

DEL 1

Innledning

1. Introduction to Scandinavian Copper

Kristine Bruland og Kristin Ranestad

This book is about the copper industry in Scandinavia in the Early Modern Period. The focus is on the two main copper producers, Røros in Norway, established in the early 17th century, and the Falun copper mines in Sweden, with roots going back to the mid-14th century. The book presents new research on Røros and Falun's copper production and trade, governance structures and the social contexts within which they operated. However, to understand the history of copper production in Denmark-Norway and Sweden, we need to go beyond national borders.¹ This is because global impulses and events shaped the copper industries even in these relatively small and remote regions. The copper industries of Røros and Falun were elements of a much larger, in fact global, industry. One of our ambitions has been to throw some light on this aspect and show how these local copper communities were connected to global trends. This is important, since the international aspect of Swedish and Danish-Norwegian copper has been given limited attention, in the main confined to Heckscher's path-breaking research on metals many years ago (Heckscher, 1949), although there have been some more recent studies of European influences, with Dutch and German immigrants playing significant roles in technical and organizational innovation, notably in the early period.² In this Introduction we set out themes and issues discussed in the chapters,

¹ Norway was part of the Danish kingdom until 1814.

² See for example Berg (1998), Sprauten (1974, 2008), Bull (2002), Ødegaard (1982), and Seresse (1992).

and outline some features of copper production and international trade to set the Scandinavian copper industries in context.

A central question in many studies of economic and social developments in 18th century Europe concerns the links to industrialisation and economic growth elsewhere, especially the British Industrial Revolution. The influential work of David Landes, *The Unbound Prometheus*, saw European industrialisation very much as a diffusion of new industries from Britain to western Europe (Landes, 1969). Metals, above all iron, played an important role in this. Their place in the British Industrial Revolution is well known: iron became used as an alternative for wood in infrastructures, machine parts, ships, household goods, buildings and much else, while undergoing radical changes in its production. In similar vein, steel has been seen as a key input into both consumer and producer goods. We suggest that there are two important problems with this perspective. First, Scandinavia began to industrialise well before the British Industrial Revolution and was part of global economic networks that facilitated change. As we shall seek to show, Scandinavia was a long-term participant in global change and cannot be seen simply as a follower in it. Second, the role of metals in industrialisation should not be reduced to iron and steel: non-ferrous metals such as copper played major roles in global economic transformations – this is particularly the case in the growth of the Atlantic slave economy from the 17th century.

Copper has not received the same attention as iron and steel, even though copper was mined in many places from prehistoric times, accounted for an important part of metal use, was used to make a range of goods and was vital for a vast array of brass (copper mixed with zinc) and bronze (copper mixed with tin) products. In early modern Europe copper was used to make products for households and industries and for military purposes, notably guns and cannons. It was a key ingredient in the making of instruments, tools and machinery used in scientific and industrial contexts, thus furthering innovation in many countries from the 17th and 18th centuries onward. The British Royal Navy experimented and succeeded in developing viable copper sheeting techniques for their ships in the 1760s, which subsequently spread through Europe (Knie-Andersen, 2010, pp. 35–36, 38). This was a major innovation: copper sheets were used

to cover the wooden hulls of sailing ships, dramatically reducing damaging parasite growths and contributing to new patterns of global trade and warfare, especially in the tropics. Copper was used to make coins, which were widely used in Europe and Asia. Copper also enhanced domestic life and was used in making a range of household goods such as pots and pans, clocks and watches, piano strings, instruments, ornaments and buckles.¹

The world's expansion of copper production and trade developed as a wide-ranging global network built upon flows of workers, finance and products. Copper rich areas were exploited on a worldwide scale. From the 14th century, copper production and trade had expanded from different sites in Europe, as well as Asia, America and Africa. By the early modern period pure copper, semi-finished and finished products were made and traded in networks that crisscrossed the world. An important transition took place in the first half of the 19th century when the smelting of copper became separated from the mining of copper. This took place in Swansea, in Wales, where copper production was based on coal fired smelting furnaces. Swansea imported copper ore for smelting from all over the world, including Latin America, Australia and Southern Africa, and copper ore became a globally traded commodity. Swansea became the major global smelting centre and London became a main manufacturing centre of copper goods for household consumption, producer goods and for global trade. Subsequently, from Swansea copper products were exported to Africa and Asia (Evans & Saunders, 2015). Other than the «Copperopolis» of Swansea, copper was produced and traded all around the world – in Scandinavia, in the Mansfeldt district of Thuringia, from Neusohl and Schmöllnitz in the Upper Hungarian district, in the Eastern Alps, in Japan and China and elsewhere. Japan's copper export increased significantly in the late 17th century and totaled around 6000 tons in the late 1690s while China made extensive use of copper to make coins (Kim & Nagase-Reimer, 2013). It has been estimated that world output of smelted copper rose from around 2,500 tons in 1700 to 17,200 tons in 1800 and to over 53,000 tons in 1850 (Evans & Saunders, 2015).

1 For a description of the products that were made see Hansen (1994, pp. 30–32), Knie-Andersen (2010, pp. 35–63), Rudloff (2011, p. 16), Aagensen (2000, pp. 19–20, 26, 31, 47, 81) and Vendeldorf (2000, pp. 27–28).

In Scandinavia, copper production was built up in copper rich regions, in particular in the Røros and Southern Trøndelag region from the 1640s, and in the Falun or Dalarna region in Sweden from the 14th century. The main product was «gahr copper» (refined copper of 98–99 percent purity). The making of copper goods was concentrated primarily in the Stockholm area and in Danish Zealand, Jutland, Schleswig and Holstein. After the golden age of the 17th century, copper production in Falun started to decline. The Swedish hegemony in Europe was over and from the 1750s and 1760s British copper export had become larger than the Swedish (Heckscher, 1949, p. 377; Heckscher, 1968). In the 1760s, annual copper production of the mines in Cornwall, which delivered copper ore to Swansea, totalled more than 8,000 tons (Kim & Nagase-Reimer, 2013). While copper production at the much smaller Røros Copper Works and the other, yet smaller copper works in Norway, had been increasing from the 1730s, it never reached levels of output that fully compensated for the decline that Falun experienced. Falun's production decreased from around 2,000 tons per year in the 17th century to around 640 tons annually from the 1730s, and Scandinavia was pushed to the outskirts of world copper production.

Scandinavian copper industries were linked to each other. The main copper product made in Norway and Sweden, gahr copper, was used by copper smiths and copper mills in the Copenhagen area to make kitchen utensils, needles and other tools. Japanese, Hungarian and Russian copper was also used, as well as melted-down copper and brass wares – collected from domestic industries and households or imported from abroad. The intra-Scandinavian copper trade also encompassed copper and brass goods from the Danish ruled Schleswig, Jutland and Zealand, made for Danish markets (see Kristin Ranestad's chapter 8).

The Scandinavian copper industries were linked through movements of people and knowledge. When Røros attempted to adopt the «Swedish smelting method» in 1762 many visits from Røros to Falun took place, while Swedish observers visited Røros for long periods to gain information about production and techniques in use, reporting to the Swedish state's Bergskollegium on their return (see chapter 9 by Göran Rydén). Writing about mining education in the 17th and 18th centuries the state geologist Rolf Falck-Muus argued that an important part of the education provided

at the Røros «mining cadet school», as well as at the Mining Seminar at the Kongsberg silver mine, was a stay abroad and that Falun in particular was a popular destination among the young mining students (Falck-Muus, 1949). Scandinavian miners and mine administrators often spent time at other copper mining works – within their own country and elsewhere in Scandinavia as well as in continental Europe – to learn about new techniques, to explore the suitability of new and more efficient methods, and to practice. Such knowledge reached the Scandinavian copper industry also through immigrant workers from central Europe, often at the initiative of the state. In the 16th century, the Swedish King Karl IX acquired help from German mining experts to adopt a German organisational structure in Falun (Lindroth, 1955), while at least five hundred German workers were invited by the Danish-Norwegian King to assist in the organisation of mining in Norway, of whom the majority went to Kongsberg silver mines. From Kongsberg many of the German workers moved on to other Norwegian mines and in 1670, there were at least thirty Germans at Røros engaged in managing operations (Hiort, 1846, p. 59). In the 17th and 18th centuries the mining techniques used in Norway and Sweden were similar to those used in Germany and elsewhere in continental Europe, while many techniques and aspects of work organisations were common to the mines at Røros and Falun, as well as to Kongsberg (Ødegaard, 1982, p. 8).

At the national level, we note that the Scandinavian states were actively involved in the development of the copper industries and in copper exports. The Swedish state did more than regularly send Swedes to investigate and report back on metal production abroad (see chapter 9 by Göran Rydén). The Swedish Crown was deeply engaged in all aspects of copper production. It was also engaged in the mine's decline, which set in in 1687, and which the Crown sought to stem. Norway was under the Danish Crown and here also the state was heavily involved in the exploration, production and trading of copper (see chapters 2 by Kristin Ranestad and Sven Olofsson and chapter 3 by Anne Signe Enget). Røros Copper Works was founded on Royal privileges to mine all ore deposits and to use forest, water and labour resources within an area of 45.2 kilometres radius of the Røros Copper Works' first mine, Old Storsvarts. This was the so-called «circumference». Permission to expand the circumference was from time

to time granted by the King. Conflicts nevertheless developed concerning forest resources. There were frequent conflicts with other copper works, forest owners and farmers about access to commons and other forested areas (see chapter 4 by Henrik Thommesen). In return for the granting of privileges, the King received a tenth of the copper produced (tithe). Most of this copper was sold, although occasionally, the King ordered some of the copper to be used for roofing of his castles (Sprauten, 1974, p. 70). The Crown also received excise duties on all exported copper. In order to control the exploitation of metal resources, the King created an administrative framework, much inspired by the organisation of public mines in Germany (see chapter 3 by Anne Signe Enget).

State involvement did not stop there: the Danish and Swedish Crowns were also heavily involved in the day-to-day running of the copper works. In the 1660s, for example, when the owners at Røros failed to meet their obligations – to pay wages and deliver provisions – the state took action (see Kristin Ranestad and Sven Olofsson's chapter 2). Copper was mostly a profitable business and gave the owners good returns. At Røros, the profit rate was often 25% and at times as much as 75%. Yet, some owners appear to have struggled to meet their obligations to cover the running costs. Workers' revolts followed, as did brutal punishments, which resulted in the state taking a much more active role in the daily operations. In the mid-1680s the King enforced tighter control and supervision of the owners to ensure that wages were paid and provisions delivered. Miners, smelters and farmers all had a role in the implementation of these reforms, which probably prevented the shutdown of the Røros Copper Works. They organized themselves in an early form of trade union and demanded regular wage payments and better terms of work. Two Royal Commissions were staffed by a handful of state officials, who meticulously went through the accounts, regulations and organisation and in the main acknowledged the interests of the workers. The reforms at Røros appear relatively advanced and may well have been a forerunner in the European context.

Falun's structure had developed over centuries and was still, in the 18th century, characterized by each copper field being divided into several mining units, or shares, owned by individual Head Miners (Bergsmän). Ownership was granted by Royal privilege, and the Head Miner must work

his share. The Head Miners in effect operated small-scale enterprises. They hired, managed and paid the labour working for their respective units. Inputs, such as charcoal, firewood and timber, were supplied by the Head Miner who also smelted and refined the copper (see Hedvig Widmalm's chapter 5).² The overall copper field, with all its individual shareholders and units, was however, governed by a larger administrative organisation, the Stora Kopparberg Bergslag, with the Swedish King as its Executive Director. The King was also a member of the Swedish Board of Mines (established in 1637), to which he appointed all supplementary members.

Røros Copper Works appears both more «modern» and less complex than Falun. The company was owned by individual shareholders and run by the company Board (established in 1762), which was composed of shareholding owners. It was the owners, or their appointees, who hired workers, paid wages, were responsible for provisions, and regulated transactions and bought and sold the shares. While Royal privileges were a crucial precondition for establishing the Røros Copper Works and important thereafter for central aspects of its operations, such as access to raw material and labour conflict (see chapter 2 by Kristin Ranestad and Sven Olofsson, chapter 4 by Henrik Izzet Thommesen, and chapter 5 by Hedvig Widmalm), they had deeper roots in Falun and appear more entrenched and dispersed. In 1716 the Mine Inspector Anders Swab initiated a restructuring of the Falun mining organisation, thirty years after Røros, transforming, arguably, the «medieval» corporation into a more modern mining company (Heckscher, 1968, p. 44; Boethius, 1951, pp. 54–85; Lindroth, 1955).

Through its links to continental Europe Scandinavian copper entered a complex network of producers, traders and consumers, which in fact reached yet further, beyond Europe's borders to a large global network. Estimates of the quantities and reach of the exports show that Sweden exported gahr copper and finished copper goods to numerous European ports and places in France, Holland and Prussia, and to cities such as Copenhagen and Amsterdam. Amsterdam was one of the world's major copper trade centres and also received most of the gahr copper that was

² See Hedvig Widmalm (2018) for a very useful discussion of Swedish mining organisation, positions and translations of terms, and the complex changes and reforms at the mine.

produced in Norway. From Amsterdam, copper was sold to Germany and France where copper and brass smiths transformed it into finished wares such as wire, sheets, candlelight holders, buttons, buckles, needles, kitchen utensils, clocks and musical instruments. Strong global forces influenced sales of Scandinavian copper, and its price (see chapters 6 and 7 by Sven Olofsson and Ragnhild Hutchison). Wars and blockades stopped deliveries, while uncertainty about how much copper would be brought to Amsterdam from other places, such as the Far East, made it difficult to know which price to set. Counter measures included attempts at price agreements – a Swedish-Norwegian cartel – and withholding of copper, in one instance involving Swedish authorities (see Sprauten, 2008). It is clear that the Scandinavian copper regions had strong links with other European countries and regions and were part of a Europe wide network of copper production and trade.

Through European and worldwide trade networks, Norwegian and Swedish copper reached far beyond Europe, to remote places across the world. Scandinavian gahr copper was sold to Holland, France, Germany, Great Britain and Spain, where goods like cannons, copper plates for sheeting of ships and large-scale equipment for sugar refining were made and exported to Africa, Asia and America. The goods were typically shipped by trading companies such as the Dutch East India Company (VOC), the British East India Company (EIC), the Danish Asiatic Company (DAC) and the Swedish East Asiatic Company (SEAC) to markets outside Europe, protected on their voyages by navies equipped with cannons (of copper, brass or iron) and weapons to defend or force their shipments. Bronze cannons from Frederiksværk (north of Copenhagen), made of copper from all over the world, were shipped to countries in Asia, Africa and America (Aagensen, 2000). Among the destinations of the shipments sent from Copenhagen of copper sheets and other copper wares were Danish trading colonies in West Africa, Canton in China and in the Caribbean (Asiatisk Kompagni, n.d. a, b and c).

At the time, there was considerable inter-regional trade in East Asia, notably between Japan, China and India, stretching west to Africa. Japanese copper was sent to Europe, but the larger share went to China – traded through the Dutch East India Company – of which much was used to make copper coins (Ryūto, 2006). The general ledgers of DAC's office in

Tranquebar, a Danish trade colony from 1620 to 1845, also include Japanese and Hungarian copper, which further illustrates the complex trade systems of which Scandinavian copper was a part (Asiatisk Kompagni, n.d. a). The British East India Company supplied Asian markets with British copper and in turn influenced industrial development, both in Britain and Asia (Bowen, 2002). Britain also exported copper and brass to Africa (Evans & Saunders, 2015).

The growth of the Atlantic slave economy from the 16th century was based on exchange of manufactures including copper products (high quality bars or rods and artefacts) to purchase slaves in Africa, and production equipment for the plantations producing sugar in the Caribbean and Brazil. Copper thus served the slave economies, the effects of which are far from played out. British plantation owners installed enormous, heat tolerant copper boilers on their plantations to boil the sugar canes harvested by slaves. The sugar was shipped to many European ports for sugar refining and consumption. This had powerful implications for sugar production in Europe and for consumption of sugar, which rose steeply in the 18th century. English and Welsh industrialists in particular, took advantage of the increased demand for copper equipment in the British sugar plantations in the Caribbean (Zahedieh, 2013, pp. 805–825). In this way, copper played an important role in imperialism, empire building and trade across the world.



Early map of Røros town. Bykart over Røros. Tegning: Thotts samling, nr. 689. Det Kongelige Bibliotek i København.

The book divides into five parts. After the introduction, the second part, *Kobberindustri og stat*, largely deals with state functions and involvement in the copper industries in the two countries, Denmark-Norway and Sweden. Chapter 2 by Kristin Ranestad and Sven Olofsson «Statlige reformer ved Røros kobberverk: arbeidere, betjenter, partisipanter og stat» discusses the content and implications of the state reforms that were introduced by two Royal commissions in the 1680s. The reforms led to radical changes in the organisational system at Røros, and how and why the reforms were adopted, are analysed. The authors argue that miners, smelters and farmers joined together in an early form of trade union and demanded regular wage payments and better working conditions. The Commissions, with some state officials among the members, meticulously scrutinised the organisation, including the accounts, and largely supported the employees' demands, possibly quite a unique development at the time. The reforms, which prevented Røros from shutting down, appear as a precursor of things to come, by introducing complex control mechanisms aimed at ensuring supply deliveries and wage payments, and involving a considerable degree of responsibility to paid directors and middle-managers.

The role of the state is further analysed in Chapter 3, «Bergmesteren i det nordafjelske Norge, 1656–1699» by Anne Signe Enget. The focus is on the Mining Inspectors in Norway, who were public officials appointed by the King to supervise mining operations in Norway. They were given considerable authority with regard to how the mining industry was run. Whether the Mining Inspectors acted in accordance with the King's interests is discussed. Enget finds that the Mining Inspectors did not always act in the King's interest, in particular when the position of Mining Inspector and Director of the mines were held by the same person; simultaneously acting as the King's agent and as Director of the Røros Copper Works, produced conflicts of interest. Enget connects this to the wider development of the state in Denmark-Norway.

The Early Modern Period was a period of transformative change, giving rise to economies which we today regard as modern and market based. What the forces were that led to this result, and how it happened, are discussed in Chapter 4 «Konflikter om allmenninger rundt Røros kobberverk, ca. 1648–1800», by Henrik Izzet Thommesen, which deals with conflicts

about the commons around Røros. He explores how the struggles that arose between the Røros Copper Works and the local communities about access to resources, and their resolutions, contributed to the transition. The conflicts involved different, and often opposed, interests and practices, including both private initiatives and the state, while the results favoured the economic interests of the new urban class. The system of royal privileges was instrumental in this transformative transition – an old feudal institution now served the creation of a modern, market-based economy.

Organisational change and conflict is further analysed in Chapter 5, «The Household Economy of the Great Copper Mine, 1716–1724» by Hedvig Widmalm which takes a close look at the protests of a group of miners against a series of economic reforms implemented in the early 17th century and how the protests were received by a Royal commission appointed by the Swedish Diet to investigate the householding at the mine. The starting point for the investigation is that these events must be analysed in the light of the early modern concept of the economy – or householding – which is very different from our modern concept. The chapter shows how actors, at micro level, thought in terms of the household economy and how this shaped the actions of the miners as well as the Royal commissioners.

The third part, *Skandinavisk kobber på globale markeder*, mainly addresses where copper from Scandinavia was transported to, and for what purposes. We underline that 18th century Scandinavian copper was an element of a complex, extensive production and trade network with global reach. Chapter 6, «Det norske kobberet i Europa og verden på 1700-tallet» by Ragnhild Hutchison explores the copper that was exported from Norway and processed in European countries. She maps the locations where Norwegian copper was being traded and analyses some of the networks involved with the aim to gain further insights into cross-border trade systems and into how the copper trade contributed to the socio-economic changes taking place in Europe at the time.

Chapter 7, «Svensk koppar- och mässingsexport under 1700-talet» by Sven Olofsson, maps the export markets for Swedish raw copper and copper and brass wares during a period when production was in decline. He shows that destinations were widely spread across Europe, including ports from where copper wares were exported to other continents. He suggests

that the downturn in Swedish copper exports in the 18th century was caused, on the one hand, by the many European wars, and by the smaller quantities of copper mined in Falun from the mid-18th century on the other. The Swedish state actively sought to support production, processing and exports of copper with direct subsidies.

Chapter 8, «Intrikate markeder: kobberproduksjon og handel i Det oldenburgske monarki» by Kristin Ranestad discusses copper processing in the Oldenburg Monarchy. It shows that only some of the raw copper from Norway was processed in the Monarchy. Much of the copper and brass that was processed was imported from Sweden, Hungary, Britain and Japan. Such imports of copper and brass were hardly consistent with the political goals of «mercantilism» or «cameralism», namely import substitution and self-sufficiency, which are often thought to have informed contemporary policies.

The fourth part, *Kobberarbeid og lokale tilknytninger i Rørosområdet*, concerns aspects of life and work for people connected to copper production, either indirectly or directly. Chapter 9, «Med svenska ögon på Røros och den norska kopparhanteringen» by Gøran Rydén, builds on the written records of individual agents, primarily the reports of Nils Psilanderhielm and Anders Swab, to the Swedish state's Bergskollegium, from their visits to Røros in the 18th century. Charged with gathering information about Norwegian mining, their reports give insights into aspects of work and production in copper from Swedish perspectives that are otherwise difficult to find. The visitors described the ways in which work was carried out in the Røros mines, and what the conditions were like for the workers.

Chapter 10, «An Artisan and the Røros Copper Works: Børre Hansen Langland», by Hans Westberg Aas and Kristine Bruland, takes as its point of departure a farmer-clock maker living in a remote hamlet in the Røros region. They argue that Langland was not an isolated craftsman, but someone connected, at least informally, with much wider trends. His links with the Copper Work's director Peder Hiort gave him a connection to the main intellectual currents of the time, while his travels to the Swedish Stjärnsund Manufactory connected him to the frontiers of watch and clock technology. The European industrial enlightenment seems to have spread, via figures such as Langland, into remote Norway.

The fifth part, Avslutning, marks the end of the book with Chapter 11, «The Global Context of the Scandinavian Copper Industry» by Kristine Bruland and Keith Smith. It describes the global context of Scandinavian copper industrialisation, and how it was influenced by, and even influenced, European industrialisation and global development. Copper was a major global product, linked to the creation of the Atlantic economy, and undergoing major technological and organisational revolutions. What emerges is not simply the fact that Scandinavian developments in this industry were part of a wide global economic process, but also an important conceptual point. That models of global change based on distinctions between a centre, on the one hand, and a periphery that imitates or emulates, on the other, may be very misleading. Such models typically start with the British Industrial Revolution as the major event that brought on industrialization and modern economic growth for then to be imitated in continental Europe, then spreading to more remote regions and countries elsewhere in the world. Framing the problem in this way neglects the fact that, when we look at specific activities like copper, from the 17th century the global economy was engaged in a complex and integrated process of development. Røros and Falun may have been remote, but they were far from peripheral.

References

- Aagensen, J. (2000). *Bronzeartilleriet*. Frederiksværk: ITA Center.
- Asiatisk Kompagni. (n.d. a). *Asiatisk Kompagni, afdelingen i København*. Hovedbøger, afdeling i København (1732–1840), VA. XIV (p. 35). Copenhagen: Rigsarkivet.
- Asiatisk Kompagni. (n.d. b). *Asiatisk Kompagni, afdeling i Tranquebar*. Hovedbøger, afdeling i Tranquebar (1733–1778), VA. XIV (p. 111). Copenhagen: Rigsarkivet.
- Asiatisk Kompagni. (n.d. c.). *Asiatisk Kompagni, afdeling i Frederiksnagore*. Hovedbøger, afdeling i Frederiksnagore (1778–1827), VA. XIV (p. 127). Copenhagen: Rigsarkivet.
- Berg, B. I. (1998). Kaldkiling, fyrsetting og kruktsprengning. To studier i bergbrytningens historie. *Fjell-Folk*, 13.
- Boethius, B. (1951). *Gruvornas, hyttornas och hamrarnas folk*. Stockholm: Tiden.
- Bowen, H. H. (2002). Sinews of trade and empire: The supply of commodity exports to the East India Company during the late eighteenth century. *The Economic History Review*, 55(3).
- Bull, I. (2002). Merchant households and their networks in eighteenth-century Trondheim. *Continuity and Change*, 17(2).

- Evans, C. & Saunders, O. (2015). A world of copper: Globalizing the Industrial Revolution, 1830–70. *Journal of Global History*, 10.
- Falck-Muus, R. (1949). *Bergsmannsutdanningen i gamle dager: norske bergmenn til Sverige som ledd i utdannelsen*. Stockholm.
- Hansen, J.-P. (1994). *Kobbermøllen ved Krusaa*. Copenhagen: Foreningen til Gamle Bygningers Bevaring.
- Heckscher, E. F. (1949). *Sveriges Ekonomiska Historia*. Stockholm: Albert Bonnier.
- Heckscher, E. F. (1968). *An economic history of Sweden* (3rd ed.). Harvard: Harvard University Press.
- Hiort, P. (1846). *Peder Hjort og Peter Schnitler Krag's Efterretninger om Røraas Kobberverk og Præstegjeld*. Christiania.
- Kim, N. & Nagase-Reimer, K. (2013). *Mining, monies and culture in early modern societies*. Leiden: Brill.
- Knie-Andersen, B. (2010). *Fabrikken i Brede: krudtværk og kobberværk, industripark og nationalmuseum*. Lyngby: Historisk-topografisk Selskab for Lyngby-Taarbæk Kommune.
- Landes, D. (1969). *The unbound Prometheus: Technological change and industrial development in western Europe from 1750 to the present*. Cambridge: Cambridge University Press.
- Lindroth, S. (1955). *Gruvbrytning och kopparhantering vid Stora Kopparberget intill 1800-talets början*, Del 1 Gruvan och gruvbrytningen. Uppsala: Almqvist & Wiksell.
- Rudloff, S. (2011). *Kobbermølle*. Sønderjylland: Museum Sønderjylland and Cathrinesminde Teglværk.
- Ryūto, A. (2006). *The intra-Asian trade in Japanese copper by the Dutch East India Company*. Leiden.
- Seresse, V. (1992). *Tysk bergverkstradisjon ved Røros kobberverk 1671–1685*. Trondheim.
- Sprauten, K. (2008). I dørsprekken av Europa. I *Årbok for Nord-Østerdalen*. Tynset: Anno museum, avd. Musea i Nord-Østerdalen.
- Sprauten, K. (1974). *Staten og storborgerne. Finansieringen av Hans Hornemans utenrikshandel 1745–1758*, hovedoppgave, Universitetet i Oslo.
- Vendeldorf, A. (2000). *Classens Værk*. Denmark: Tjørneby.
- Widmalm, H. (2018). Exploring the mores of mining. The oeconomy of the great copper mine, 1716–1724. *ACTA UNIVERSITATIS UPSALIENSIS. Uppsala Studies in Economic Studies*, 114.
- Zahedieh, N. (2013). Colonies, copper, and the market for inventive activity in England and Wales, 1680–1730. *The Economic History Review*, 66(3).
- Ødegaard, S. (1982). Bergbrytning i eldre tider. *Fjell-folk*, 7.