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Organizational Changes and Employment Shifts in the Mining Industry: Toward a New Understanding of Resource-Based Economies in Peripheral Areas

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Abstract

Technological development and innovation have improved productivity in mining; consequently, mining employment has decreased. In the light of a growing demand for raw materials, mining activities have increased in many mining regions. In Sweden, this development has had modest effects on employment levels, although improved productivity is not the sole explanation. The aim of this paper is to examine the extent to which a reorganization of mining employment has occurred; which industrial sectors might be affected by such restructuring; and whether restructuring has any implications on gender equality. Previous studies by Eriksson (2004) and Knobblock & Pettersson (2010), have demonstrated that new employment strategies, in addition to mergers and acquisitions, have been implemented and that they affect employment. However, the extent of this reorganization remains unknown. The current study was carried out in Västerbotten, a mining region in northern Sweden. By means of unique longitudinal database, connecting information concerning individuals and companies and covering the total population of Sweden, along with data from the Mining Inspectorate of Sweden, this study examined issues of employment, labour mobility, and gender equality. Key informant interviews with mining stakeholders were also conducted, adding to the knowledge concerning organizational changes. The data suggests that an organizational change had occurred, with jobs having been outsourced by the mining industry to other sectors. This led to the start-up of new companies, increased employment, and the inclusion of more women in the field. Results also indicated that the mining industry and related companies have represented new development potential in peripheral mining regions.

Keywords: Mining, Employment, Outsourcing, Innovation, Regional development

1.0 Introduction

Globally, the mining industry has made a strong resurgence in the 21st century, not only in terms of production volume but also in terms of job creation (Dicken, 2011; SGU, 2010). This reinvigoration can be attributed to a growing demand for mined resources in the expanding economies of Asia, the easing of strict mining legislation, and more secure mining operations (Dicken, 2011; Ministry of Enterprise, Energy and Communication, 2002; Frasier Institute, 2008). In assessing previous research, it is evident that industries must be innovative in order to remain competitive (Almqvist & Gröning, 2010; Dicken, 2003): innovation is often perceived as the

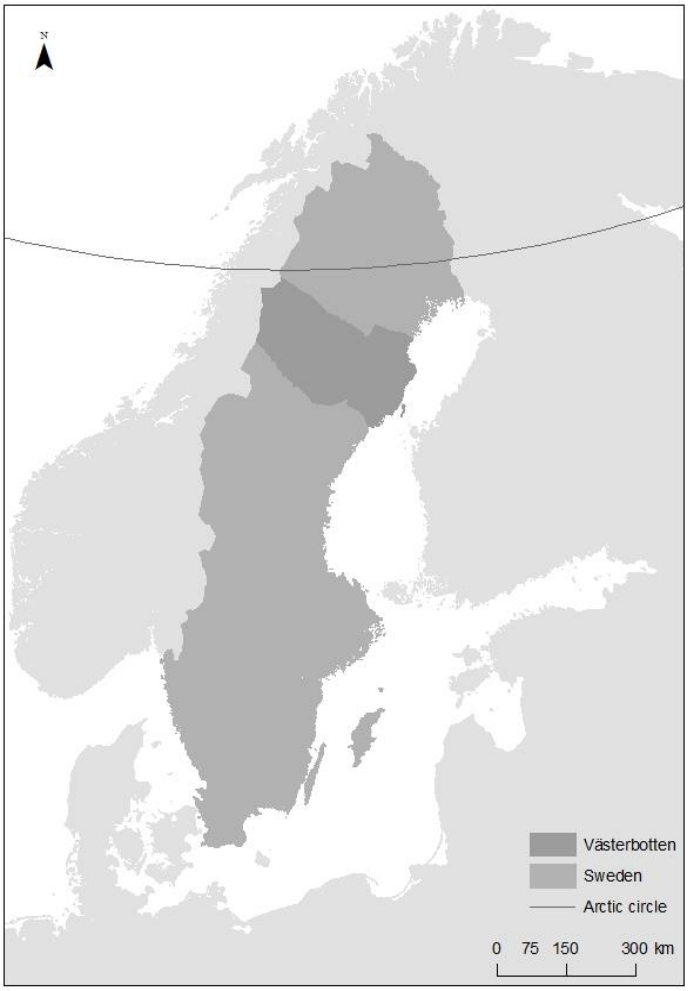
main push factor behind regional development, economic growth, and increased productivity (Baumol, 2002; Boschma, 2005; Dicken, 2003). Thus, a productivity increase causes downsizing in mining employment (Dale, 2002; Neil et al., 1992). As a result of this process, many resource-rich nations and resource-based communities have moved from resource-bias economies to those based on service.

In Sweden particularly since the 1980s, mining has suffered from declining importance with regard to employment and economic development. Today, tertiary service activities dominate the labour market (SCB, 2012a). Even in Sweden's largest resource towns the mining industry provides work for less than 20% of the workforce (PUAB, 2011). Resource extraction has also attracted increasingly negative attention, largely having to do with environmental and social concerns, but also due to preconceptions of the industry concerning path dependency and resource curses (Auty, 1993; Dale, 2002; Hayter, 2000; Richards, 2009). One reason for such stigma might be that the benefits from resource extraction are less obvious today as compared to the first half of the 20th century, when the local economy depended more heavily on resources, and new resource communities were still being developed in Sweden.

The aim of this study was to examine the degree to which observed changes in mining employment were the result of industrial restructuring, whereby employment was transferred from the mining companies to related companies outside the traditional mining industry. In relation to this aim, the following research questions were addressed: To what extent has a reorganization of mining employment occurred? What other economic sectors have been affected by this industrial restructuring? Has the reorganization led to any changes in gender equality in the mining sector?

The focus of this study was the mining industry in Sweden. Västerbotten County (Figure 1), which has had large-scale mining operations since the 1920s, was chosen as a case study. Today, both Swedish and foreign major and junior mining companies are located in the area, as are a number of companies dealing with related activities (Tillväxtverket, 2009). The study covered the time period from 2000 to 2008, and was based on a review of longitudinal micro data, data from the Mining Inspectorate of Sweden, and key informant interviews with mining stakeholders in the area. This made it possible to identify companies and employees engaged in mining and related activities, and to follow them from a longitudinal perspective.

Figure 1. The Study Area of Västerbotten



Recent changes in the mining industry have motivated research on industrial restructuring and reorganization in this sector. The prices of metals and minerals are highly volatile and fluctuations in the world economy are magnified in the mining sector, leading to sudden boom and bust periods (Auty, 2004; Dicken, 2011; Humphreys, 2010). Previous research often focused on production, mine closures, and the restructuring of resource communities. Very seldom has research focused on the redistribution of labour within the industry and what effects this has had on additional sectors. More recent research has touched on the changing modes of production, and has suggested that jobs might have been transferred from mining to other sectors; for example, Knobblock and Pettersson (2010) have demonstrated that through outsourcing, companies outside the traditional mining industry have provided mining companies with labour for performing core mining activities. Research on industrial reorganization in this sparsely populated region may provide new insights into what types of employment and regional development potential mining can give rise to within developed economies. This is particularly the case in areas characterized by remoteness, a scattered population, and limited access to infrastructure: common features of many peripheral mining regions in countries, such as Canada and Australia.

The structure of the remainder of this paper includes an examination of the literature concerning resource extraction and its implications on economic development, and the restructuring of mining activities, particularly the reorganization of the industry; the presentation of methodological concerns, including the division of mining activities in core and related activities; an introduction to the materials applied to the study; the presentation of results concerning workplace generation, employment development, labour mobility, gender equality, and outsourcing; and concluding remarks.

2.0 Resource Extraction and Regional Development

Raw material extraction has been an important force behind colonization, population development, economic growth, and land use conflicts in the remote resource-rich regions of northern Europe (NÄRP, 1982; Sörlin, 1988). In considering the past, industrial investments have had a greater local impact; however, a greater mobility of people and goods, specialization, and an increasingly globalized economy have minimized the local effects over time (Berner et al., 2011). After the first half of the 20th century, many resource communities began experiencing difficulty in maintaining population levels, services, and jobs when the resource economy failed (Keyes, 1992; Hayter, 2000; NÄRP, 1982; Neil et al., 1992). This declining pattern was not only evident in the mining regions of Europe, but also emerged in other mining nations (Keyes, 1992).

Research in the field of economic geography has frequently focused on natural resources. Much of this research originated from Innis and Mackintosh's work concerning staple economies in Canada from the 1920s onward (Innis, 1999; Mackintosh, 1964; Gunton, 2003; Hayter & Barnes, 1990). Although the export of natural resources (or staples) can have deep economic impact on the development of nations or regions, Innis (1999) argued that there were risks in becoming permanently locked into dependency as a resource hinterland. On the other hand, Mackintosh (1964) argued that it was possible to develop a modern economy based on staple production alone.

The concept of path dependency was later developed to explain industry evolution and technological adoption processes (Boschma & Lambooy, 1999; David, 1985; Martin & Sunley, 2006; Nelson & Winter, 1982). The concept had a strong influence on evolutionary economics, particularly through the work of Nelson & Winter (1982). Innovations are rooted in previous innovativity: the accumulation of knowledge leads to a technological trajectory that, in combination with firm routines, can create different degrees of path dependence that delimit the options for further development (Grabher, 1993; Martin & Sunley, 2006). Boschma & Lambooy (1999) argued that the evolutionary notions of path dependency may have been linked to the issue of regional adjustment: mature industries with outdated organizational routines and technology were particularly susceptible to losing their competitiveness, which may affect the regional economy negatively.

Auty (1993) described resources as an economic curse, arguing that resource-rich countries often failed to transform their natural assets into development opportunities. Many mining communities have experienced the difficulties that resource extraction brings, including shifting demand and mine closures; as a result, the restructuring of mining communities has often directed focus toward the negative societal effects of mining (Auty, 1993; Dale, 2002; David, 1985; Halseth, 1999; Hanink, 2000; Neil et al., 1992; Neil & Tykkyläinen, 1995, 1998; Richards, 2009).

In most cases, theories of regional development have focused on the competitiveness of firms and regions, their ability to adapt, and the importance of human capital and information technology for innovation processes (Scott & Storper, 2003). The mining industry's importance as a contributor to economic activity, in both developed and developing countries, has often been underestimated, even when the industry has held some of the world's largest companies (Crowson, 2009). Mining continues to affect the economy of many nations. The relationship between resource extraction and regional development has also been overlooked in economic geography for some time (Gunton, 2003). Important changes have occurred; for example, some mining communities have successfully diversified to become service economies, and have increased their flexibility through investment in small-scale manufacturing or different forms of tourism (Hayter, 2000; Keyes, 1992; O'Faircheallaigh, 1992).

3.0 Restructuring of Mining Activities

Increased political stability following the end of the Cold War led to the removal of protectionist mining legislation in more than 80 countries from the 1980s onward, including Sweden in 1992 (Bridge, 2004; Ministry of Enterprise, Energy and Communication, 2002; Humphreys, 1995). This legislative shift occurred around the same time as economies like China and India began growing, creating an increased demand for metals, mining technology, and related services (Dicken, 2011; Humphreys, 2010). These changes resulted in a rapid development of the mining industry through mergers and acquisitions (M&A), and the establishment of new mining and exploration companies on a global scale (Dicken, 2011). Furthermore, global mining companies have emphasized intensive cost-cutting, concentration on core business, and heavy investment in new technology (Eriksson, 2004).

Mining companies have reduced their financial risk and positioned themselves strategically through product diversification and investment in different geographical locations (Shapiro et al., 2007). A strategy adopted by mining companies worldwide in the changing of production, or for rapidly reducing risk on a large scale, has been to consolidate; thus, causing a wave of M&A in the industry (DePamphilis, 2007; Dicken, 2011; Eriksson, 2004; Shapiro et al., 2007; Wrigley, 2003). Since the end of the 1990s, expenditure on M&A has risen rapidly while being diverted from exploration (Eriksson, 2004). One conclusion is that this change was part of the restructuring process, meaning that majors acquire juniors with promising exploration results or deposits; thereby, reducing their own risk without lowering productivity.

Difficulties in handling unprofitable production, environmental pollution, and lower employment, continually affect mining nations and resource communities. Sweden is just one of such countries to feel the impact of these concerns (Ministry of Enterprise, Energy and Communication, 2002; SGU, 2010). The Swedish mining industry peaked during the 1950s, in terms of mines in operation and mining employment (SGU, 2010). As in many other resource nations, a single mining company was able to dominate the labour market by keeping business activities in-house to avoid labour shortage or competition. The viability of the resource community was thereby dependent on the success of the mining operation, often creating strong loyalty to the mining company (Bergdahl et al., 1997).

In the European north, this resulted in policies aimed at diversifying the economy, which formed the start of a restructuring process (Ministry of Enterprise, Energy and Communication, 2002; NÄRP, 1982). In contrast to many mining towns elsewhere in the world that simply shut down, larger mining towns in Sweden were often restructured, usually under the auspices of the Swedish welfare state. This restructuring meant that mining companies were no longer the major employers, not even in the largest mining municipalities of northernmost Sweden (PUAB, 2011). However, the strong loyalty and former in-house production led to low levels of entrepreneurship at a time when other industry sectors were developing.

Work in the mine has had, and continues to have, many strong symbolic links to masculinity (Abrahamsson et al., 2010). The workplace culture reinforces this environment of predominantly male workers (Abrahamsson & Somerville, 2007; Collinson & Hearn, 1996), discouraging much female employment; however, organizational and technological change may put any existing tacit gendered contracts into question (Abrahamsson et al., 2010; Butler, 1993). Additionally, community development agreements have favoured the advent of gender equality among workers in resource communities in countries such as Australia (O'Faircheallaigh, 2012).

4.0 Creating New Opportunities through Innovative Organizational Change and Labour Mobility

Many industries and products go through cycles and stages, involving any number of different challenges. Each stage requires appropriate strategies to deal with manufacturing, labour skills, and workforce (Kuznets, 1929; Schumpeter, 1939; Vernon, 1966). The mining industry differs from many other industries in that the outcomes, processed metals and minerals, are always needed, even when production methods and business organization vary over time.

Inflow of FDI and a rise in employment are factors often associated with innovation (Head et al., 1999). Innovation can also be characterized as an interactive process, whereby companies collaborate with customers, suppliers, other related companies, and research and development institutions (Lundvall, 1988). Businesses have increasingly recognized the importance of collaboration and networking, which have had an impact on innovation in many industries, including primary activities (Fischer & Varga, 2002; Frenken, 2000; Jacquier-Roux & Bourgeois, 2002; Nieuwenhuis, 2002). Innovation capacity is increasingly connected to networks of firms, rather than a single firm itself or to specific individuals working in the firm (Powell et al., 1996). Increasing demand for efficiency has moved mining toward flexible production, affecting the organization of both companies and resource communities (Dicken, 2011). Outsourcing has allowed mining companies to rapidly adjust production volumes and costs (Bridge, 2004). Large companies typically develop already existing products, while smaller businesses tend to develop new products and make breakthroughs (Baumol, 2004); as a result, smaller firms can be important to the production of new employment opportunities and industrial change, especially if they are technology-driven (Rickne & Jacobson, 1999). In Sweden, mining company reorganizations have had a great impact on the mining industry in terms of reducing costs and increasing productivity (Eriksson, 2004).

Reorganization requires access to different skills, and perhaps even new input in the form of human capital. Labour skills, social embeddedness, and knowledge are

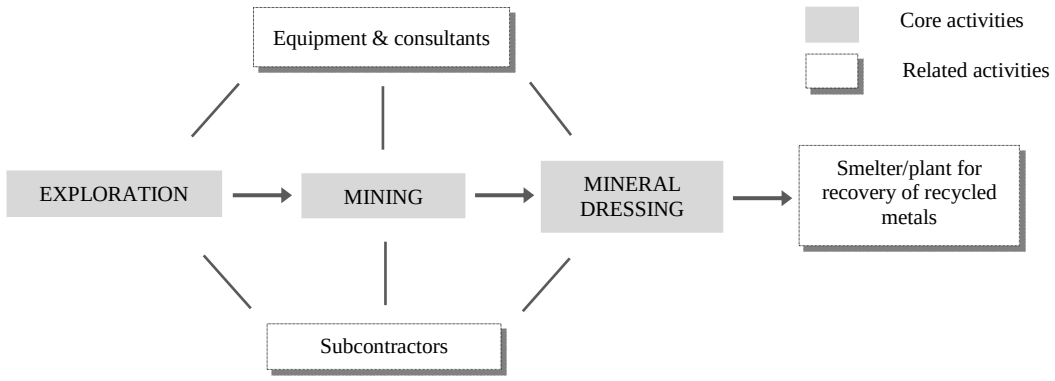
increasingly considered to influence a company's ability to stay ahead in a competitive global economy (Granovetter, 1985; Head et al., 1999; Maskell & Malmberg, 1999; Svensson Henning, 2009). According to Storper & Walker (1989) and Maskell & Malmberg (1999), it is favourable to conduct mining operations in areas where there is existing experienced labour: labour skills being place-specific. All economic actions are embedded in structures of social relations, and knowledge is created and reproduced through social interaction (Malmberg et al., 1996). The embedding of knowledge takes different forms; for example, much is tacitly embodied in individuals whose knowledge can be exchanged within the firm. This is an important competitive advantage, not only for the firm itself but also for those in relation to the firm (Maskell & Mamberg, 1999).

The labour force is relatively fixed in particular geographical locations. In peripheral resource-rich regions, where fewer jobs are available, the shift from primary and secondary activities to a service economy has fostered labour market-related migration flows. This is particularly true from a historical perspective. Today, various forms of commuting supplies mining companies with labour if there are no settlements nearby. Long-distance commuting by airplane has emerged as a way of handling labour requirements when distances are far too long for daily or weekly commutes. The fly-in/fly-out (FIFO) model of labour that became common in the mining industry during the 1970s and 1980s is used in both Canada and Australia (Houghton, 1993; Markey et al., 2011; Storey, 2001; Tykkyläinen, 1998).

5.0 Data and Methods

For the purpose of this study on organizational change, economic activities were divided into *core* and *related* actions. *Core activities* refer to those executed in the mine, such as exploration, mining, and mineral dressing (Figure 2). However, previous research has demonstrated that mining operations also engage other companies besides mining companies, in what are labelled *related activities* (Dicken, 2011; Knobblock & Pettersson, 2010; Tillväxtverket, 2009)**.** These include the development and production of machinery and equipment, subcontracting, mining-related services like legal representation and the analysis of mineral samples, and work carried out at smelters (Figure 2).

Figure 2. Organization of Mining Activities



Source. Knobblock and Pettersson (2010).

The term mining industry represents actors that own mines or deposits or conduct exploration, such as major and junior mining companies. Core and related activities can be performed by labour working in the mining industry, but also by subcontractors and consultants that are traditionally not regarded as part of the mining industry but as belonging to other economic sectors. In the conceptual framework of this paper, the term mining sector includes all companies, employees, and activities executed in either core or related activities.

This study was based on data from the longitudinal registry, the Mining Inspectorate of Sweden, and from semi-structured key informant interviews with representatives of 15 companies. Registry data concerning industries, firms, and individuals were accessible in a unique geo-referenced longitudinal micro database (ASTRID). This database included many annual administrative registries from Statistics Sweden, including the Swedish Standard Industrial Classification (SIC) data. In ASTRID, each company and workplace was associated with an industry sector code (SIC) that was determined on the basis of its primary activity. If there were multiple activities at the firm or workplace, the industry sector code was based on the activity that employed the most personnel. The classification of SIC data changed during the investigated time period; therefore, both definitions (SIC92 and SIC02) were used. A firm could have many production units or workplaces listed in ASTRID, all of which had a unique identification number (CFAR). ASTRID also included socio-economic information regarding the total population of Sweden, and every employee was linked to a production unit that made it possible to connect industries and workplaces to individuals' socio-economic attributes.

The Mining Inspectorate provided geo-referenced data on all companies holding exploration permits or exploitation concessions or with mines in production in Västerbotten during 2007-2008. The key informant interviews were held with chief executive officers and managers working at four major companies, one junior company, and ten related companies in Västerbotten during the autumn of 2008. In the case of one major company, informant interviews were held with five chief executive officers and managers due to the company's production diversity. The informants provided information concerning additional companies in the industry and the use of subcontractors. These interviews provided a means of capturing aspects of workplaces that performed both core and related activities, which might have been overlooked in the SIC data as belonging to the mining sector. Inaccuracies in the SIC may have occurred for several reasons: the production might have changed since the company started (whereas the classification remained based on its initial production), or a firm might have diversified and now conducted work in several industries (Statistics Sweden, personal communication, August 2011; SCB, 2012b). The informants also provided information on organizational changes that were occurring in the mining sector and collaborations with other firms or stakeholders.

Workplaces in the Västerbotten mining sector were identified in the database by matching geo-referenced data from ASTRID with that from the Mining Inspectorate, as well as information from the interviews. This resulted in a data set of 79 workplaces and 3,759 individuals for 2008, all belonging exclusively to the mining sector. Even though all 79 workplaces were active solely in the mining sector in 2008, not all were identified as part of the mining sector according to their SIC classification. The remaining workplaces were recognized as belonging to the mining sector through interviews and data from the Mining Inspectorate;

thus, some of the included workplaces have SIC codes that were unrelated to the mining sector (see Table 1). These SIC codes were merged into the following industry sector groups: agriculture and forestry, pulp, manufacturing, construction and engineering, transports, services, and public service activities. This procedure ensured the inclusion of all mining activities in Västerbotten.

Table 1. *Workplace Classification*

Industry sector	**Activity**	**Workplace SIC92**	**Workplace SIC02**	**SIC codes include**
Mining activities and related services	Core and related activities*	10100-14500, 27100-27540, 29510-29520, 37100-37200, 74140-74150, 51520, 65231	10100-14500, 27100-27540, 29510-29520, 37100-37200, 74140-74150, 29420, 65231	Mining and quarrying, drilling, transportation/ blasting, services, consultants, exploration, mineral dressing, smelter/plant
Agriculture and forestry	Unrelated activities	01111-05025	01111-05025	Agriculture, hunting, forestry, fishing
Pulp	Unrelated activities	21000-22330	21111-22330	Manufacture of pulp, paper and paper products
Manufacturing	Unrelated activities	23100-26829, 29530-36630, 15000-20520, 28100-29500	15111-20520, 23100-26829, 28110-29410, 29530-36630, 29430	Food products, textile, wooden products, chemicals, non-metallic mineral products, machinery and equipment
Construction and engineering	Unrelated activities	40000-41000, 45100-45500	40110-41002, 45110-45500	Electricity, gas and water supply, construction,
Transports	Unrelated activities	60100-63230	60100-63230	Aviation, rail transport, road transport, ship
Services	Unrelated activities	65232-72600, 50100-51510, 51530-55529, 63300-65230, 74100-74130, 74200-74849, 92100-99000	50101-51510, 51530-51810, 51830-55529, 63301-65220, 65232-72600, 74111-74130, 74201-74879, 90010-99000	Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods, communication, hotels and restaurants, financial intermediation, real estate, renting and business
Public service activities	Unrelated activities	73100-73203, 75100-91330	73101-73203, 75111-85329	Public administration and defence, compulsory social security, education, health and social work

* Defined in Figure 2.

Employment in core and related activities in Västerbotten was calculated for the years 2000-2008. Labour mobility between economic sectors was calculated by following individuals from 2008 back through to their affiliation in 2000. This allowed for an examination of degree of affectedness on industry sectors due to organizational changes in the mining industry. Individuals' socio-economic characteristics were also investigated using descriptive statistics.

6.0 Results

6.1 Emergence of New Workplaces

In recent years, the Västerbotten mining sector underwent significant changes. The representatives of the related companies, as well as several representatives working for majors, stated that proximity and well-established social networks (interpreted as functional proximity and social embeddedness) led to the start-up of new firms and workplaces. The data demonstrated that 2008 saw 36 new workplaces engaged in the Västerbotten mining sector, as compared to 2000. These workplaces provided work for 6% of the employees in the regional mining sector that year.

Table 2. *Workplace Generation 2008 Compared to 2000*

	New firms 2008	Number of
Core and related activities		
Mining activities	7	136
Related activities	1	1
Unrelated activities		
Manufacturing	5	15
Construction and engineering	1	7
Transports	1	4
Services	21	59
Total	36	222

Source. ASTRID, the Mining Inspectorate and interviews 2008.

According to the SIC classification, approximately 40% of the employment generated by the new workplaces could be found in unrelated activities (see Table 1). This suggested a certain degree of inaccuracy in the SIC data. A majority were active in the service industry, while the remainder worked in manufacturing, construction and engineering, transports, or other related services. The workplace generation between 2000 and 2008 supported previous research by Tillväxtverket (2009) and Knobblock & Pettersson (2010), which indicated outsourcing strategies among mining companies in the Västerbotten mining sector.

6.2 Redistribution of Labour from Core Companies to Related Firms

The ASTRID data confirmed that the recent increased interest in mining resulted in greater employment within both core and related activities (Table 3): it represented a shift, breaking with the declining mining employment of previous decades. Additional official statistics demonstrated an increase during the 21st century, in terms of both employment and mining-related investments (SGU, 2012).

Table 3. *Employment Estimates in Västerbotten's Mining Sector, 2000 and 2008*

	Employment 2000	Employment 2008	Employment change	Employment change, (%)
Mining	462	787	325	70
Exploration	5	26	21	420
Mineral dressing	36	61	25	69
Total employment in core	503	874	371	74
Smelter/plant	619	988	369	60
Transportation/blasting	69	14	-55*	-80
Mining-related services	98	179	81	83
Consultants	10	119	109	1090
Machinery and equipment	993	1585	592	60
Total employment in related	1789	2885	1096	61
Total employment in core and related activities	2292	3759	1467	64

Source. ASTRID. *The decrease is dependent on M&A and labour mobility from the transport sector into other sectors, according to key informants.

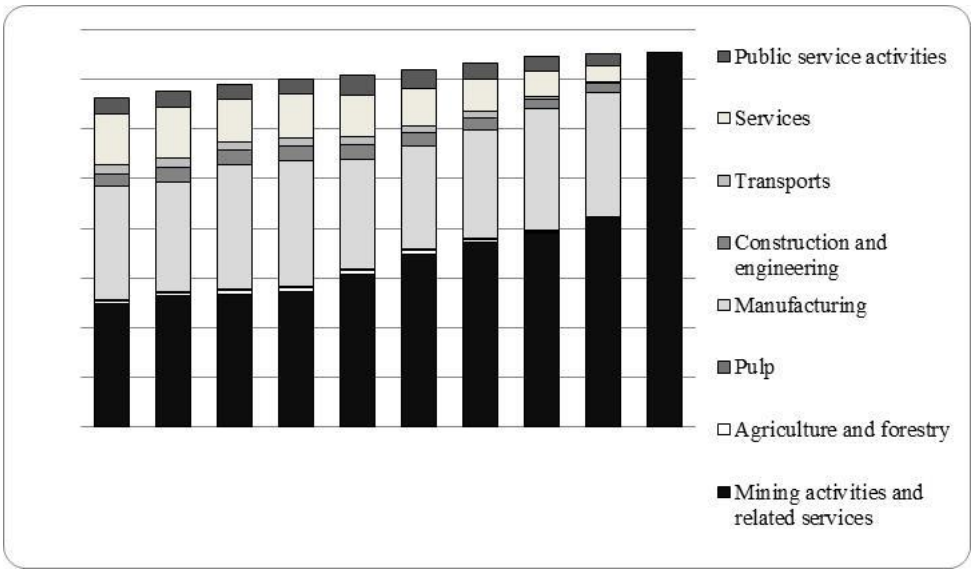
From 2000 to 2008, the increase was nearly 1,500 employees in core and related activities. This represented approximately 3% of the total labour market in Västerbotten for 2008: the final year of the study. Key informants working for majors and juniors stated that the companies outsourced several different types of activities; consequently, less than 25% of employees working in the mining sector in 2008 worked within core activities, while the remaining 75% worked in related activities.

6.3 Labour Mobility into the Mining Sector

The distribution of employment per industry sector, estimated through the combination of sources and compared to SIC data, showed a discrepancy in 2008 (Figure 3); as such, it is reasonable to believe that the use of SIC data could also affect employment estimates for other industries in Sweden.

According to SIC data, approximately 2,100 employees worked with "Mining activities and related services" in 2008. This was an increase of 70% from 2000 to 2008, but was still 1,650 fewer individuals as compared to the estimates of almost 3,800 employees shown in the "2008 estimates" bar of Figure 3. About 1,250 employees worked in the manufacturing sector in 2008, while services, public service activities, and construction and engineering were also common industry sectors represented in the SIC data.

Figure 3. Workers' area of employment by industry, presented according to SIC compared to 2008 estimates.



Source. ASTRID.

The rise in employment was in part due to increased mining in Västerbotten and labour mobility between different industry sectors. It suggested that outsourcing strategies adopted by the mining companies had implications on the employment structure in Västerbotten's mining sector, as well as in other industry sectors in the mining districts. Further, in the analysis of the micro data, labour mobility between different economic sectors connected to the mining industry implied that labour skills and functional proximity were important factors influencing the development of new firms and innovation.

According to ASTRID and the key informants, outsourcing strategies were a rather recent change, implemented primarily since 2005. This coincided with a period of increased exploration activity and foreign direct investments (FDI) in the region (SGU, 2010). Several leading managers also noted an increased need for staff at this time. However, the mining companies' own employment levels stood relatively still or even fell during the same period. Instead, subcontractors and consultants were contracted for both core and related activities. An example of this was a major mining company in Västerbotten that filled approximately half of its employment needs in-house, while the remainder of the jobs were outsourced.

The data also revealed a connection between other nature-based industries, like agriculture and forestry as well as pulp and paper, and rising numbers of employees from these industries in the mining sector. Representatives of two majors in the region agreed that this could have been caused by a demand for similar skills in managing large-scale industrial processes. These findings were in line with previous research on labour mobility of non-miners in the peripheral regions of the Nordic countries (Neil et al., 1992). Approximately 15% of the employees in the mining sector had previously worked with services. These employees were recruited to perform very diverse tasks, including administrative work or motor vehicle repair.

According to interviews with representatives of a major mining company, there were profound gender differences in the recruitment of staff members. It was within administration or services that most woman staff members were employed within a company, while men continued to perform heavier jobs. The representatives said they had been attempting to change this situation for some years, though one problem they faced was that very few women applied for jobs in the mining industry, which traditionally was a male-dominated industry. In Sweden, women were even prohibited from taking underground mining jobs from 1900 to 1978 (Abrahamsson et al., 2010). Only 10% of the miners in Västerbotten were women in 2007 (Knobblock & Pettersson, 2010), while in 2008 women accounted for 15% of all employees in the Västerbotten mining sector when related activities were included among the data.

6.4 Investments, M&A, and Outsourcing in the Sector

In the Swedish mining industry, production and exploration have increased rapidly since 2000 (SGU, 2012). Mining-related foreign direct investment has also been high in Sweden in general, as well as in Västerbotten (SGU, 2010). Exploration expenditures in Sweden have increased since 2003 and nearly a third of all exploration activities between 1990 and 2008 were conducted in Västerbotten, according to the Mining Inspectorate. Further, the number of companies holding exploration permits increased by almost 30% between 2006 and 2007.

M&A and their effects have not been studied within the Swedish mining context. Representatives of major mining companies stated that the major companies, and their business associates, were engaged in the acquisition of majors, juniors, and related firms both in Sweden and abroad. They acquired other companies as a strategy to diversify geographically, spread risk, or to acquire a specific technology or competence.

New labour practices led to new business opportunities, product development, and increased flexibility. Outsourcing and M&A should therefore be regarded as complementary strategies: in Västerbotten, outsourcing occurred mostly on the local or regional level, and for different reasons than M&A. Most often, these joint strategies occurred when companies wanted to be able to more rapidly change the plant's number of workers, both skilled and unskilled, as well as its production capacity. Outsourcing replaced the former in-house production system, resulting in reduced risks. Utilizing M&A entailed strategies for changing production, diversification, or breaking into a new geographical area or production segment, while outsourcing allowed for more quick and efficient handling of labour requirements locally, and reduced the risk of unnecessary labour costs.

6.5 Functional Proximity and Social Embeddedness in Mining

Majors and juniors in Västerbotten ranged from private local firms to transnational companies. During the key informant interviews, representatives stated that the companies were localized in Sweden due to the rich mineral deposits, a favourable political climate, and modern mining legislation. Foreign companies in the study area also wanted to be perceived as "local" and put much effort into this strategy; for example, hiring local staff and Swedish-speaking CEOs. ASTRID data included all employees with their residential address in Sweden and confirmed that local staff was hired in the Västerbotten mining sector: the mean distance to work,

from the residential location, was under 30 kilometres and approximately 90% of the labour force in the mining sector lived less than 50 kilometres from work.

According to many key informants, irrespective of firm size, functional proximity (accessibility or distance) and social embeddedness were important factors because they facilitated innovation. Mining was characterized by strong local and regional social embeddedness, and led to close collaboration between mining companies and related firms in Västerbotten. This also extended to bust periods, such as the economic crisis that began in 2008: some related companies were on the edge of bankruptcy but were saved by investments from business partners in the region.

Functional proximity and institutional factors could also stimulate regional development. In Västerbotten there were several mining institutions that facilitated collaboration between the mining industry, stakeholders, universities, and the community. The key informant interviews revealed many examples of collaboration between suppliers and customers, as well as other stakeholders in the region; thus, supporting the notion that innovation is an interactive process between actors (Lundvall, 1988). Gertler et al. (2000) stated that a firm's home base remains the most important site for innovation and R&D. The interviews with representatives of related companies and a Swedish major, demonstrated that this particular region gained from the tacit knowledge and social embeddedness that have ripened during years of resource exploitation. This was important for managing labour force requirements as well as changing the conditions of production.

7.0 Concluding Remarks

The results of this study imply that recent changes in mining require an expansion of the definition of what "the mining industry" entails. Due to reorganizations and M&A among mining companies, the local workforce is often employed in other industry sectors, where they perform both core and related activities. Most new jobs are available in the more diversified related activities; as a result, the Västerbotten mining sector stands strong despite concerns regarding the hardships of the 2008 financial crisis.

The mining industry outsources activities, causing a continuous fragmentation of functions, while the companies reduce their risk and consolidate. As in other places (Shapiro et al., 2007), mining companies in Västerbotten position themselves strategically and diversify through investment in new locations, according to key informants. The use of M&A, together with high levels of FDI, resulted in hope for regional development and a new era of business expansion brought about by mining.

In peripheral areas, the continuation of rural settlements depends on access to jobs and labour. This study demonstrated that the mining sector remains attractive to those seeking jobs in rural parts of Västerbotten, where the labour market is less dynamic as compared to urban areas. Despite Västerbotten being remote, the FIFO-model is not used; instead, a great majority of the workers are local and live nearby, contrary to other mining operations in Australia or Canada. Labour mobility in the regional mining sector has been relatively high, especially since 2005. According to Eriksson (2009), labour mobility between firms is an important factor influencing productivity. In the Västerbotten mining industry, productivity has increased and jobs and workplaces have been generated, although mostly for men.

In some other mining nations, promotion of gender equality is achieved through community development agreements that have had positive effects

(O'Faircheallaigh, 2012). This type of agreement does not exist in Sweden. There are financial incentives for women to start working in sectors dominated by men, as wages there are generally higher. However, in the rural areas of Sweden women are overrepresented in the public service sector, while more than 30% of men are employed in manufacturing and mining (SOU, 2006). In Västerbotten, both core and related activities are still highly dominated by men despite efforts by the mining companies to change this situation. This emphasizes that labour markets in rural parts of Sweden are divided and vulnerable, which can affect the viability of the resource community.

As is common to all economic pursuits, mining activities are socially embedded (Granovetter, 1985). The interviews provided a picture of a mining region characterized by strong formal and informal networks and business relations between mining companies, related companies, and residents within and outside the mining communities. These ties exist due to the long history of mining in Västerbotten, but they have not necessarily generated path dependency. Instead, social embeddedness creates an innovative business climate, where functional proximity increases a firm's possibilities to interact, collaborate, and deepen social contacts, which in turn enables innovation diffusion (Hägerstrand, 1991). In Västerbotten, companies engaged in core and related activities recognized the importance of collaborations between firms for innovation purposes; as such, this study aligns with works by Frenken (2000), Fischer & Varga (2002), Jacquier-Roux & Bourgeois (2002), and Nieuwenhuis (2002).

Even though Västerbotten has a history of dependency on mining, not all production factors have turned into ubiquities. Rich deposits, functional proximity, social embeddedness, and the relatedness of mining activities have led to a continuation of certain activities, particularly those requiring high-skilled labour and tacit knowledge. The contribution of this study lies in its demonstration that reorganization can be innovative and contribute to job creation and the emergence of new workplaces. Rickne & Jacobson (1999) have previously shown that small firms can be important for the establishment of new jobs and for industrial change, particularly if they are technology-based (also the case in Västerbotten). Development in the mining industry has led to an opening for new firms: the rise of not only small-scale mining and junior companies, but also firms performing related activities that can provide livelihood for the local population in areas with small labour markets.

This study pointed to the value of using a combination of data to produce a more secure and fair evaluation of the mining sector. In addition, the results illustrated that risk-reducing strategies influence how different industrial sectors affect one another. Further research on relatedness between industrial sectors could contribute to a more holistic and conjunctive understanding of growth potential, industrial development, and labour market dynamics. This paper identified existing capabilities and challenges for dealing with organizational changes that may strengthen the sustainability of peripheral mining communities. Future development potential is no longer dependent on the resource alone; rather, the long-term experience from mining is used to produce products and services to be sold elsewhere and to be used in other industries. Development is dependent on how successfully companies can adjust their production and organization to global market conditions, and how they manage to reinvent themselves through innovation. At present, foreign direct investment, new firms, and rising

employment have allowed the regional mining sector to succeed in diversifying and adapting to changing global conditions within the industry.

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