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The Embeddedness of Software Development in the Ukraine: An Offshoring Country Perspective

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ABSTRACT *Since 2004 there has been an acceleration in offshoring tasks that engender high-level skills. The aim of this article is to examine the offshoring of software development to the Ukraine from the perspective of sender countries. We report the data gathered from interviews with CEOs or senior managers in Europe and the US that offshore software development to the Ukraine. We use a three-fold conceptual framework to analyse the data, which focuses on; structural embeddedness to identify constraining influences; cognitive-cultural embeddedness to examine how firms leverage tacit knowledge and network embeddedness to understand the role of offshoring in wider corporate strategies. We conclude that while offshoring to the Ukraine has brought higher level employment for individuals, territorially and temporally it is weakly embedded.*

Introduction

Offshoring and outsourcing represent ongoing and accelerating trends in the reorganization of firms. Outsourcing focuses on ownership and is the process of contracting part of a firm's operation or value chain to a third party. International sourcing has been increasing as firms concentrate on their core business as a way of minimizing costs. Offshoring is a spatial concept as firms relocate part of their production to another country. However, these arrangements are not dichotomous, and these two developments can give rise to a complex menu of arrangements.

A bifurcated division of labour has been suggested with knowledge-based functions remaining in the core economies, while simplified and routinized tasks in production and the provision of services would be outsourced to or undertaken in emerging markets (Hutton, 2004; Coyle & Quah, 2002). Since 2004 there has been an acceleration in offshoring more skilled tasks such as R&D, sophisticated software development, design,

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mathematics-based finance and actuarial functions that require post-graduate or higher level skills.

While the bulk of offshoring activity in software development and related activities continues to favour India and Ireland as host destinations, there is a growing view that major cities in these countries are reaching a saturation point as a focus for these operations (White, 2004). As a consequence companies are surveying other global regions, including Central and Eastern Europe and Russia, as well as China as possible destinations for relocation. Therefore, there is agreement that offshoring and outsourcing is shaped by and shaping complex geographical and organizational forms which has profound implications for regions and cities (Aggarwal *et al.*, 2008).

The empirical focus of this article is the offshoring of software development to the Ukraine, which has emerged as a new site for sophisticated IT functions.

Ukraine's perceived attractiveness lies in its legacy and culture of research, which emanates from having the biggest and oldest cybernetics centre in former Soviet bloc, and consistent production of highly qualified students in mathematics and theoretical physics relying heavily on IT technologies. Although a large economy with a population of 49 million and major cities (Kiev, Lvov, Kharkov and Odessa), it could be viewed as economically and politically peripheral on the edge of the European Union. Furthermore, with low levels of foreign direct investment, it is weakly integrated into global flows of capital (UNCTAD, 2010). This raises pertinent questions regarding the possibilities of regional growth and dynamism, particularly with regard to its capital city Kiev, as a result of capturing high-level functions in the value chains of software development.

The conceptual lens for considering this question is the notion of embeddedness (Polanyi, 1944; Granovetter, 1985, 1992; Smelser & Swedburg, 1994; Grabher, 1993, 1994), which enables an exploration of the nature and form of social, economic and institutional linkages. By adding a spatial dimension, economic geographers consider the extent to which these relations are embedded within particular spaces and place. Therefore, the notion of embeddedness is a starting point for considering quantitative and qualitative aspects of employment, spillovers in the form of technological and managerial know-how for indigenous firms and the establishment of new discourses appropriate to a competitive regional economy. There have been extensive contributions to understanding and conceptualizing the relationship between firms, localities and regional environments (Dicken & Thrift, 1992; Oinas, 1995; Dicken *et al.*, 1995) in general, and those that have examined the role of foreign investment in transition economies (Smith, 1998; Van Zon, 1998; Hardy, 1998, 2006, 2007; Pavlínek & Smith, 1998; Altvater, 1998; Uhlig, 1998; Swain, 1998; Drahokoupil, 2008). However, there has been little attempt to consider the impact on or embeddedness of investment in high-skilled business services through offshoring arrangements to these economies.

It is argued that in order to understand and explore the impacts of offshoring software development to a particular region, it is necessary to reconsider and sharpen the notion of embeddedness. Rather than supplanting economic categories with non-economic categories which might include "social", "cultural" and "political", and viewing them as mutually exclusive and dichotomous, these aspects are merged to offer a more integrated and richer way of looking the influences of firms on locality. Drawing on a categorization posited by Zukin and Dimaggio (1990) and White (2004), the conceptual framework presented here centres on a taxonomy based on three influences on embeddedness,

which are grouped for discursive convenience into structural, cognitive-cultural and network influences.

The article aims to contribute to the literature on regional development by considering the relationship between offshoring software development and locality. The purpose is also to enrich understanding of the concept of embeddedness in the context of an empirical investigation. The article is structured as follows; the first section outlines the methodology of the project. The second section explores the conceptual framework by elaborating the influences on embeddedness. Sections three, four and five report the findings and analyse the data through the lens of structural, cognitive-cultural and network influences on embeddedness. The final section concludes by discussing the implications of these for the embeddedness of software outsourcing in the Ukraine.

Methodology

Twelve semi-structured interviews were conducted with CEOs or senior managers of companies based in Europe and the United States (US) that offshored software development to the Ukraine. Interviews in the UK were conducted face-to-face, while those with respondents in Europe and the US were conducted by telephone. The interviews lasted between 45 minutes and two hours, they were recorded, transcribed and analysed thematically. To ensure anonymity, the names of the firms have been changed. Table 1 provides a summary of the interviewees, the activities of the companies and their country of origin.

Conceptual Framework

At a conceptual level, critics have argued that embeddedness has become an “over-territorialized” concept (White, 2004) which emphasizes local inter-firm relationships. It is contended here that in order to understand the spatial impacts of investment in business services, and specifically the impacts of offshoring on locality three salient influences on embeddedness need to be considered. These emphasize structural constraints and the distinctive features of the sector; the interrelationship of the cognitive and cultural influences as firms try and leverage knowledge; and network embeddedness in order to contextualize activity in the wider value chain and corporate strategy of firms.

Structural Influences on Embeddedness

An understanding of structural influences on embeddedness is important in terms of gauging the potential of offshoring for regional development. The range of options and degree of latitude that firms have in making decisions about their own future, for example, may be overstated by underplaying factors that are exogenous to the region. Structural factors can be defined as the parameters that limit the field of action in which agents formulate strategy, and broad imperatives which ultimately push firms towards particular ends, albeit via a number of diverse routes and managerial strategies (Schoenberger, 1994). These structural influences relate to factors such as the competitive features of the sector, the knowledge intensity and relational demands of the product or service, the level of technology and nature of the market.

Increased competitiveness and the need to sustain profits has led to the deverticalization of firms and re-engineering in order to arbitrage costs and seek new knowledge and innovation (Jacobides, 2005; Coe, 1997). The separation of work geographically and

Table 1. Summary of firms interviewed which outsource to the Ukraine

Interviewee	Company	Activity	Country of origin
CEO	Digitploy	Employment agency for IT	UK
Director of Development	Communibyte	Buying calls in bulk and reselling	UK/US
Director of Marketing	Logiglob	Design and build software	US
CEO and founder	Heavensent	Mapping APIs, Tools and Services	US
CEO	Extrembyte	Internet-based services firm	US
CEO	Adaptdotcom	Adaptation of software for demand purposes for PCs	Netherlands and US
MD	Vikinglog	Business systems developer for fashion retailer and mail order	Sweden
CEO and founder	Webspecbyte	Web sites	Netherlands
CEO and founder	Marketlogi	Web-based system that helps marketing consultants	Switzerland
CEO	Ticket-toU	Tickets for travel, sport, entertainment	US
CEO	Phonebyte	Software development for mobile telecommunications	UK
Senior manager	Dotcomploy	Executive recruitment IT	UK

Source: Author.

organizationally has involved longer and more complex value chains (Gupta & Venditti, 2009; Gupta *et al.*, 2006). The compression of time and the need for agility and flexibility is critical to the new competition as firms compete in terms of their ability to reduce time in the development of new products, order cycles and time to market in order to gain a significant advantage over competitors (Schoenberger, 1997).

There is an important connection between outsourcing, offshoring and regional development. Sabel (1988, 1994) suggests that the vertical disintegration of large transnational corporations (TNCs) has resulted in the proliferation of autonomous small and medium enterprises (SMEs). The argument suggests that the reorganization of large firms in the past three decades has encouraged regional embeddedness by creating opportunities for SMEs to cultivate long-term supply relationships. This production network is best viewed as a learning system which minimizes transaction costs by fostering high trust relations typical of clans, socially constructed markets and productive communities.

There is an extensive literature on value chains, which focuses on the role of an activity which is specifically located in wider production networks (Gereffi, 1996, 1999, 2005; Coe *et al.*, 2004, 2008a, 2008b; Hess & Coe, 2006; Hess & Yeung, 2006). The relevance of this approach is to interrogate the extent and implications of the location of higher value added function such as design, sales and marketing, and those decision-making operations such as finance and human resource management. These enable the interrogation of power relationships within value chains (Christopherson & Clark, 2007).

Cognitive-cultural Influences on Embeddedness

Cognitive and cultural influences on embeddedness are inextricably linked. Cognitive influences on embeddedness refer to the way in which capital accumulation depends on

embodied knowledge and skills while cultural embeddedness refers to the way in which individual firms use management strategies to leverage high-level knowledge. A firm's culture can be defined as "shared collective understandings in shaping economic strategies and goals" (Zukin & Dimaggio, 1990). Culture constitutes that set of social conventions embracing behavioural norms, standards and customs and the "rules of the game" underlying social interaction within the firm (Schoenberger, 1994). Three bodies of literature contribute to understanding the relationship between cultural-cognitive influences on embeddedness which include; regions, agglomeration and tacit knowledge, the internal reorganization of firms to access tacit knowledge and the transfer of discursive and material institutions across borders.

The first, strand of literature claims the superiority of relational and geographic proximity (industrial clusters and agglomerations) over formally constituted networks of knowledge and learning based on ubiquitously available products of education, science and technology (Amin & Cohendet, 1998, 2004). According to this view highly dynamic local regions draw extensively upon localized assets for competitiveness (Saxenian, 1994; Asheim, 1997; Kirat & Lung, 1999; Maskell & Malmberg, 1999a, 1999b; Bathelt *et al.*, 2002; Gertler, 2003; Morgan, 2004). This literature points to the conclusion that in a global economy, where the codified knowledge offered by science and technology is increasingly easy to access, uncoded knowledge rooted in relations of proximity provides an advantage in deriving and maintaining competitive advantage (Zanfei, 1996; Storper, 1997; Amin & Cohendet, 1998; Porter & Solvell, 1998). The importance of face-to-face contact, for example, is evident in the agglomeration of service sector industries such as the concentration of business services in global cities and financial centres in particular.

However, the existence, properties and success of agglomeration and industrial districts have been criticized for being regionally and sectorally selective (Grabher, 1993; Markusen, 1996) and embracing adversarial rather than cooperative relationships in the sharing of knowledge and learning (Markusen, 1999). Furthermore, some evidence points in the direction of the internationalization rather than the localization of R&D, with transnational firms scanning and absorbing foreign R&D (Blanc & Sierra, 1999; Allen, 2000; Amin & Cohendet, 2004; Grabher & Ibert, 2006; Dreyer & Vinding, 2007), while other literature emphasizes increasing tensions between localization and internationalization (Christopherson & Storper, 1986; Coe, 2001; Hardy & Currie, 2002; Trippel & Todtling, 2007; Lane & Probert, 2007; Chaminade & Vang, 2008; Kaiser & Liecke, 2008; Lorenzen, 2008).

The second strand of literature pertinent to cognitive-cultural embeddedness focuses on how firms restructure their internal organizations to elicit tacit knowledge embedded in employees at all levels of the firm's structure. It has been argued that traditional hierarchical structures represent a block on learning and innovation and that there are therefore limits to classical modes of organization. Moves towards less hierarchical structures and networked relationships between different divisions have been interpreted as opening up the possibility for firms to be more deeply embedded in localities. However, it may be argued that accounts purporting that changes in the internal organization of firms have resulted in flatter structures or more autonomous subsidiaries have often been oversimplified (Hardy, 2006, 2007).

Connected to this literature is an exploration of the relationship between innovation potential and the organization of work that underpins it, and, in particular, the need for

companies to access tacit knowledge and tap into the creativity of labour in order to innovate and maintain competitive advantage (Nonaka & Takeuchi, 1995; Laursen & Foss, 2003; Lorenz & Wilkinson, 2003). Contemporary management literature points to a new orthodoxy (Bilton, 2007) of eschewing harder controls of the labour process by enabling individual autonomy, creating flatter structures and developing inclusive cultures (Hagstrom & Hedland, 1998; Teece, 1998). However, there is also evidence that the pressures of commercial competition form a countervailing force which can result in a range of organizational controls that are to the detriment of creativity and innovation (Randle, 1996; Randle & Rainnie, 1997; Barrett, 2004). Therefore, the tension between creativity and control forms a strong thread through the literature on management, organization, creativity and innovation.

The third strand of literature relates to entering new institutional contexts, whereby incoming firms have to negotiate with, or around established behaviours and understandings in order to become more responsive and react quickly to changes in the market. In other words, as firms cross national boundaries they need to introduce and establish new material and discursive practices in the firm through restructuring management practices and changing established business habits and practices (Hardy *et al.*, 2005; Hardy, 2006). Therefore, there are important organizational considerations, relating to entering new markets and acquiring new assets, and impinging upon how to manage operations over wider geographical areas embracing different institutional and cultural establishments.

A further aspect of offshoring strategy relates to the methods used by firms to establish their corporate culture and collective understandings in a new context. Questions relate to how far existing firm needs to be restructured to bring its operation and norms into line with those of its other operations; the extent to which firms transfer existing models, and how far they consciously attempt to replace existing behaviours and methods will have implications for their sensitivity to local institutions.

Network Influences on Embeddedness

Network embeddedness examines the role played by intra- and inter-firm relationships (White, 2004) impinging on the propensity for local linkages. Key issues are raised regarding the place of the local operation within the wider corporate network. These have largely been addressed within the context of an analysis of the relationship between affiliates and parent company, although some writers have pointed to a need to understand networks as being much more loosely constructed both temporally and in their architecture.

Castells (1996, p. 158) claims that “networks are the fundamental stuff of which organizations are made”, and that rather than talking about TNCs, we should explore international networks to capture the myriad of firms’ relations across borders. Teece (1998, p. 158) suggests that changes in internal structures and the proliferation of interfirm agreements have produced new hybrid organizational arrangements which “... may well represent a new and dramatic organizational innovation in business history”. Therefore, it has been argued that, in this more turbulent and competitive environment, we are witnessing the emergence of a new type of TNC which differs from those which predominated earlier periods (Bartlett & Ghoshal, 1993; Dicken, 2003). This complex global model is characterized by an integrated network configuration and a capacity to develop flexible coordinating processes.

There are two aspects of network embeddedness that are pertinent to territorial embeddedness, namely questions related to heterarchical managerial control and the management of distance.

First, it has been argued that networks herald a uniform move from hierarchy to heterarchy, whereby HQs have relinquished their role as monitoring devices to become “architects of communications” in order to tap subsidiaries as a source of product, process and organizational innovation (Dunning, 1997). These capabilities apply both inside the firm which, it is argued, displace hierarchical governance relationships, as networks of relationships which comprise social capital become more inclusive and egalitarian. The second aspect relates to how distance is managed. While some have privileged the face-to face contact that comes from geographical proximity, others have posited the importance of networks or organizational proximity. Technology such as electronic mail, video conferencing and work stations may be able to achieve the organizational advantages of centralization on a decentralized geographic basis. Table 2 provides a summary of possible permutations of offshoring/outsourcing network relationships along the dimensions of geography and ownership.

Offshoring and Outsourcing to the Ukraine: A Simple Taxonomy

The next three sections analyse the interview data from firms that offshore or outsource to the Ukraine through the lens of structural, cognitive-cultural and network influences on embeddedness. The taxonomy proposed in Table 3 identifies and highlights critical dimensions of these three influences, which are pertinent to offshoring.

Structural Influences of Embeddedness

In considering motives for relocating parts of the value chain, accessing knowledge and low wage costs have been posited as occupying different end points of a spectrum and as dichotomous. Furthermore, many accounts have privileged knowledge acquisition as a motive for remaining in the home country. However, the offshoring of software development in general, and to the Ukraine in particular, was driven both by the search for lower costs and knowledge seeking. All companies had a precise knowledge of wage costs and fully loaded costs per hour and the reason for locating in the Ukraine was given as the wage differential between other parts of Europe, including the post-communist countries which joined the European Union in 2004 and 2007. One CEO summarized this as being

Table 2. Offshoring, outsourcing and ownership permutations for sourcing

	On-site	Near-shore	Offshore
Complete ownership	Status (neither outsourced nor offshores)	In house, near shore (captive centre in nearby location)	Captive offshore
Shared ownership	Joint venture onshore	Joint venture near shore	Joint venture offshore
No ownership	Onsite vendor	Offsite near shore vendor	Offshore vendor

Source: Gupta *et al.* (2006).

Table 3. Influences on and dimensions of embeddedness

Influences on embeddedness	Dimensions of embeddedness
Structural influences on embeddedness	Low cost versus knowledge seeking
	Disintegration of value chains and mobility
Cognitive-cultural influences on embeddedness	Agglomeration and tacit knowledge
	Accessing tacit knowledge internally
	Institution bending
Network influences on embeddedness	Temporality of networks
	Role of teams
	Place in value chain

Source: Author.

the ability to obtain “human capital at a competitive price compared with other Western European capitals” (CEO of Ebuilders). According the manager of one organization;

By leveraging our global facilities, world-class engineers and state-of-the-art tools and processes, companies can increase the quality of their software products while dramatically reducing timelines and operating costs—often by more than 60% (Senior Manager).

The Ukraine’s cultural and geographical proximity were cited as advantageous attributes for some of the case study firms. However, the overriding attractiveness of this location related to the ability to leverage high-level knowledge at a relatively low cost. The standard of technical education was deemed to be exceptionally high with an extensive pool of potential employees emerging from three higher education institutions and universities (estimated at 12,000 graduates a year). In particular, these Ukrainian graduates were perceived as having high-level mathematical and computational skills, which was a legacy of the knowledge that had been central to the defence industry before 1990. One CEO noted that;

They [Ukrainians] had a lot of expertise, putting it bluntly, in calculating the trajectory of a missile ... so very strong depth of talent ... not a strong local market. (Marketing Director Globalogic)

Two sets of processes were evident in making the decision to locate in the Ukraine. The first was where a matrix was constructed to evaluate and compare various locations in an objective and scientific way. Cost savings, technical skills, command of English and the business environment were each scored and weighted and the final decision was driven by cost minimization. A second group of CEOs had taken the decision to offshore to the Ukraine through having personal or business connections with the country and in these cases other destinations were not considered. A “good experience” with the place or the people minimized risk, and the cost differential was considered to be sufficient.

The structural characteristics of software development point to a lack of embeddedness and high degree of mobility. The relocation of production had taken place in a series of waves, with countries at different points in a cycle. As wage costs increased in one

country then lower cost destinations were sought and therefore comparative advantage was relatively short lived. Some of the software companies were not considering other destinations, whereas others were continually searching for the next low-cost destination with Vietnam, South America and Nigeria identified as countries that were potential sites for offshoring. One CEO reported;

I've got a friend his model is his goes round sets up an office and hires people ... and he sells the bodies. (CEO Extrembyte)

It was suggested that people could be hired relatively cheaply as they had not "learned their value". However, as companies start to offshore to a particular country there was a process of price inflation, which had been observed in the Ukraine. A consensus which emerged from the interviewees was that the wage cost of a developer had risen from \$450 in 2004 to \$1500 by 2008.

Mobility was possible, because with no expenditure on equipment or property, "sunk costs" were minimal. The only investment was in training, where it would take a new employee about six months to learn the code and "get up to speed". As a result of this one respondent argued that;

Every country in the world is a possible site for software development. There are computers and intelligence all over the world ... it is easy to find out what they are doing by the code they write ... if they don't write good code you get rid of them. (CEO Extrembyte)

It was relatively easy to downsize and/or relocate as the software developers were generally on flexible contracts or self-employed. Most professionals in the Ukraine were paid in dollars after receiving a minimum wage salary in *ribna*, everything else was paid into an offshore bank account. This meant that if offshoring firms wanted to downsize, close down or relocate, they were only obliged to pay severance on that part of salaries that was paid in *ribna*, which gave them flexibility regarding costs.

Cognitive and Cultural Influences on Embeddedness

There was no evidence of firms engaging with local institutions, and most reported a desire for institutional avoidance and distance from government. Ukrainian firms and individuals were employed to deal with the bureaucracy. Furthermore, there was little contact between sub-contracting/offshoring firms. In some cases this was deliberate as they regarded themselves in competition for highly skilled workers. Therefore, rather than drawing on the generalized tacit knowledge in the city, firms were specifically trying to access embodied knowledge from Ukrainian programmers and developers.

The link between cognitive and cultural influences on embeddedness is that management strategies, implicit or explicit in corporate culture, are specific ways of leveraging codified and tacit knowledge. This is reflected in deliberate policies exhibited by firms regarding both their organizational structures and management of human resources. In particular, there is a debate about the process and management of software development, where skills and knowledge need to be focused on the ability to adapt in quickly changing environments. Complex management strategies can be distilled into three

particular methodologies; the waterfall model, the agile-adaptive approach and extreme programming.

The waterfall approach assumes that one can specify a satisfactory system in advance, collect bids for its construction, and then have it built and installed. The waterfall method is based on an inflexible division of labour which divides a project into stages, such that commitments are made early on, and it is difficult to react to changes in requirements. This linear production process is criticized for being too rigid and should be regarded more as an ideal type than strategy used by firms.

The agile-adaptive method is more of an evolutionary approach based on the assumption that software development needs to engender a more iterative methodology. Agile-adaptive methods incorporate small increments with minimal planning and iterations are in short time frames, typically lasting from one to four weeks. Each iteration is worked on by a team through a full software development cycle. This method emphasizes face-to-face communication over written documents, and places a high level of importance on routine and formal daily face-to-face communication among team members. Therefore, agile methodologies are often characterized as being at the adaptive end of the spectrum with predictive approaches lying at the other.

A third methodology is that of extreme programming which is characterized by “simplicity” where no future investment is made unless immediately needed. Feedback is given in order to have a system running constantly that gives developers reliable information on its functions so that “the system and its code serve as the incorruptible oracle to report about the progress and state of development”. A central tenet is that the direction of product and process development uses pre-defined techniques and frameworks.

In the rest of this section we examine three firms which occupy the end points of this spectrum. Logiglob and Heavensent exemplify the agile-adaptive approach, whereas Extrebyte provides a clear example of extreme programming.

Logiglob and Heavensent: The Agile-adaptive Model

The interviewees from Logiglob and Heavensent were both explicit in their use of an agile-adaptive model. The marketing director of Logiglob explained;

There is a traditional way of building systems, which is known as waterfall where you have an idea and write a spec, you take that spec as though its gospel, develop the product and then it often has no value to anyone as things have moved on. There's a very much more agile approach where you're my business user, you're continually coming up with new ideas, so I am building in short iterations, sometimes as short as two or three weeks. Everything is evolving—you are very rapidly going through that life cycle.

The CEO of Heavensent echoed this need for agility, suggesting that the process of producing software for a non-technical final user could not be reduced to simply sending a specification for code and then getting it back. This agility demanded a close relationship between the offshoring firm and programmers and developers in the Ukraine. The approach of both firms was characterized by constant communication within the firm, engendering commitment and value setting. In the case of Heavensent there were daily meetings using video conferencing where each team or group gave a summary of

project developments, in order to chart progress and exchange information. Identifying problems meant that teams elsewhere could be tapped for solutions. Both companies believed that good collaboration was made up off a “string of small conversations” and a culture of daily interaction on small issues.

The second shared feature of this approach was the necessity of engendering commitment as a way of “getting the best” out of the employees and reducing turnover. Both case study companies rejected the “body shopping” approach where programmers were hired on a short-term basis and paid an hourly rate.

Body shopping is all about . . . you want ten people, . . . interview some or all of them, that’s what you get, they’ll do what you tell them to do – that requires much more structure and discipline on your behalf to be successful. We are far more tell us what you want at a relatively high level and we will help you with the whole process. But what you really want is not fifteen engineers, you actually want a product out by 31 March . . . so we can focus on the end deliverable (Logiglob).

Contact was maintained not only by daily video conferencing, but also through company newsletters and offsite person to person meetings. The importance of integrating the company across national boundaries and making employees feel “part” of the firm was a central part of their management of human capital. Furthermore, giving developers and programmers interesting work was regarded as central to reducing turnover and maintaining commitment. It was important to establish that such firms were “cool to work” for, even though employees may be able to get a higher salary elsewhere.

The third feature of this approach was the importance of establishing a strong corporate culture through value setting, which included trying to encourage ideas about creativity, transparency in decision-making and work-life balance. “*We are not sweat shopping off-shoring . . . they are part of our organization, even now*”. It was emphasized that the process was not about the technology, but creating a culture where the whole organization buys into the mission and the vision.

. . . it’s the way you do business . . . it’s the way you treat people, it’s the way people treat each other, open and transparent—a decision making process where people know what’s going on. People are treated well whether they are inside the company or outsourced. Its about the customer and how they experience the product. Exactly the same message whether its Kentucky or Kiev.

Extrembyte: Extreme Programming

The management of software developers in Ukraine by Extrembyte lay at the other end of the spectrum, in that they explicitly described themselves as a hierarchical organization. Critical to the way in which they managed software engineers was through the instigation of a task accounting system that they had developed for themselves

. . . people can walk in walk out see what needs to be done . . . get the code . . . download it, work on it and upload it again . . . it can be done anywhere . . . they could be on a beach in Tahiti if they wanted to be. The entire company is virtual there is no company in the US either. Our costs of doing business are as minimal as possible.

This project management system meant that they could track the work, the clients, and also insert new people and monitor how long the work was taking. Although email, Skype and instant messaging were used, face-to-face contact was minimized. The team in the Ukraine had an annual Christmas party once a year, but the CEO had never met any of the team in the Ukraine over an eight-year period. Video conferencing was considered to be gratuitous and oral communications “simply a waste time”. A weekly meeting by telephone was held with the top programmer/country manager and everything else was done using the task accounting system.

These people are here to get a job done, they don't care what we look like and we don't care what they look like ... We track them by the numbers, we estimate in advance how long each task should take, and if a programmer is consistently taking longer to do a task, then we let them go.

A sophisticated means of checking job allocation and where they were in time was key to being “hands off”, even new employees were hired over the internet. The CEO was scathing about meetings and face-to-face contact and describes the experience of sub-contracting to a firm in the US in the following terms;

So many managers, so much design, there would be meetings, everyone would come for the meetings, then there would be pizza ... there would have thirty people in a meeting, but by the time the code came out it was piddly it was nothing ... it was just really inefficient.

There are implications of these two business models for the embeddedness of firms. In the first case, the need to respond to clients flexibly and quickly and develop high-quality products necessitated developing skills, training and trust building within an organization. Firms using this model exhibited a higher degree of embeddedness and less inclination to move production, after having made an investment in human capital. In the second case, labour was treated as an undifferentiated unit of production and production was seen as perfectly mobile between different global sites. Accordingly, place was transitory in nature.

Network Embeddedness

The simple matrix presented in Table 2, which shows permutations of networks based on geography and ownership, does not capture the complexities of offshoring/outsourcing arrangements that were apparent from the interviews. In particular, three features of network embeddedness emerged from the data that related to the temporality of networks, the centrality of the team and place in the value chain.

First, the fast changing nature of networks meant that they took on a kaleidoscopic quality. The sector was characterized by turbulence in terms of the life span of companies, and evident in the continual cycle of dissolving companies and the opening up of new ones, often by same managers. Many of these high-tech start ups were funded by venture capital, some on the basis of one product. If the product was unsuccessful then the need for the firm became defunct. In one case, a firm was established in Kiev buying telephone calls in bulk and then reselling them to customers. When this product

was unsuccessful, the firm was closed. The existence of projects where tasks had an “end point” or “institutionalized termination” (Grabher & Ibert, 2006) served to further increase instability, and therefore “. . . the transience of projects . . . blurs the neat image of the clear formal (inter) organizational arrangements prevailing in the more robust strong tie architectures” (Grabher & Ibert, 2006).

In another case Ukrainian employees made redundant from one firm formed their own company and became sub-contractors to the firm they had previously worked for. Therefore, while the concept of networks is well established in the literature, the software sector, in Ukraine at least, would be much better described as a kaleidoscope, where the industrial scene is constantly morphing into new configurations.

The second aspect of network embeddedness, was that the basic unit constituted not individuals or firms, but teams. All the firms interviewed were involved in building their own teams, building such teams for clients or, in the majority of cases “renting” teams from a company based in the Ukraine. The CEO of Logiglob explained;

We don't build any of our products and we don't have any of our own intellectual property . . . You come to me and say 'Dave – 'I've got this software company and this is the product I'd like to build' I would then assemble a team for you and that becomes your virtual subsidiary.

At one extreme there was a US firm which employed one country leader, who oversaw five team leaders, each of which had five members. The CEO explained;

Technically we only have one employee, all the rest are subcontractors and self employed and responsible for paying their own taxes . . . We have seen the emergence of people whose firm is really just finding bodies and truly just giving you a body, so that you can integrate them into your team. So if you want cheap programmers to work in your project, you are not farming your project out, you are integrating them into your team and managing them directly.

At the other extreme one firm had bought six Ukrainian firms, “biting off the head and swallowing the body”, and “rented out” 150 teams to clients in the West.

Typically we'll build a team, almost a perfect analogy. You can almost think of us as a franchise operation, so there's an infrastructure, physical, HR, IT, process, method and within that big box there's 150 individual teams completely aligned with their customer.

Between these two extremes, most European and US-based firms offshored their work by hiring a team from a company (foreign or home owned) in (the) Ukraine. The notion of outsourcing or sub-contracting was variously described as “rude” or “irrelevant” and one interviewee claimed that he would have failed if he used such a vocabulary. The way in which these teams were regarded as being temporarily part of the company to which they were contracted, was reflected in such comments as “they are like an extension of our firm . . . they could be sitting here” or “we regard them as people working in our company”. Therefore, teams were temporarily plugged into companies and encouraged to be psychologically part of that firm, wearing hats with the company logos and drinking

coffee from mugs with the company logo. All of them had some sort of loyalty programme. For example, several firms invited Ukrainian employees to the country of the offshoring company, if they were located in Europe at least.

Third, with regard to position in the value chain, the process of software development and production in the Ukraine lay at the bottom end. At the top of the value chain were software users in non-software companies, which included firms across all sectors from retail to finance. Firms in all sectors are dependent on software, which involves customized development for complex and proprietary systems and the maintenance and updating of those systems. Software development functions were then outsourced to large service firms, or in the case of the Ukraine, to software-intensive high technology start-ups in Europe and the US, where they were all headquartered. The order came from the client who retained the intellectual property rights, and all the business functions were located in the home country, including human resource management, finance, marketing, sales and contact with the client.

Accounts of network embeddedness have suggested that the place of an operation in the value chain in terms of the functions it performs and its degree of autonomy have important implications for its impact on a locality. The fast changing landscape in terms of the nature of the operation, ownership and centrality of teams, pose a significant challenge for analysing its effects. The boundaries between offshoring and outsourcing are blurred and constantly changing. However, what is clear is that operations carried out in the Ukraine lie at the bottom of the value chain with little control resting with companies to which work was outsourced and even less to employees.

Conclusions

The offshoring and/or outsourcing of software development to Ukraine has produced, for Kiev in particular, employment for highly skilled graduates in knowledge-intensive work. However, with virtually no sunk costs the structural characteristics of the software industry make it highly mobile. Competitive conditions constantly drive a search for skilled labour at lower costs. However, the route of arrival had implications for the embeddedness of firms.

Companies that had entered the Ukraine through personal or business contacts exhibited greater commitment to location and were not considering other destinations. Those that had used the matrix systems for assessing the costs of competing destinations were recalibrating their information, particularly in relation to wage costs, and were considering other destinations such as South America and Nigeria. The place of Ukrainian sub-contractors makes them dependent both on their ability to be cost competitive and also on the demand for the final product.

Cognitive and cultural influences were an important influence on the time horizon for firms operating in the country. The need for firms to engender commitment and reduce employee turnover was addressed using different strategies which had implications for the quality of work on offer and degree of embeddedness in the locality. One approach could be loosely termed as "body shopping" where firms paid high salaries to employ programmers and developers on a short-term basis. Other firms invested more widely in training, development and range of benefits, which included permanent contracts and the possibility of travelling to the offshoring country. In this case there was evidence of the transfer of managerial skills and expertise, particularly in relation to project management in a "customer facing" environment. Furthermore, Ukrainian firms benefitted

from spillovers in terms of the quality requirements as a result of being locked into global networks, which also provided the possibility of further customer diversification.

Territorial embeddedness was very weak. There was minimal interaction with other firms in the city and institutions outside those that they were compelled to deal with. Rather than an industrial atmosphere where knowledge flowed between firms, there was competition in relation to employing the best graduates. None of the firms carrying out software development had intellectual property rights and they occupied the bottom point of the value chain. Firms in the Ukraine were nodes of knowledge that formed a small part of the value chains on TNCs. Their lack of power within the value chain meant that they absorbed the risk if the customer firm at the top of the value chain cut back on a project or on IT development. Temporal embeddedness was short-term, because the work could quickly be switched to another location, and the firms that were most cost driven continually searched for new sites. For these firms, the Ukraine had provided a brief window of opportunity to arbitrage wages and knowledge.

References

- Aggarwal, A., Berry, O., Kenney, M., Lenway, S. A. & Taylor, V. (2008) Corporate strategies for software globalisation, in: L. Labrianidis (Ed.) *The Moving Frontier: The Changing Geography of Production in Labour-Intensive Industries*, pp. 255–280 (Aldershot: Ashgate).
- Allen, J. (2000) Power/economic knowledge: Symbolic and spatial formation, in: J. R. Bryson, P. W. Daniels, N. Henry & J. Pollard (Eds) *Knowledge, Space, Economy* (London: Routledge).
- Altvater, E. (1998) Theoretical deliberations on time and space of post socialist transformation, *Regional Studies*, 32(7), pp. 591–605. doi:10.1080/00343409850119490.
- Amin, A. & Cohendet, P. (1998) Learning adaptation in decentralised business networks, *Environment and Planning D*, 17(1), pp. 87–104.
- Amin, A. & Cohendet, P. (2004) *Architectures of Knowledge: Firms, Capabilities and Communities* (Oxford: Oxford University Press).
- Asheim, B. T. (1997) Learning regions in a globalised world economy: Towards a new competitive advantage of industrial districts, in: M. Taylor & S. Conti (Eds) *Interdependent and Uneven Development: Global–Local Perspectives* (Aldershot: Ashgate).
- Barett, R. (2004) Working at Webboyz: An analysis of control over the software development labour process, *Work, Employment and Society*, 38(4), pp. 777–794.
- Bartlett, C. & Ghoshal, S. (1993) Beyond the M-form: Toward a managerial theory of the firm, *Strategic Management Journal*, 14, pp. 23–46. doi:10.1002/smj.4250141005.
- Bathelt, H., Malmberg, A. & Maskell, P. (2002) *Clusters and Knowledge: Local Buzz, Global Pipelines and the Process of Knowledge* (Fredricksberg: Danish Research Institute for Industrial Dynamics, Copenhagen Business School).
- Bilton, C (2007) *Management and Creativity* (Oxford: Blackwell).
- Blanc, H. & Sierra, C. (1999) The internationalisation of R&D by multinationals: Trade-off between external and internal proximity, *Cambridge Journal of Economics*, 23(2), pp. 187–206. doi:10.1093/cje/23.2.187.
- Castells, M. (1996) *The Rise of the Networked Society* (Oxford: Blackwell).
- Chaminade, C. & Vang, J. (2008) Cultural clusters, global–local linkages and spillovers: Theoretical and empirical insights from an exploratory study of Toronto’s film cluster, *Industry and Innovation*, 14(4), pp. 401–420.
- Christopherson, S. & Clark, J. (2007) Power in firm networks: What it means for regional innovation systems, *Regional Studies*, 41(9), pp. 1223–1236. doi:10.1080/00343400701543330.
- Christopherson, S. & Storper, M. (1986) The city as a studio; the world as a backdrop: The impact of vertical disintegration on the location of the motion picture industry, *Environment and Planning D: Society and Space*, 4(3), pp. 305–320. doi:10.1068/d040305.
- Coe, N. (1997) Internationalisation, diversification and spatial restructuring in transnational computing firms: Case studies from the UK market, *Geoforum*, 28(3–4), pp. 253–270. doi:10.1016/S0016-7185(97)00012-2.

- Coe, N. (2001) A hybrid agglomeration? The development of a satellite-marshallian industrial district in Vancouver's film industry, *Urban Studies*, 38(10), pp. 1753–1775. doi:10.1080/00420980120084840.
- Coe, N., Hess, M., Yeung, W.-Ch., Dicken, P. & Henderson, J. (2004) Globalizing regional development: A global production networks perspective, *Transactions of the Institute of British Geographers*, 29(4), pp. 468–484. doi:10.1111/j.0020-2754.2004.00142.x.
- Coe, N., Dicken, P. & Hess, M. (2008a) Global production networks—debates and challenges, *Journal of Economic Geography*, 8(3), pp. 267–269. doi:10.1093/jeg/lbn006.
- Coe, N., Dicken, P. & Hess, M. (2008b) Global production networks: Realizing the potential, *Journal of Economic Geography*, 8(3), pp. 271–295. doi:10.1093/jeg/lbn002.
- Cooke, P. & Morgan, K. (1994) Growth regions under stress, in: A. Amin & N. Thrift (Eds) *Globalization, Institutions and Regional Development in Europe*, pp. 91–117 (Oxford: Oxford University Press).
- Coyle, D. & Quah, D. (2002) *Getting the Measure of the New Economy* (London: Industrial Society), May.
- Dicken, P. (2003) *Global Shift; Reshaping the Global Economic Map in the 21st Century* (London: Sage).
- Dicken, P. & Thrift, N. (1992) The organization of production and the production of organization: Why business enterprises matter in the study of geographical industrialization, *Transactions of the Institute of British Geographers*, 17, pp. 279–291. doi:10.2307/622880.
- Dicken, P., Forsgren, M. & Malmberg, A. (1995) The local embeddedness of transnational corporations, in: A. Amin & N. Thrift (Eds) *Globalization, Institutions and Regional Development in Europe*, pp. 23–45 (Oxford: Oxford University Press).
- Drahokoupil, J. (2008) *Globalization and the State in Central and Eastern Europe: The Politics of Foreign Direct Investment* (London: Routledge).
- Dreyer, I. & Lund Vinding, A. (2007) Searching near and far: Determinants of innovative firms' propensity to collaborate across geographical distance, *Industry and Innovation*, 14(3), pp. 259–275.
- Dunning, J. H. (1997) *Alliance Capitalism and Global Business* (London: Routledge).
- Gereffi, G. (1996) Global commodity chains: New forms of coordination and control among nations and firms in international industries, *Competition and Change*, 1(4), pp. 427–439.
- Gereffi, G. (1999) International trade and industrial upgrading in the apparel commodity chain, *Journal of International Economics*, 48, pp. 37–70. doi:10.1016/S0022-1996(98)00075-0.
- Gereffi, G. (2005) The governance of global value chains, *Review of International Political Economy*, 12(1), pp. 78–104. doi:10.1080/09692290500049805.
- Gertler, M. T. (2003) Knowledge and the economic geography of context, or the undefinable tacitness of being (there), *Journal of Economic Geography*, 3(1), pp. 75–99. doi:10.1093/jeg/3.1.75.
- Grabher, G. (Ed.) (1993) *The Embedded Firm: On the Socioeconomics of Industrial Networks* (London: Routledge).
- Grabher, G. (1994) The disembedded regional economy: The transformation of East German industrial complexes into western enclaves, in: A. Amin & N. Thrift (Eds) *Globalization, Institutions, and Regional Development in Europe*, pp. 177–195 (Oxford: Oxford University Press).
- Grabher, G. & Ibert, O. (2006) Bad company? The ambiguity of personal knowledge networks, *Journal of Economic Geography*, 6(3), pp. 251–271.
- Granovetter, M. (1985) Economic action and social structures: The problem of embeddedness, *American Journal of Sociology*, 91(3), pp. 481–510. doi:10.1086/228311.
- Granovetter, M. (1992) Economic institutions as social constructions: A framework for analysis, *Acta Sociologica*, 35, pp. 3–11. doi:10.1177/000169939203500101.
- Gupta, S. & Venditti, C. (2009) Smarter sourcing in a post-crisis environment, *Journal of Financial Transformation*, 27, pp. 53–57. The Capco Institute.
- Gupta, S., Puranam, P. & Srikamth, K. (2006) *Services Sourcing in the Banking and Financial Services Industries; Exploding Myths and Describing Emerging Best Practice* (The Capital Markets Company N.V. and London Business School).
- Hagstrom, P. & Hedland, G. (1998) A three dimensional model of changing internal structure in the firm, in: A. D. Chandler Jr, P. Hagstrom & O. Solvell (Eds) *The Dynamic Firm: The Role of Technology, Strategy, Organization, and Regions*, pp. 166–191 (Oxford: Oxford University Press).
- Hardy, J. (1998) Cathedrals in the desert, *Regional Studies*, 32(7), pp. 639–652. doi:10.1080/00343409850119526.
- Hardy, J. (2006) Bending workplace institutions in transforming economies: Foreign investment in Poland, *Review of International Political Economy*, 13(1), pp. 129–151.

- Hardy, J. (2007) Learning' or 'coercive' firms? Foreign investment, restructuring transforming economies and the case of ABB Poland, *International Journal of Management Concepts and Philosophy*, 2(3), pp. 277–297. doi:10.1504/IJMCP.2007.015002.
- Hardy, J., Currie, J. & Ye, Z. (2005) Cultural and political embeddedness, foreign investment in transforming economies: The case of ABB in Poland and China, *Competition and Change*, 9(3), pp. 271–291.
- Hess, M. & Coe, N. (2006) Making connections: Global production networks, standards and embeddedness in the mobile communications industry, *Environment and Planning A*, 38(7), pp. 1205–1228. doi:10.1068/a38168.
- Hess, M. & Yeung, H. W.-Ch. (2006) Guest editorial: Whither global production networks in economic geography? Past, present and future, *Environment and Planning A*, 38(7), pp. 1193–1204. doi:10.1068/a38463.
- Hutton, W. (2004) Don't weep for our lost factories, *The Observer*, 19 December.
- Jacobides, M. G. (2005) Industry change through vertical disintegration: How and why markets emerged in mortgage banking, *Academy of Management Journal*, 48(3), pp. 465–498. doi:10.5465/AMJ.2005.17407912.
- Kaiser, R. & Liecke, M. (2008) The Munich feature film cluster: The degree of global integration and explanations for relative success, *Industry and Innovation*, 14(4), pp. 385–399.
- Kirat, T. & Lung, Y. (1999) Innovation proximity: Territories as a loci of collective learning processes, *European Urban and Regional Studies*, 6(1), pp. 27–38. doi:10.1177/096977649900600103.
- Lane, C. & Probert, J. (2007) The external sourcing of technological knowledge by the US pharmaceutical companies: Strategic goals and inter-organizational relationships, *Industry and Innovation*, 14(1), pp. 5–25.
- Laursen, K. & Foss, N. (2003) New human resource management practices, complementarities and the impact of innovation performance, *Cambridge Journal of Economics*, 27(2), pp. 243–263. doi:10.1093/cje/27.2.243.
- Lorenzen, M. (2008) Internationalization vs. globalization of the film industry, *Industry and Innovation*, 14(4), pp. 349–357.
- Lorenz, E. & Wilkinson, F. (2003) Organisational change, human resource management and innovative performance: Comparative perspective, *Cambridge Journal of Economics*, 27(2), pp. 239–241. doi:10.1093/cje/27.2.239.
- Markusen, A. (1996) Sticky places in slippery space: A typology of industrial districts, *Economic Geography*, 72, pp. 293–313. doi:10.2307/144402.
- Markusen, A. (1999) Fuzzy concepts, scanty evidence, policy distance: The case for rigour and policy relevance in critical in regional studies, *Regional Studies*, 33(9), pp. 869–884. doi:10.1080/00343409950075506.
- Martin, R. (1999) The new economic geography of money, in: R. Martin (Ed.) *Money and the Space Economy* (Chichester: John Wiley).
- Maskell, P. & Malmberg, A. (1999a) The competitiveness of firms and regions: Ubiquitification and the importance of localized learning, *European Urban and Regional Studies*, 6(1), pp. 9–25. doi:10.1177/096977649900600102.
- Maskell, P. & Malmberg, A. (1999b) Local learning and industrial competitiveness, *Cambridge Journal of Economics*, 23(2), pp. 167–185. doi:10.1093/cje/23.2.167.
- Morgan, K. (2004) The exaggerated death of geography: Learning, proximity and territorial innovation systems, *Journal of Economic Geography*, 4(1), pp. 3–22. doi:10.1093/jeg/4.1.3.
- Nonaka, I. & Takeuchi, H. (1995) *The Knowledge Creating Company* (Oxford: Oxford University Press).
- Oinas, P. (1995) Types of enterprise and local relations, in: B. Van Der Knaap & R. Le Heron (Eds) *Human Resources and Industrial Spaces: A Perspective on Globalization and Localization*, pp. 177–195 (Chichester: John Wiley).
- Pavlínek, P. & Smith, A. (1998) Internalization and embeddedness in east-central Europe transition: The contrasting geographies of inward investment in the Czech and Slovak Republics, *Regional Studies*, 32(7), pp. 619–638. doi:10.1080/00343409850119517.
- Polanyi, K. (1944) Reprinted 1957. *The Great Transformation: The Political and Economic Origins of Our Time* (United States: Beacon Press).
- Porter, M. E. & Solvell, L. O. (1998) The role of geography in the process of innovation and the sustainable competitive advantage of firms, in: A. A. Chandler Jr, P. Hagstrom & L. O. Solvell (Eds) *The Dynamic Firm: The Role of Technology, Strategy, Organization, and Regions*, pp. 440–457 (Oxford: Oxford University Press).
- Randle, K. (1996) The white-coated worker: Professional autonomy in a period of change, *Work, Employment and Society*, 10(4), pp. 737–753.
- Randle, K. & Rainnie, A. (1997) Managing creativity, maintaining control: A case study in pharmaceutical research, *Human Resource Management Journal*, 7(2), pp. 32–46. doi:10.1111/j.1748-8583.1997.tb00280.x.
- Robert-Nicoud, F. (2008) Offshoring of routine tasks and (de)industrialisation: Threat or Opportunity—and for Whom? *Journal of Urban Economics*, 63, pp. 517–535.

- Sabel, C. (1988) Flexible specialization and the re-emergence of regional economies, in: P. Hirst & J. Zeitlin (Eds) *Reversing Industrial Decline?* (Oxford: Berg).
- Sabel, C. (1994) Flexible specialisation and the reemergence of regional economies, in: A. Amin (Ed.) *Post Fordism: A Reader*, pp. 101–156 (Oxford: Blackwell).
- Saxenian, A. (1994) *Regional Advantage* (Cambridge, MA: Harvard University Press).
- Schoenberger, E. (1994) Corporate strategy and corporate strategists, *Progress in Human Geography*, 22(1), pp. 435–451.
- Schoenberger, E. (1997) *The Cultural Crisis of the Firm* (Cornwall: Blackwell).
- Smelser, N. J. & Swedburg, R. (Eds) (1994) *The Handbook of Economic Sociology* (Princeton: Princeton University Press).
- Smith, A. (1998) *Reconstructing the Regional Economy: Industrial Transformation and Regional Development in Slovakia* (Cheltenham: Edward Elgar).
- Storper, M. (1997) *The Regional World: Territorial Development in a Global Economy* (New York: Guildford Press).
- Swain, A. (1998) Governing the workplace: The workplace and regional development implications of automotive foreign direct investment in Hungary, *Regional Studies*, 32(7), pp. 653–671. doi:10.1080/00343409850119535.
- Teece, D. J. (1998) Design issues for innovative firms: Bureaucracy, incentives and industrial structure, in: A. D. Chandler Jr, P. Hagstrom & O. Solvell (Eds) *The Dynamic Firm: The Role of Technology, Strategy, Organization, and Regions*, pp. 134–165 (Oxford: Oxford University Press).
- Trippl, M. & Todtling, F. (2007) Developing biotechnology clusters in non-high technology regions—the case of Austria, *Industry and Innovation*, 14(1), pp. 47–67.
- Uhlir, D. (1998) Internationalization, and institutional and regional change: Restructuring post-communist networks in the region of Lanskroun, Czech Republic, *Regional Studies*, 32(7), pp. 673–685. doi:10.1080/00343409850119544.
- UNCTAD (2010) *World Investment Report* (New York and Geneva: United Nations).
- Van Welsun, D. & Reif, X. (2005) Potential offshoring: Evidence from selected OECD countries, *Brookings Trade Forum*, 2005.
- Van Zon, H. (1998) The mismanaged integration of Zaporizhzhya with the world economy: Implications for regional development in peripheral regions, *Regional Studies*, 32(7), pp. 607–618. doi:10.1080/00343409850119508.
- White, M. C. (2004) Inward investment, form embeddedness and place: An assessment of Ireland's multinational software sector, *European Urban and Regional Studies*, 11(3), pp. 243–260. doi:10.1177/0969776404044022.
- Zanfei, A. (1996) Technology and the changing organization of transnational firms. Paper presented at EMOT Theme 5 Conference Learning and Embeddedness: Evolving Transnational Firm Strategies in Europe, Durham, 28–29 June.
- Zukin, S. & Dimaggio, P. (Eds) (1990) *Structures of Capital: The Social Organization of the Economy* (New York: Cambridge University Press).