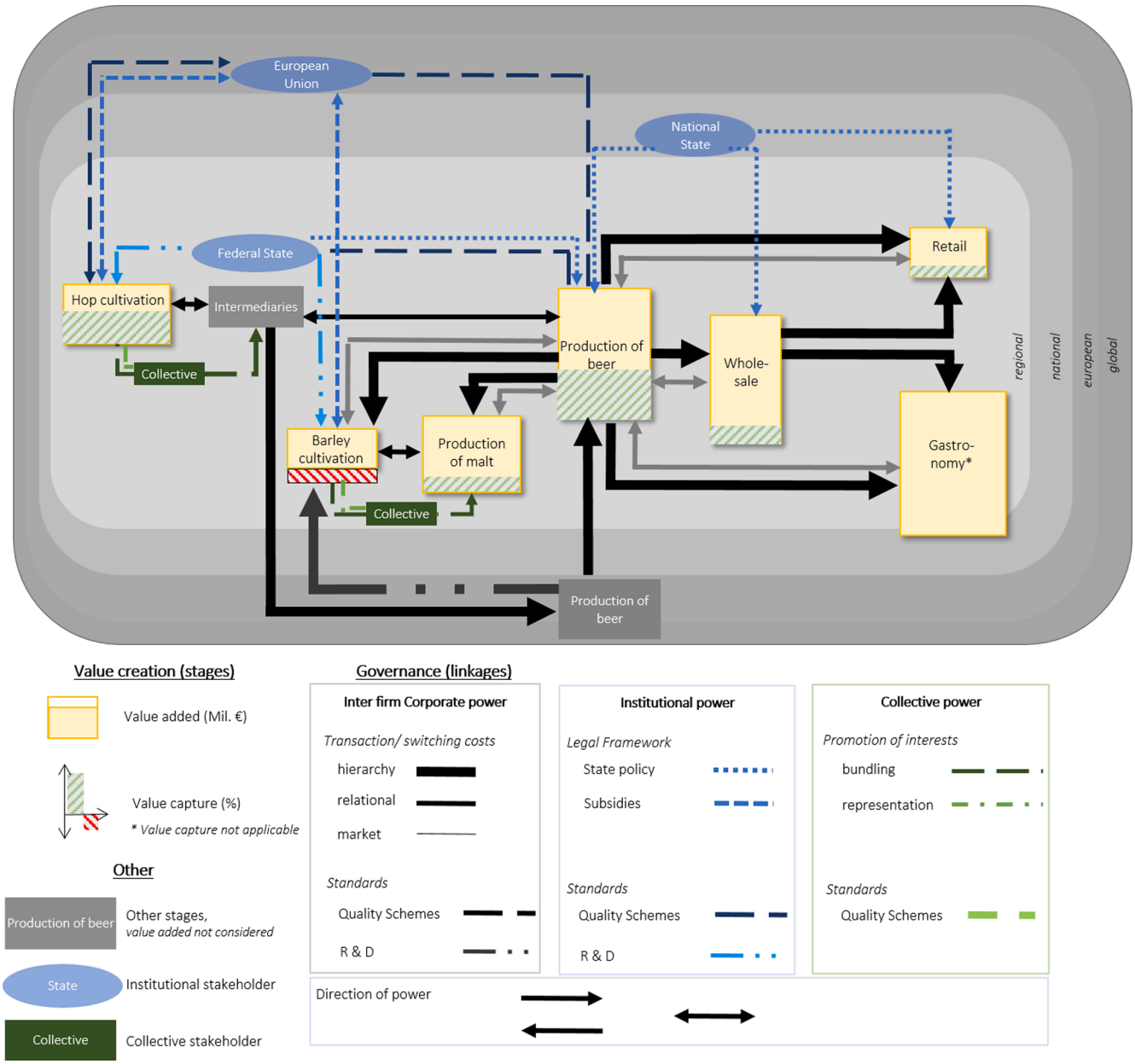

Fig. 5. Governance mapping of the Bavarian beer market.

stakeholders that conduct R&D activities, i.e. in terms of new flavour species (intermediary traders, breweries, state institutions, C11):

> *"Current research includes […] the adaptation to climate change and global* competition *to stabilise value creation."*
> (C11, own translation)

Within the agricultural stage, patenting is a mechanism to retain control over market development. It is largely conducted by corporate processing firms, while regional farmers also benefit from the regional research infrastructure. Against this background, we map the hop cultivation stage as attractive in terms of value capture and characterised by producer power, as well as significantly affected by state measures.

4.2.2. *Barley cultivation*

Compared to hops, the cultivation of spring barley shows rather dispersed cultivation patterns and a more small-structured landscape (15.000 businesses). However, a low average economic profitability with an overall negative value added outlines the dependence on agricultural subsidies. Still, barley is stable and beneficial in crop rotation, and therefore popular in sideline businesses (C21).

There is a regional 'pre-breeding" industry for seeds in Bavaria (C21, C23). Nevertheless, some farmers initiated the internalisation of the propagation process due to cost arguments, to increase value capture and improve their position within the network, even though this is at the cost of regional ties:

> *"Although there is a stand-alone sector in which seedlings are bred. But* increasingly, *farmers are also doing it themselves."*.
> (C23, own translation)

In terms of sales, the high price variegation of the global spot market alters the attractiveness of regional markets due to stable, yet slightly less profitable contracts (C22, C23). The following quote illustrates the fluctuation of prices in global crop markets and the effects of long-term contracts:

"The price development is strongly market-dependent. Malting barley is a 'world product': you look at producers from all over the world, and malting barley is traded worldwide. Long-term price stability is achieved through preliminary contracts, which results in security on the one hand, but on the other hand, higher prices are not possible."
(C23, own translation)

Despite prevailing regional flows and contracts, there is no evidence of strong links between farmers and the malting industry. Rather, strong cooperatives and intermediary traders link both sectors.

Despite the demand for 50% regional inputs in the Bavarian purity law, low political support in cultivation is opposed to high external price dependency (C21). Like in hop cultivation, R&D in barley varieties is highly competitive and dominated by big breweries (C23). Patenting is therefore an including or excluding mechanism due to its affordability, which particularly pressures smallholders (C23):

"There is a demand for certain types of malt, especially from large and craft breweries. Indeed, this is an opportunity for maltsters to earn more. However, through direct contracts with agriculture, these breweries grant patents to farmers, who in turn supply directly to these breweries. The very big breweries have their own laboratories for breeding certified barley varieties. The global company Carlsberg is a recent example with a renowned laboratory."
(C23, own translation)

A recent example is the legal case brought by the Carlsberg brewery to establish new standards for patent policies. In this case, we see the counter example of adaptive embeddedness, where the stage is embedded regionally but not able to benefit from international linkages. By contrast, the promotion of regional research is a necessary approach to actively segment from the global market and to guard against exogenous TNC power (Salder and Bryson, 2019; Taylor and Thrift, 1982). Hence, state actors also foster regional innovation processes to counter balance this form of corporate power. The mapping shows barley production as an object of hierarchical governance from breweries, within and (more so) from beyond the region. Meanwhile, barley is involved in relational downstream linkages through long-term contracts.

4.2.3. Malting plants

Malting is a highly concentrated sector with approximately 20 businesses in Bavaria. Most of them are small-to-medium-sized enterprises (SMEs), although some are participating in or leading on the international market.

The main sourcing channel (90%) of malting plants is the contract market with stable prices for 2–3 years, whereas the daily spot market with higher costs accounts only for a small share (10%, P13). Malting machines are available within the region and obtained through direct contracts (P11, P13).

"Bavarian maltsters mainly draw on Bavarian barley. The contract system is structured as follows: About 90% of the volume is already arranged in advance through contracts, then mostly for 2 to 3 years. However, the regional malting barley production is not sufficient to cover the demand."
(P13, own translation)

"A main supply firm for machinery in malting is a regional firm in Northern Bavaria: Künzel. But, I guess, they obtain their machine parts from China or else."
(P11, own translation)

However, malting plants secure a hierarchical network position over service providers through externalisation for cost reduction (such as transport, storage, P11, P13). This is particularly interesting against the background of the malting stage itself being formerly externalised in the mid 20th century, and has developed as its own economic sector with several market leaders since then (IREKS, Bamberger Mälzereien, P13). However, some breweries bypass the malting plants through direct contracts with barley producers, to secure their demand.

"However, the regional malting barley production is not sufficient to cover the demand. Thus, breweries need to reach out to agricultural businesses directly to secure their supply with regional barley, and thus malt, and be able to label their beer 'regional'."
(P13, own translation)

Therefore, the mapping visualises the malting stage as rather passive and dominated by the brewing sector.

4.2.4. Breweries

With approximately 650 businesses and around 12,000 employees, the brewing industry is a specialised economic sector of high regional relevance. The spectrum ranges from local microbreweries to internationally operating companies (in terms of export share), with only a few being owned by one of the global lead firms (Dun & Bradstreet GmbH, 2022). The smaller breweries operate with lower volumes on a local scale, whereas bigger breweries tend to produce higher quantities and pursue export strategies (P21, P22):

"Smaller breweries have regained their popularity, although export orientation plays only a minor role for them. By contrast, large breweries are much more focused on export *orientation."*
(P21, own translation)

"50 % of the breweries in Bavaria produce up to 1,000 L. There is a distinction between traditional breweries with predominantly regional sales and the production of specialities that require a large market and thus generate supra-regional sales. In this context, exports of beer from Northern Bavaria, which is characterised by small breweries, are lower than from the large breweries in the South."
(P21, own translation)

Small breweries are often involved in relational links with artisanal malting plants and retain long-term, relational contracts for local hops supply (P22, P24).

"We cooperate via regional supply *circuits, e.g. contracts with local farmers."*
(P22, own translation)

Likewise, downstream transactions mainly serve regional markets (P22). On the other hand, bigger breweries tend to purchase their malt from the bigger, export-oriented malting plants and via hops trade intermediaries. Still, relational arguments dominate a trend towards rather price-driven market logics (P23, P24):

"Importantly, one *knows one's suppliers and producers"*
(P23, own translation)

"Proximity to primary producers is important; we prefer regional products when the *prices are the same."*
(P24, own translation)

Downstream operations (including national and export sales) are a central strategy of those larger breweries. They also pursue different strategies to foster their hierarchical position, including fragmentation (i.e. malting) and integration (i.e. logistics), low-price-policies and brand acquisitions (P21, P13):

""There is strong price pressure *due to promotional offers for Pils varieties. (e.g. Warsteiner, Bitburger)."*
(P22, own translation)

"The outsourcing of maltings is a phenomenon *of the century's turn; mainly 50 years ago."*
(P13, own translation)

Organisationally, some of them belong to TNCs, for example Paulaner and Tucher (Heinecken), or Spaten and Löwenbräu (Anheuser Busch Inbev.). However, TNC firm possession does neither affect regional production networks (e.g. hops and barley) nor the overall productivity as the strategic coupling debate suggests (MacKinnon, 2012).

At first sight, this setting could be interpreted as a perfect example of strategic coupling, where TNCs seek entry into a profitable market with good raw material supply and dense networks (Coe and Hess, 2011; MacKinnon, 2012). Rather, it is an 'incomplete' link to a strategic market. It lacks the penetrating component of the regional production network by the TNC players and has few links with upstream and downstream actors, as suggested by Coe and Hess (2011) or MacKinnon (2012). A TNC market entry would suggest an integration of the regional and the global market with its manifold economies of scale. There is, indeed, a certain trend of concentration and brand acquisition, where larger breweries buy smaller brands and only use the label. Value creation remains mainly regional due to a critical relational network and export shares only rise on a modest level. The number of independent breweries as an indicator for the regional economy has been relatively constant during recent years, also due to new business creation (Maack et al., 2011; Bavarian Brewers Association, 2022). Also, several larger breweries remain economically independent from TNCs and defend their own lead position in the national market (for example Öttinger, Erdinger). Moreover, the consumer demand for local beer varieties strengthens this niche market (including spelt or cloudy beer, P22, P24). This segmentation is a key argument to understand the stable regional competitiveness (see MacKinnon, 2012). Meanwhile, TNC breweries mainly focus on 'mainstream' or craft varieties (Pilsner etc.), but at the same attempt enter the niche markets, but with hardly any success so far.

Despite many contrasts between small and big breweries, both benefit from a vast regional availability of machinery and packaging in spatial proximity as well as long-term contracts, a clearly relational governance setting (P23, P24). In a similar context, specialised staff is another common advantage resulting from spatial and social proximity to state institutions such as the main educational centre for brewing with international reputation (Weihenstephan University of Applied Sciences). Despite increasing competition for their graduates, both large and small breweries benefit. This is also due to rising demand for mechanical engineers in bigger breweries due to the ongoing automatisation process (P23, P24):

"The automation of the manufacturing process is becoming increasingly important, especially to *reduce sources of human error throught the production."*
(P23, own translation)

"It is becoming increasingly difficult for small and medium-sized breweries to recruit skilled staff. The competition with other (better-paying) industries for staff is just too high for that. One example is the automotive industry around Ingolstadt."
(P24, own translation)

4.2.5. Trade

Wholesale is characterised by relationships with all types and sizes of breweries. Across Bavaria, a total of 2.416 businesses operate in food and beverage wholesale (Bavarian Office for Statistics, 2020). By handling about 70% of Bavarian beer, wholesale is a relevant intermediary stage (P21, T11):

"Wholesale for beverages is the most important sales channel. Food retailers are supplied via wholesalers. But there are no really direct sales channels between smaller and medium-sized breweries and the LEH."
(P21, own translation)

However, some big German breweries retain control over beverage wholesalers through shareholding and internalisation (I1). Consequently, wholesale is partly an object of the hierarchical governance of breweries (T13):

"Some breweries in Bavaria have shares in the beverage wholesale trade. Or even own them themselves. In addition, many breweries sell beverages at their own outlets. That is, for instance, Weihenstephan brewery."
(I1, own translation)

In retail, beer sells in most of the 6.761 food-retail and beverage retail businesses in Bavaria (Research, 2021; Bavarian Office for Statistics, 2020). Retail mainly sources Bavarian beer from wholesale. Less than 5% is sourced in relational long-term direct contracts with local businesses. The product varieties generally differ across different types of retail. Beverage retail usually offers several local varieties and is more often involved in direct contracts. Supermarkets provide smaller shares of regional beers, while discounters mainly offer less expensive extra-regional beers obtained through wholesale. This can be considered another example of market segmentation, namely between of sales channels of smaller breweries and TNC breweries. Again, larger breweries attempt to undermine this with the help of special offers that put smaller breweries under pressure (Pilsener variety). The mapping condenses these sales logics as follows: Larger breweries partly exercise hierarchical power over their trade channels, while smaller breweries operate more often in relational linkages

4.2.6. Gastronomy

Like beverage retail, small individual businesses often buy local types (T21, I1).

"20% of breweries have *their own vehicle fleet. Especially the small and medium-sized companies have their own fleet and drive to the gastro independently."*
(I1, own translation).

By contrast, several system gastronomic services belong to the same mother companies as the bigger breweries (T11).

"Many of the system restaurants, like McDonalds or Vapaino, are owned by beverage companies. These are Krombacher or Radeberger, for example."
(T11, own translation)

Breweries are in a rather dominant, hierarchical position towards gastronomy. While direct contracts only amount to approximately 5% of beer sales, they usually include competition-precluding serving licences, which bind restaurants to specific breweries (T14, I1).

"There are long-term contracts with German breweries in Gastro. But due to the complex distribution systems, it is extremely difficult to get into the market. The basis is the contracts, some of which are fixed for 10 years and include delivery obligations and credits. This makes it extremely difficult for newcomers to the market, both locally and internationally, to sell elsewhere than to independent landlords."
(I1, own translation)

4.3. Institutional power

Several state actors and attached institutions influence the beer market in Bavaria. Legal frameworks by state institutions include the prominent German Purity Law at the national level which has legally

prohibited ingredients beside hops, barley and water for a long time (German Bewers' Association, 2020). Beer that did not meet this standard was not allowed for sale on the German market until 1987, when the EU Commission forced the abolition of the ban due to the freedom of competition (Kuhl, 1990). This example illustrates how the European Single Market (ESM) influences a regional economy. However, this is a rather rare example of the impact of the ESM. As the most relevant trade countries of beer are located within the EU (Denmark, Czech Republic, Netherlands, Belgium), the ESM protection towards external players plays a small role (DESTATIS, 2022).

Moreover, the German deposit system can be interpreted as another framework regulation that affects the regional production system. A common criticism is that the lack of harmonisation of the European bottle deposit systems is a market barrier due to a legal patch-up within Europe. Still, in 2006, the European Commission rated the ecological advantages higher than the economic challenges of a fragmented deposit systems. Consequently, this policy has certain market protecting effects by altering market entry costs for foreign firms, particularly small breweries (I1, T11). Consequently, this can be seen as a counterexample to the ESM, where other considerations undermine its internal effects.

The geographical indication (GI) system by the European Union is an example of product standards, which is also a promotion strategy. In our case study, seven GIs promote the reputation of local beer production. Two hop varieties ('Spalt hops', 'Hallertau hops') and four beer types ('Bavarian beer' and four local types) are covered by this framework (C12, Bavarian State Ministry for Nutrition, 2022). Thanks to this GI framework, local farmers and small breweries benefit from reputation effects. *Geprüfte Qualität Bayern* is another example of product standards, established by the Bavarian Ministry of Food and Agriculture, which has a strong impact on the origin of hops and barley in the brewing stage. While the label is not mandatory, it has a significant impact on breweries' access to retail. Moreover, state research institutions are involved in R&D on new seed varieties. Innovation in varieties promote the competitiveness of local farming and can be a relevant counterweight to the excluding effects of R&D by TNCs.

Finally, subsidies bear a high relevance in the linkage between state institutions and agricultural cultivation. For instance, the hop producer cooperative in the Hallertau region (HVG Hopfenverwertungsgesellschaft e.G.) is the largest recipient of agricultural subsidies from the European Union in Bavaria ((Proplanta GmbH, 2021). Moreover, the most common calculations show that barley cultivation is not profitable without bonuses and subsidies.

4.4. Collective power

Collectives and umbrella organisations play an important role within several stages in representing businesses, logistics and machinery. Both agricultural stages are mainly organised in cooperatives that coordinate and bundle downstream operations. The spatial concentration of hop cultivation has brought about one powerful cooperative in the Hallertau regions (HGV), which represents more than 800 businesses. By contrast, there is a spatially and organisationally dispersed pattern of cooperatives in barley cultivation that support local famers. Likewise, malting plants are organised within state and federal networks (Bavarian Maltsters' Association, German Maltsters' Association) which provide a broad range of services including lobbyism, funding and exchange. A different situation can be observed within the brewing sector with several, partly competing associations based on product standards and corporate forms (The Free Brewers, Association of Private Breweries in Bavaria, Bavarian Brewers Association). However, in the processing stages, collectives serve as networks for exchange and advocate production standards rather than labour or environmental standards. Similarly, there are some representative associations on the trade stage (German Beverage Retail Association, Bavarian Hotel and Restaurant Association DEHOGA). All in all, the production network is characterised by collectives that represent specific stages, whereas issues concerning the whole production network, as well as environmental issues or product standards, play less of a role.

5. Discussion and conclusion

5.1. A 'Bavarian Model'? Regional Value capture and corporate inter-firm governance

Previous studies have suggested two central arguments regarding the nexus of governance and value capture. First, we partly confirm with the assumption that that both power and value capture tend to be located at the processing stage (with the malting stage being a counter example, Carbone, 2017; Sexton, 2013). Second, our study contradicts to a certain extent the literature postulating a reciprocal relationship between the degree of value capture and power within production networks (Bowman and Ambrosini, 2000; Henderson et al., 2002; Dallas et al., 2019; Ponte et al., 2019). The most powerful stage does not necessarily obtain the highest value capture and creation, as two examples concretise. First, breweries obtain high levels of value creation, a medium degree of value capture, but maintain a central corporate governance position. This network position applies to both SMEs and bigger corporate breweries. The central network position stems from the fact that the breweries conduct multiple linkages with all stages. Only some globally active breweries conduct additional strategies to hold power through internalisation, investment in R&D, and general efforts to establish linkages with any other stage, even bypassing intermediate stages.

Second, hops cultivation obtains low value creation, high value capture but a weaker governance position within the network. In terms of corporate governance, this contradicts findings in the context of other globally traded products, i.e. cocoa or horticulture (Alford and Phillips, 2018; Neilson et al., 2018). In our case, reputation effects, regional assets and successful export seem to be of greater benefit. In many of these studies, institutional power is a key argument that resembles the assumptions made in the 'Norwegian Model' (Lund and Steen, 2020). It focusses on cooperation between institutional and firm actors. State involvement mainly concerns regional assets and beneficial market conditions as strategic location factors. However, our setting contrasts in two key aspects and therefore suggests a 'Bavarian model' namely in motivation and focus. First, the motivation of the Bavarian public sector is rather indirect, aiming at place branding and indirect economic effects rather than at monetary state benefits. Second, institutional power has a clear regional focus. The hope is to prevent decoupling processes and unfavourable strategic coupling by foreign TNCs. Hence, the suggested "Bavarian model" targets regional strength rather than competitiveness or attractiveness in a global context (Table 3).

Empirically, Henderson et al.'s (2002) tripartite framework provides a helpful approach for the analysis of the state, firms and collectives interplay. It is applicable in production networks within and beyond the regional scope (Yeung and Coe, 2015). Our application of this heuristic to a local–global context explains the interaction of firm and non-firm actors at different spatial scales. However, as outlined in chapter 2.2, a careful differentiation at the intra-regional level is necessary during operationalisation processes. For the further development of the methodology, alternative approaches for the spatial differentiation of networks seem promising (i.e. TRACAST approach, see Goldstein and Newell, 2020). Moreoever, in their original publication, Henderson et al. (2002) state that there can hardly be an absolute monopoly of market power by leading firms. At the same time, the concept is rather open regarding the operationalisation of power distribution. For internal differentiation, further typologies are required. The GPN heuristic is therefore more appropriate for interregional contexts than to intraregional ones. Moreover, the consideration of consumer orientation is an example (see Henderson, 2005). To provide a economic focus on value creation, our approach excluded consumer power, which has been prominently highlighted in other strands of literature (e.g. in Alternative

Table 3
The Norwegian model versus the bavarian model (based on Bergene and Bonde Hansen, 2016; Lund and Steen, 2020).

	Norwegian model	Bavarian model
State Role	• Shareholder (coporate) and non monetary (indirecct benefits)	• Non-monetary(indirect benefits)
Activity Target	• International competitiveness Reshoring Domestic TNC	• Endogenous growth Reputation effects Domestic SMEs and TNC
State Activities	• Promotion of regional assets (competencies) R&D Funding	• Promotion of regional assets (competencies) R&D Funding Marketing

Food Networks, Marsden, 2000; see also Barrientos, 2013; Yeung and Coe, 2015). Considering products as regionally embedded and associated, operationalising the identification to be of great economic relevance for the link between products and their places of origin (Schober et al., 2023; Chilla et al., 2020) could be beneficial for further research.

5.2. Regional assets and network embeddedness

Large breweries operate both on the regional and international level, and they base their power on a broad network where they hold a high degree of sector centrality (Gammelgaard and Dörrenbächer, 2013). The concept of strategic coupling is of only limited conceptual value in this context. It is true that TNCs do participate in the local market through brand label use and ownership, and they benefit from regional assets and international trade links. However, the regional network profits to a high degree from the regional vs. international market segmentation (trade channels and product styles) instead of hollowing out. In the long run, this supports flexible specialisation (Taylor and Thrift, 1982; Yeung, 2009, 2021).

The various institutional and collective quality standards and legal frameworks benefit regional commodity flows and craftsmanship rather than the more automatised global industry. Indeed, there are some attempts by TNCs to gain control over the standard formulation. However, they have not yet gained a powerful position towards regional players. We illustrated a few exceptions like single ownership structures or the Carlsberg patent debate. Still, regional assets are a crucial element of regional economic development. Institutional power can effectively support and sustain regional assets like institutional knowledge, tradition and innovation potential. State institutions countervail a central assumption from the strategic coupling concept according to which institutional power usually benefits TNCs and only indirectly the regional economy (MacKinnon, 2012, Henderson et al., 2002). Consequently, intra-regional economic linkages might play a stronger role in strategic coupling than often assumed.

The prevailing forms of institutional and collective power as well as a dense network promote the embeddedness of economic operators and the position of small operators. Firstly, the multiplicity of quality standards and geographical indications support territorial embeddedness (Schober et al., 2023; Crescenzi et al., 2022). At the same time, they promote product reputation (Bavarian beer, Hallertau hops, Purity law, see Donner et al., 2017). The majority of economic operators across all stages are SMEs. They are embedded in dense and relational networks that foster trust, mutual benefit, and economic resilience (Pallares-Barbera et al., 2004). Second, the social embeddedness of the network is reflected in the consumer preferences represented by a high turnover at the gastronomy stage (Sage, 2003). Our case study illustrates two ways in which the mixture of social and territorial embeddedness strengthens the regional network (Waite, 2017). Territorial embeddedness and its reputation is a central basis of the global positioning of the regional market. At the same time, these networks stabilise the regional setting against potential TNC-induced competition that could result from strategic coupling. However, the embeddedness concept could benefit further from exploring the intra-sectoral competition of regional lead firms and the economic implications for regional commodity flows. Regional flows of information (Karlsson and Gråsjö, 2014; Porter, 2003) and networks (Bergman and Feser, 2020; Whitford and Potter, 2007) have been of major academic interest. By contrast, there is little specific evidence on how governance settings and respective value creation link regional economies with strong global markets. Our contribution provides conceptual and methodological basis for regional contexts that might be – or not – attractive for strategic coupling.

5.3. Regional production networks: Between the global and local

International trade involves several economically relevant export links along the entire beer production network. While there are only small import flows, the export activities comprise a) Bavarian hops as a globally important product and b) local beer as a regional speciality of modest but rising export volumes. International trade links do not exist due to a single lead firm that particularly benefits from specific regional assets. This contradicts other empirical studies with TNC involvement (Yang, 2009; Nilsen, 2019). Our case shows that globalisation does not necessarily lead to what has been referred to as the 'dark side' of globalisation or the hollowing-out of regions (Nilsen, 2019; Yeung and Coe, 2015). By contrast, local stakeholders along all stages of the production network can successfully resist global concentration dynamics. This refers to newer approaches to strategic coupling: regional economies can take an active part by preserving their productivity, and TNCs rather tend to follow brand acquisitions than coupling into the market (Grillitsch et al., 2019; MacKinnon, 2012). While sector embeddedness is one reason, the governance specificities are another. Although the strong institutional governance setting might be a specifity of the culturally embedded product, the network and spatial proximity (Bertram et al., 2021) as well as long standing traditional networks are structures that may be rather generic for regional (food) production. Moreover, the balance between coupling and segmentation is the key in this context.

This has consequences for understanding the debate on local–global economic linkages in general. Our case study confirms Yeung (2021) in stating that governance is not exclusively explained by TNC strategies but also by the multiplicity of linkages at the regional and global levels (Hervas-Oliver and Boix-Domenech, 2013). However, larger firms with TNC affiliation and regional lead firms can operate at different scales and interact with the respective governance settings. We show that segmentation supports smaller operators and stabilises them against dynamics of the global market. Their adaptive embeddedness enhances their positioning through trust, long-term relations and political support (Salder and Bryson, 2019; Whitford and Potter, 2007). As a consequence, we illustrate the regional level as not necessarily only a market niche of a globalised economy or strategic location, but a hub of multi-scale dynamics in value creation and governance. In doing so, we contribute to an understanding of regions as more active fragments of global economies than assumed in globalisation debates (Henderson et al., 2002; Yeung and Coe, 2015). Both, conceptually and methodologically, we aim to provide to a better understanding of regional economies in the context of crises, re-shoring and a new interest in regional economies (Gereffi, 2023; Lund and Steen, 2020). Hence, our findings underline the need to broaden the focus of globalisation debates. Regional settings should be considered as potentially more active parts of a global economy.

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CRediT authorship contribution statement

Carola Wilhelm: Conceptualization, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Tobias Chilla:** Conceptualization, Methodology, Project administration, Writing – original draft, Writing – review & editing.

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.

Data availability

Data will be made available on request.

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