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General Issues

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*Røros Copperworks and the Role of Workers,
Managers, Investors and the State in
Business Development*

Kristin Ranestad

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Røros Copperworks and the Role of Workers, Managers,

Investors and the State in Business Development*

Kristin Ranestad[♣]

Abstract

State reforms adopted in the 1680s prevented the largest copperworks in the Oldenburg Monarchy, Røros, from shutdown. They appear to be a forerunner in Europe. The changes ensured supply deliveries and regular wage payments through spread of ownership, delegating more responsibilities to the Director and managers and introducing complex control mechanisms and state monitoring of the accounts and daily tasks. Why were the changes adopted, and why were the regulations formed this way? The answer partly lies in that miners, smelters and farmers organised themselves in an early form of work union and demanded regular wage payments and better work terms. The Crown established two Commissions consisting of state officials who meticulously went through systems and accounts and largely considered the employees' demands. The increased state involvement was related to the Kings Frederick III and Christian V's economic interests in Røros who were inspired by mercantilist thoughts of the time.

Keywords: Norwegian copper mining, early modern period, stakeholders, management, joint-stock companies, state reforms

JEL-codes: N13, N3, N44, N54, N84

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1. Introduction

This paper seeks to describe and analyse the content and implications of the state reforms that were introduced at Røros Copperworks in the late 1680s, which probably prevented shutdown of the business; and explore how and why they were adopted. The reforms were quite advanced and may have been a forerunner in Europe, notably in that (1) employees showed early initiatives of work organisation and played a key role in ensuring system changes; and in that (2) the new regulations led to spread of ownership, complex control mechanisms, forced external state monitoring and delegation of increased responsibility and control to paid managers at the expense of the investors.

Røros Copperworks, located in the Central and remote part of Norway, was established in 1644 and became the largest copper business in the Oldenburg Monarchy. The Works employed hundreds of workers and nearby farmers. It was an attractive investment and also encouraged industrial development in other places by supplying copper to coppersmiths and workshops in Denmark, Schleswig and Holstein.¹ The King's annual income from Røros represented 50-60 per cent of the total tax income from Trondheim district and in between 1645 and 1695, tithe and customs totalled 439,811 rigsdaler. This illustrates the importance of the Works, and suggests that that a recession, or stagnation, would have repercussions far beyond the local town.² What did the late 1680s state reforms entail? How and why were new regulations adopted, and why did they eventually take the form they did? Investors' embezzlements – including illegal copper withdrawals, avoiding wage payments, and not delivering committed food and input supplies – ; miners, smelters and farmers' reaction to this by demanding regular wage payments and better work terms; and the state response which brought about a radical change in the formal institutional framework are analysed here in the quest to answer these questions. The Royal Commissions' reports, Røros managers' instructions and correspondence between miners, smelters and farmers in Røros, investors, King Frederick III, King Christian V and state officials in Trondheim and Christiania³ are examined.

¹ Kristin Ranestad, "Copper trade and production of copper, brass and bronze goods in the Oldenburg monarchy: copperworks and copper users in the eighteenth century". *Scandinavian Economic History Review*, 67, No. 2 (2019), pp. 190-209

² Knut Sprauten, «I dørsprekken av Europa», in *Årbok for Nord-Østerdalen* (2008), 61

³ Old name for Oslo

2. Theoretical context: early modern business ownership and organisation

Business historical literature is heavily focused on ‘accounting’ and ‘business management’ in Britain before and during the Industrial Revolution, and the United States. Yet, there is evidence that initiatives to rationalise business organisations by for example introducing advanced cost accounting systems began much earlier than what business and economic historians such as Sydney Pollard and Alfred Chandler suggest. Business development, and attempts to make more efficient business systems, such as using ‘profit’ identification, waste elimination, sophisticated managerial and cost accounting, quantifying performance, external surveillance of accounts, rational ownership systems, and rules to compare, differentiate, hierarchize and reward workers began much earlier; and were also discussed and practiced outside Britain.⁴ For example, Luca Zan indicates that sophisticated managerial and cost accounting, much like modern business management of the 19th and 20th centuries, were discussed in Renaissance by showing discourses about securing skilled workers, good quality materials and inventory at the shipyard Venice Arsenal.⁵ Here, we analyse measures that were taken to rationalise the ownership and organisational systems in a remote copperworks in the outskirts of Europe, namely Røros Copperworks, to assess what it can tell us about early modern business development.

Related to the subject of rational business systems is the question of which role the different ‘stakeholders’, i.e. the different parties involved in businesses, should take. Who should control and supervise the different stages of production? First; there has been a discussion about the role that investors, and owners, should take. Establishing a few large owners have proven efficient, yet large dominating owners who exercise control at the expense of smaller owners, and who might have conflicting interests, has a long history.⁶ Business literature proposes costs and benefits of both concentrated and spread ownership, and business organisations have moved in different directions, and chosen different ownership

⁴Marc Nikitin, “The birth of industrial accounting in France: the role of Pierre-Antoine Godard-Desmarest (1767–1850) as strategist, industrialist and accountant at the Baccarat Crystalworks”, *Accounting, Business & Financial History*, vol. 6, issue 1 (1996); John Richard Edwards and Trevor Boyns, “Industrial organization and accounting innovation: charcoal ironmaking in England 1690-1783”, *Management Accounting Research*, 1992, 3, 151-169, Salvador Carmona et al. “Control and cost accounting practices in the Spanish Royal tobacco factory”, *Accounting, Organizations and Society*, Vol. 22, No. 5 (1997), 411-446; John Richard Edwards and Edmund Newell, “The Development of Industrial Cost and Management Accounting Before 1850: A Survey of the Evidence”, *Business History*, vol. 33, 1 (1991), 35-57; Luca Zan, “Accounting and management discourse in protoindustrial settings: the Venice Arsenal in the turn of the 16th century”, *European Accounting Review*, 11:2 (2004), 291-304; Paul Frentrop, *A history of corporate governance* (Amsterdam, 2003)

⁵ Luca Zan, “Accounting and management discourse in protoindustrial settings: the Venice Arsenal in the turn of the 16th century”, *European Accounting Review*, 11:2 (2004), 291-304

⁶ See the conflict between large and small owners of the Dutch East India Company in the 1600s: Paul Frentrop, *A history of corporate governance* (Amsterdam, 2003), 64-65

models.⁷ Second; the extent to which key responsibilities should be delegated to paid managers and directors has also been debated. According to David Landes, as early as the ‘pre-machine era’, the ability of managers to organise production was essential to maintain the system.⁸ However, such systems could lead to a lack of motivation to maximize profits and to act in owners’ best interests, according to Adam Smith, and others after him.⁹ This separation between ownership and control became apparent in large early modern ‘joint stock like companies’, Røros being one of them.

Mining, due to its very nature, naturally demanded a high degree of coordination and supervision and led to strict division of labour and complex management systems involving several levels of managers and middle-managers, long before the Industrial Revolution.¹⁰ Mines had to be constructed in relation to where the ore was located, often in remote areas and far apart, and ore processing occurred in smelting plants, which depended on access to waterpower and hence frequently placed kilometres away from the mines. Mineral and metal extraction demanded huge amounts of investments and raw materials and there were high risks involved in developing mining projects. This was probably why many mining projects were organised as ‘joint-stock companies’ with multiple investors. Daily tasks and key responsibilities were then delegated to paid directors and managers with problems arising between management and owners, and challenges related to managers defrauding their owners.¹¹ Organising and coordinating several hundred – sometimes thousands – of workers without powers of compulsion, and simultaneously being competitive and making profit, has been pointed out as particularly challenging, and how to solve such issues was not obvious. Work organisation, ownership and control, ensuring investments etc. for these – often huge – projects created severe problems for many early modern European mining businesses.

The state took a more active part in business development from the 17th century, often due to emerging problems. In line with early modern mercantilist or cameralist thoughts, European states – with the exception to the British islands, where private

⁷ See discussion on ownership: Paul Frentrop, *A history of corporate governance* (Amsterdam, 2003)

⁸ David Landes, “What Do Bosses Really Do?”, *The Journal of Economic History*, Vol. 46, No. 3 (Sept. 1986), 595

⁹ See Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776); Sydney Pollard, *The genesis of modern management* (London, 1965), 21

¹⁰ Christoph Bartels, “The Production of Silver, Copper, and Lead in the Harz Mountains”, in Klein, U & Spary, E.C. eds. *Materials and Expertise in Early Modern Europe* (Chicago, 2009)

¹¹ See e.g. Adam Smith; Warwick Funnell and Jeffrey Robertson, *Accounting by the First Public Company* (New York, 2013); Sydney Pollard, *The genesis of modern management* (London, 1965)

shareholders continued to dominate - increased their role in mining¹²; both as investors, regulators, supervisors and creating and advancing accounting practices.¹³ One of the few mining companies that Sydney Pollard analyse which did not fail – London Lead Company's, formed in 1704-05 – became ‘...one of the pioneers of modern management in the nineteenth century’ partly due to regular inspection by experienced Court members who ‘travelled around all the mines, designed works and reported on markets, processes, legal points etc.’¹⁴ Monitoring of the Dutch East India Company's directors was also found successful.¹⁵ There is, however, still a lack of knowledge of how states in different countries became involved in the economic sphere and in the organisation of industries and businesses, and how the relationship between the state and private actors, and other stakeholders involved in businesses unfolded. There is still much research to be done on the early modern business organisation, in terms of regularity frameworks, systems and practices, and eventually regulative improvements and advancements. As we shall see, at Røros, the relationship between the investors, employees and the state took an unusual turn. The state reforms introduced in the late 1680s led to altering of the roles in that the paid managers and the state increased their control and responsibilities at the expense of the investors.

This paper examines how and why one of the largest copper businesses in Scandinavia came to be a forerunner in Europe by introducing measures which reduced fraud and embezzlements, and ensured supply deliveries and regular wage payments. The literature about early modern Scandinavian mining businesses largely describes people in administration, mines, production, crises and course of events¹⁶, yet there is further insight to

¹² See Christoph Bartels, “The administration of mining in late medieval and early modern Europe”, in *Mining, Monies and Culture in Early Modern Societies*, Nanny Kim and Keiko Nagase Reimer (eds), Brill: Leiden, 2013, p. 119

¹³ Salvador Carmona et al. “Control and cost accounting practices in the Spanish Royal tobacco factory”, *Accounting, Organizations and Society*, Vol. 22, No. 5 (1997), 411-446; Luca Zan, “Accounting and management discourse in protoindustrial settings: the Venice Arsenal in the turn of the 16th century”, *European Accounting Review*, 11:2 (2004), 291-304; Geoffrey Jones, “Revising the role of profit-seeking in management and accounting history”, *European Accounting Review*, 6:4 (1997), 791-798; Salvador Carmona and Luca Zan Special Section: “Mapping variety in the history of accounting and management practices”, *European Accounting Review*, 11:2 (2002) 291-304; Concha Álvarez-Dardet Espejo et al. “Accounting and control in the founding of the New Settlements of Sierra Morena and Andalucia, 1767-72”, *European Accounting Review*, 11:2 (2002), 419-439, Rafael Donoso Anes, “Accounting and slavery: the accounts of the English South Sea Company, 1713-22”, *European Accounting Review*, 11:2 (2002), 441-452

¹⁴ Sydney Pollard, *The genesis of modern management* (London, 1965), 17-18

¹⁵ Paul Frentrop, *A history of corporate governance* (Amsterdam, 2003), 100

¹⁶ See Gunnar Brun Nissen, *Røros Kobberværk 1644-1974* (Trondheim, 1976); Ole Øisang, *Rørosboka*, 2. bind (Trondheim, 1942); Harald Dahle, *Røros Kobberværk 1644-1894* (Trondheim, 1894). For descriptions of copper mining in Sweden, see Eli F. Heckscher, *Sveriges Ekonomiska Historia* (Stockholm, 1949); Karl-Gustav Hildebrand, *Erik Johan Ljungberg och Stora Kopparberg* (Falun, 1970); M. H. Fischer, *Stora Kopparberg* (Stockholm, 1968); Gunnar Olsson and Burnett Anderson, *Stora Kopparberg : six hundred years of industrial*

be gained in terms how the regulative measures that were taken to save the business were shaped and the roles that different stakeholders played in this. The paper complements the literature with an analysis of the rather advanced state reforms that were adopted at Røros in the 1680s; their content and implications, how and why they were implemented, and why they took the form they did. In particular, the roles of King Christian V and state officials – together with employees at the Copperworks – in enabling and carrying out the reforms, in a rather unusual way, are explored.

3. Sources and Method

In the 1680s, Royal Commissions were established to solve operational, social and economic problems that had developed in the previous decades in Røros. The Commissions are well known, and so are the course of events of the ‘workers’ rebellions’ of 1670 and early 1680s. However, details about the content and implications of the reforms that the Royal Commissions introduced, which radically improved the business prospects; how and why they were implemented and the motivations to adopt them are not discussed in the literature. This paper aims to examine the state reforms that were adopted at Røros in the late 1680s; to show how these changes advanced business, and to analyse the particular roles that the workers, and the state authorities had in implementing them. What did the Royal Commissions accomplish? How and why were new regulations implemented, what did they look like and why were they shaped the way they did? First, the system as it was set up in 1644 is described; thereafter the content and implications of the reforms are analysed; and finally the exceptional role of miners, smelters and farmers on the one hand, and the role of the state on the other, are examined. The aim is to further our knowledge of the organisational and ownership changes in late 17th century Røros and relate this to the wider early modern European business development.

These questions will be addressed by analysing written primary sources in the form of (1) Royal decrees and reports, (2) letters and (3) instructions. The Royal Commissions of 1685 and 1688 wrote detailed reports, which have been transcribed and published in volumes, and provide descriptions about the shares, allocation of tasks and responsibilities; how supplies and wages should be delivered, supervised and controlled; division of labour among the managers, investors and state officials, etc.; i.e. what are defined here as the ‘ownership’

enterprise (Stockholm, 1955); S. Lindroth, *Grubvbygning och kopparhantering vid Stora Kopparberget intill 1800-talets början* (Uppsala, 1955)

and ‘organisational’ systems of the Copperworks.¹⁷ Additionally, managers’ ‘instructions’, i.e. contracts given to individuals who were hired to management positions at the Copperworks – located at Røros Copperworks’ archive in Trondheim – provide further insight into the organisational changes and managers’ responsibilities.¹⁸ Finally, written letters, petitions and pleas signed by miners, smelters and farmers – employees at Røros – which were sent to investors of the Copperworks, King Frederick III, King Christian V and state officials in the Central Government, County Office and Mining Offices, and response letters and decrees written by investors, the Kings and state officials – some of which are located at Røros Copperworks’ archive and some of which are published in ‘royal letter volumes’ – are analysed to explore underlying reasons for the problems and the role of employees and the state in shaping and implementing the reforms.¹⁹ In their reference works, which outline the general history of Røros Copperworks from its start-up, some of the letters are referred to by Harald Dahle and Gunnar Brun Nissen in some of the first chapters, which, among other things, outline the workers’ rebellions in the 1670s, and 80s and the work of the Bragernes Commission.²⁰ This paper follows up on Dahle and Nissen’s work by making a systematic analysis of all survived written correspondence and reports connected to the reforms.

4. Røros Copperworks and the State Reforms of 1680s

4.1 Organisation and ownership systems from 1646

Røros Copperworks was established by royal decree 19 October 1646 by King Christian IV as a ‘joint-stock like company’. However, it differed from modern private joint-stock companies in key aspects, in particular in its relationship with the King. Through buying shares, the investors committed to organise production, administrate wage payments and input deliveries, and to pay royalty to the King (tithe; ten percent of the annual production, delivered each year in copper). The investors in Røros bought shares in the Copperworks while the King had

¹⁷ *Kongelige reskripter...*, Bd. 1-2., 26. sept. 1685 (Christiania 1841-1842); *Kongelige reskripter...*, Bd. 1-2., 3. august 1689 (Christiania 1841-1842)

¹⁸ Privatarkiv 211, Røros kobberverk, Instrukser 4, instrux, Peder Hiort, 1690; Privatarkiv 211, Røros kobberverk, 4, instrux, Bergskrifieren og Casseren 1690; instrux, Hytteskriveren 1752; Instrux, Hyttmæsteren 1733; Instrux, Proviant-Skriveren 1719; Instrux, Oberstiger, 1807

¹⁹ *Norske kongebrev* bd. II, hefte 4, 1676-1680; Gunvor Foslie et al. *Norske kongebrev*, bind IV, 1686-1689; Rolf Fladby et al. *Norske kongebrev*, bd. III, hefte 2 1683-1684 ; *Norske kongebrev* Bind VII 1699-1703; Berg-Ordinance 23 June 1683, Jacob Henrik Schou, *Chronologisk Register*, deel 1 (1822) ; Privatarkiv 211, Røros kobberverk, 20, letters 4/3 1666; 7/3 1666; 17/3 1666; 11/9 1669; 7/5 1670; 7/7 1670; 31/5 1670; i 1670; 25/10 1673 ; 28/3 1674 ; 4/4 1674; 1/5 1674; 4/5 1674; 15/11 1679 ; 12/11 1679 ; 3/1 1683; 21/4 1683; 12/11 1684

²⁰ See Gunnar Brun Nissen, *Røros Kobberverk 1644-1974* (Trondheim, 1976); Harald Dahle, *Røros Kobberverk 1644-1894* (Trondheim, 1894)

‘exclusive rights’ to minerals and metals in the country, and he granted them ownership and control.²¹ This organisation form, which meant that the investors had privileges, but that the King was the ultimate owner, was called ‘partisipantskap’, inspired by Saxonian ‘Gewerskap’²²

Røros is situated in the central part of Norway, south of Trondheim, in a mountainous area with large surrounding woods.²³ Typical for the Røros area were many small scattered pyrite ore deposits, which led to the opening of several smaller mines, in contrast to in Falun, for example, where one big mine was opened. The richest ore was found within the ‘Circumference’, a privileged area of 45.2 kilometres of the first mine ‘Old Storwarts’. Outside this area, the biggest ore discoveries were Kvikne and Follidal, which were mainly managed by smaller firms. The English mineralogist Clarke, who visited Røros in the late 18th century, stated that the ore lay in horizontal layers, which according to him made the transport of the ore to the surface easier compared to other places.²⁴

On site, the work organisation was strongly influenced by German models. It was highly hierarchical with strong division of labour. Many of the used work positions were German, such as ‘Stieger’, ‘Berggesell’, ‘Bergknecht’, ‘Bergjungen’, ‘Röstwender’ etc. A paid Director functioned as the operational manager and ‘mine managers’, ‘smelter accountants’ and ‘smelter masters’ – middle-managers – supervised the workers and administered the operation at the mines and smelters. The ‘supply accountant’ managed the supplies and the ‘mining accountant’ was the bookkeeper.²⁵ The middle-managers answered to the Director and the Director answered to the owner-operators. The Copperworks thus had a relatively complex management structure.

The investors – who can be called ‘owner-operators’ – were provided wide-ranging royal privileges, mainly in terms of metal ore extraction, customs and fee exemptions on goods that were used in operation, such as iron, leather, gunpowder and paper (used in blasting) and access to cheap labour. In particular, farmers who were settled within the Circumference were ‘committed to’ do transportation work and make and deliver wood and

²¹ 17. April 1673. Privilegier, dat. 19/10 1646, Røraas Kobberverk; Amund Helland, *Norsk bergret. Med udsigt over andre landes bergværkslovgivning* (Kristiania, 1892), p. 4

²² The owner-operators were called ‘partisipanter’: Nagel, “Norwegian mining in the early modern period”, *GeoJournal*, Volume 32, Issue 2 (February 1994), 144. This was a common way of organising mining works in Norway in the seventeenth and eighteenth centuries: See royal privileges: *Kongelige reskripter*, Bd. 1-2. (Christiania 1841-1842)

²³ P. Hjort, *Peder Hjort og Peter Schnitler Krag's Efterretninger om Røraas Kobberverk og Præstegjeld*, Christiania, 1846, p. 5

²⁴ Clarke, *Reise i Norge 1799*, 26

²⁵ Ole Øisang, *Rørosboka* (Trondheim, 1942), 51-52

charcoal for the Copperworks, in exchange for ‘cheap payments’, whenever needed. In addition to these privileges, the owner-operators were given the freedom to operate ‘as they best [saw] fit’.²⁶

Yet with freedom also came a large responsibility. From 1650, there were five owner-operators, but the largest owner – Joachim Irgens – owed 45 of a total of 60 shares. The owner-operators were personally responsible for delivering provisions and money needed to pay wages to the employees according to their shares by certain dates each year. Each share (*cux*) corresponded to 3,000 rigsdaler. The provisions included (1) food to the ‘warehouse’, from where workers bought supplies. The owner-operators had monopoly in Røros on all trade activities; (2) inputs – including iron, material, tools etc. used in operation, and (3) cash money to pay wages to the miners, smelters and farmers. The Director estimated the following year’s total supplies and divided them on the shares of each owner-operator, who in turn had to deliver accordingly. This resembled a form of ‘ex ante’ accounting, or cost estimates, which Pollard characterised as ‘extremely advanced’ at that time.²⁷ All the obligations, which corresponded to significant amounts of money, had to be complied with before the owner-operators could be paid in copper. The shares, then, had to be managed by financially strong people, which was hard to come by in Norway, and in the Oldenburg Monarchy, in the 17th century. People seemed to have lower wages there compared to other Western countries, which might suggest lower capital accumulation.²⁸ The low capital accumulation is reflected in the dependence on foreign capital. Owner-operators sent most of the copper to Amsterdam, and in return, Dutch merchants gave them credit deals with ‘... the advance of money for cheap interest rates’.²⁹ It should be noted, however, that limited capital was generally a challenge in early modern Europe, and in particular, when it came to large mining projects. What might distinguish Røros was that the system was set up so that the owner-operators were delegated a large degree of control by the King, yet at the same time they had a responsibility in that continued operation depended on their regular provision and money deliveries.

²⁶ 17. April 1673. Privilegier, dat. 19/10 1646

²⁷ Sydney Pollard, *The genesis of modern management* (London, 1965), 220

²⁸ Ekaterina Khaustova and Paul Sharp, “A note on Danish Living Standards using Historical Wage Series, 1731-1913”, *Journal of European Economic History*, XLIV, 3, 143-172

²⁹ Knut Sprauten, “Staten og storborgerne Finansieringen av Hans Hornemans utenrikshandel 1745-1758”, *hovedoppgave* (Oslo, 1974), 61

4.2 Royal Commissions: advanced ownership and organisational reforms

King Christian V established two Royal Commissions in 1685 and 1688; the first one, the ‘Bragernes Commission’, consisted of Privy Councillor and Lord Jens Juel, Privy Councillor and Vice Governor in Norway Just Høeg and Mining Administrator - the Head of the public Mining Office - Brostrup von Schort; the second Commission, the ‘1688 Commission’, consisted of General Johan Wibe, Prefect Hans Kaas, Assistant Councillor and Lawman Peter Drejer, Mining Councillor Johan Marselis, Mining Assessor Jens Hansen Collin and Mayor Lauritz Brix.³⁰ The Commissions introduced reforms, which changed the institutional framework of Røros Copperworks. In particular, they entailed changes in the ownership and organisational systems, which - combined – resulted in a quite advanced ‘business model’ for that time. With the reforms, the extensive freedom was given to the owner-operators in 1646 ended and were replaced by increased spread of ownership; reduced control to the owner-operators and increased responsibilities – but also clearer penalties – to the Director and middle-managers, complex control mechanisms and increased state control through monitoring. The state from then on took an active part in daily operation and recruitment.

The Bragernes Commission of 1685 introduced a new ownership structure. The Copperworks became divided into 180 shares worth 1,000 rigsdaler, instead of the earlier 60 shares of 3,000 rigsdaler. Røros’ ownership system, as it was set up in 1646, was dependent on the economic ability of a small number of investors and their willingness to fulfil their obligations, which in turn made Røros vulnerable. Thus, the spread of ownership had clear benefits. First, the reduction of the shares’ value made it easier to buy and sell shares. The aim was to increase the number of investors, which fit better in the ‘capital poor’ Oldenburg Monarchy. Second, the annual inputs and money corresponding to each share were reduced, which would reduce the overwhelming dominance of one owner, spread the risk and make it easier for the owner-operators to comply with their obligations.

The second important change was that the owner-operators’ vast control was reduced. Instead, more responsibilities were given to the Director and middle-managers. In addition to the Director’s duties of estimating the needed materials, food and money for the following year, the Bragernes Commission added that he – together with the mining accountant – was to make sure that the owner-operators made the deliveries on time and that the supplies were ‘good’, meaning ‘not rotten’ or of ‘bad quality’. Furthermore, the Director

³⁰ *Kongelige reskripter...*, Bd. 1-2., 26. sept. 1685 (Christiania 1841-1842); *Kongelige reskripter...*, Bd. 1-2., 3. august 1689 (Christiania 1841-1842); Rolf Fladby et al. *Norske kongebrev*, bd. III, hefte 2 1683-1684, 267. 15/11 1684. NM. T XIII 87b-89a.

acquired the ‘authority’ to sell the copper corresponding to the shares of owner-operators who did not deliver the agreed inputs. He was to use this money to cover eventual debts that the lack of supplies and cash would involve. The owner-operators, in turn, it was stated, ‘did not have the authority’ to take any copper until their obligations were fulfilled. The 1688 Commission gave the Director further responsibility. From that year, he was to make sure that the owner-operators supplied ‘necessary materials’ – notably iron, steel, gunpowder and leather – at least half a year in advance. He was also set to ensure that the owner-operators delivered inputs three times a year; in February, May and September, and that workers were ‘paid each and every month’.

The increased control that was delegated to the Director and middle-managers seemed to go against Stephen Marglin’s argument that managers in pre-industrial and industrial periods did not have a valuable function. According to him, managers imposed an organisational form, which made them essential, but ‘their ability’ to organise and manage was unnecessary.³¹ The new clear tasks that were given to the Director and middle-managers at Røros were more in line with David Landes’ argument that managers had an essential role and that their ability to organise production was vital.³² In general, the status of managers rose in European countries in the 18th century, which might make Røros a forerunner in this respect.³³

Discussions about how to motivate managers, for example with higher wages, penalties for fraud, possibilities of promotion, dismissing unskilled and inefficient employees etc. – seemed to have a long history in Europe.³⁴ Enforcing discipline and improving wages were discussed and assessed as early as in the Renaissance.³⁵ The Bragernes and 1688-Commissions, for their part, did the opposite of motivating workers and managers, namely to reduce wages for all employees. Lower fixed tariffs were set on ore-, coal and wood deliveries for farmers, and the monthly wages, paid according to working time, were reduced for miners, smelters and foremen by 15 to 20 percent.³⁶ This was directly connected to the severe economic state that the Copperworks was in which became apparent through the

³¹ Stephen Marglin, "Knowledge and Power" in *Firms, Organization and Labour*, F. Stephens (ed.) (London, 1984) 150

³² David Landes, "What Do Bosses Really Do?", *The Journal of Economic History*, Vol. 46, No. 3 (Sept. 1986), 595

³³ Sydney Pollard, *The genesis of modern management* (London, 1965), 69 and 136

³⁴ See W. R. Scott, *The Constitution and Finance of English, Scottish, and Irish Joint-Stock Companies to 1720*, vol 1 (Cambridge, 1910-12), 452

³⁵ Luca Zan, "Accounting and management discourse in protoindustrial settings: the Venice Arsenal in the turn of the 16th century", *European Accounting Review*, 11:2 (2004), 161

³⁶ The payment per barrel of ore was reduced from 20 to 16 skilling; coal deliveries from 3 ½ to 3 ort per lest; the wage for ‘berggesell’ from 6 to 5 rd. per month; for a ‘knekt’ from 5 to 4 rd.

Bragernes Commission's work. The Commission went through the accounts, and calculated and separated debts, which had been accumulated over decades by some of the large owner-operators. The debts were traced back to embezzlements carried out in the 1660s and 70s by the largest owner-operator, Joachim Irgens, his wife Cornelia von Westerwick – who took over his shares when he died in 1675 – and the Director and Mining Superintendent Henning Irgens, who helped them with covering up their failure to deliver with withdrawing copper illegally. In 1666, Joachim Irgens owed miners and smelters 970 rigsdaler and farmers around 26,000 riksdaler, and in 1673 he owed supplies worth 27,129 rigsdaler.³⁷ In 1684, Henning Irgens owed wages worth 14,259 rigsdaler to farmers and 208 skippund copper (equivalent to around 33.3 tons) that he had taken illegally, for which he had been arrested by Order of 16 August.³⁸ Cornelia von Westerwick's debt was 64,400 rigsdaler and 10,561 rigsdaler worth of unpaid credit slips. Due to her systematic failure over many years to pay wages and deliver supplies, the Commission confiscated and sold her shares.³⁹ Following up on the Bragernes Commission, the 1688 Commission ordered the new Mining Administrator and investor in the Copperworks, Heinrich Schlanbusch, to pay 1,325 rigsdaler due to 'failure to fulfil obligations' and to return 20 skippund copper that he had taken illegally.⁴⁰ In total, the other owner-operators demanded a compensation of 22,542 rigsdaler from Schlanbusch due to 'misconduct'.⁴¹ This shows that at Røros, acts of fraud and embezzlements resulted in punishment, yet it should be noted that other copperworks in Norway also suffered from owner-operators not fulfilling their obligations.⁴²

The embezzlements led to severe problems. On-going lack of materials led to operational challenges at the mines and smelters. In the 1660s, for example, the main mine, Storwarts, lacked wood and was partly filled with water. The coal that was used at the smelters was mostly not paid for.⁴³ Such problems seemed to continue until the reforms. Lack of cash to pay wages to employees made long-term planning and work organisation highly difficult and the chronic lack of inputs and cash, and illegal copper withdrawals, led to substantial deficits. The surplus in the first decades after the Copperworks was established was followed by deficit from 1678, and in 1682, the Works was in 'a bad state'. A couple of

³⁷ Peder Hiort, *P. Hjorts og P.S. Krags Efterretninger* (Røros, 1846), 27-28

³⁸ *Norske kongebrev*, bind 3, hefte 2, 166; *Norske kongebrev*, bind 3, hefte 3, 250

³⁹ *Norske kongebrev*, bind IV, 1686-1689, 29.05.1686, NM T XIII 331a-332a

⁴⁰ Ref. *Norske kongebrev*, bind V, 1690-1694. 51. 28/3 1693. NM T XV 102 a-b.

⁴¹ Translation: 'mislig direction'. Gunvor Foslie et al. *Norske kongebrev*, bind VI, 1695-1699, 18/4, 1696. ÅB R XVII 338b-339a; 339a-b

⁴² Harald Dahle, *Røros Kobberværk 1644-1894* (Trondheim, 1894), 54-55

⁴³ Privatarkiv 211, Røros kobberverk, 20, letter 4/3 1666

years later, the Mining Assessor Jens Hansen Collin described it as ‘ruined.’⁴⁴ According to Gunnar Nissen’s estimates, in the years 1678 to 1687, the debts totaled around 127,000 rigsdaler, which would correspond to more than the value of the total copper production of 1686 and 1687.⁴⁵

Embezzlements and fraud were highly common in early modern businesses, but while paid managers and supervisors were often the ones who cheated on their owners, at Røros the misconduct was first and foremost led by investors; with help from some of the managers on site.⁴⁶ The outcome of the two Commissions account analyses was that the people responsible for fraud were held accountable, but the foundation was laid so that the amounts of cash that each owner-operator had to come up with annually was reduced, which would make the annual deliveries more viable and reduce the risk of embezzlements going forward.

At the same time as delegating more responsibilities to the Director and middle-managers, the Commissions also adopted several measures that led to stronger discipline for the owner-operators, the Director and middle-managers. Several preventive means were introduced.⁴⁷ For example, if the Director agreed with any of the owner-operators to postpone payments or supply deliveries, he would have to pay for ‘all the damage and inconvenience’ that would affect the Copperworks. In the 1688-Commission report, it was further added that the supply accountant was to ‘keep correct accounts’ of the provisions and to inform the Mining Superintendent at the Mining Office and the Director on site ‘immediately’ if any of the owner-operators provided ‘bad or old’ provisions. Furthermore, the Director, the mining accountant and the supply accountant were not to ‘favour or benefit one owner-operator more than the other’ and if they ‘turned the blind eye’ to errors or ‘should dare to act against’ this regulation, they would be ordered to pay to ‘the poor’ during a year. If this happened a second time, they would be dismissed. The owner-operators who would have ‘enjoyed more than rightfully belonged to him’ would have to pay hundred ‘and more’ rigsdaler to the poor. Strong discipline was also reflected in the instructions of mining accountants, smelting accountants, smelting masters and head of mines after the reforms. In the mining accountant Peder Hiort’s instruction from 1690, for example, it was stated that he was to estimate the

⁴⁴ *Norske kongebrev*, bind IV, 1686-1689, 22, 5.2.1687. ÅB R XV 414a-415b

⁴⁵ Calculated based on the copper production and the registered copper price in 1687 of 57.5 rigsdaler per skippund (around 160 kilos). Gunnar Brun Nissen, *Røros kobberverk* (Trondheim, 1976), 67

⁴⁶ Sydney Pollard, *The genesis of modern management* (London, 1965), 14-21

⁴⁷ The Bragernes Commission decided that if anyone – workers or foremen - was to go against regulations, they would be incarcerated: *Kongelige reskripter...*, Bd. 1-2., 26. sept. 1685.

salaries and distribute the gar copper ‘without fear or favour’. He was not to reduce payments to the workers and farmers ‘in any way’. It was explicitly declared that he ‘...was not to spend the inputs from the [owner-operators]’, either supplies or money, ‘to his own advantage’. Dishonest accounting would lead to ‘random punishment and dismissal.’⁴⁸ These strict guidelines, restrictions and penalty warnings may be understood as early attempts, in a European context, to motivate the employees to act in the best interests of the business as a whole.

The Commissions took the initiative to establish what seemed to be pioneering ‘control mechanisms’ on input deliveries and wage payments. The 1688-Commission determined that the Director and a new accountant – appointed by the owner-operators to prepare the annual financial statements on their behalf – were both to acknowledge and agree on the accounts and income. They should both be present when inputs were delivered and when wages were paid. Moreover, the Mining Superintendent, the Director and ‘all foremen’ should each quarter ‘inspect all the supplies in the warehouses and make sure that the workers [were given] the assigned tariffs and correct weights’.⁴⁹ These new and intricate control functions aimed to divide the power between the owner-operators, the Mining Superintendent, the Director and the middle-managers, to stimulate transparent transactions and to ensure that input deliveries and wage payments were managed and carried out properly (see Appendix 3 for details about ‘who answered to who’). Further transparency was encouraged in the 1688-report by establishing that ‘everyone [might] know’ what the work and duties of the Director, and the other middle-managers were, and what they were to ‘do and defend’.

A wide-ranging ‘state monitoring’ was one of the key measures that were taken by the Commissions. A certain degree of state surveillance and inspections of mining works were established through the public Mining Office – founded in 1654 in Christiania, much inspired by German public mining organisation – yet the new reforms intensified the state’s role in daily routines. The Bragernes Commission decided that the Mining Office should be informed of the set wage and price tariffs. It was the 1688-Commission, however, that really increased state involvement, which can be summarised in five main points. The report declared, first, that instead of the owner-operators, the Mining Office was to set the prices of food at the warehouse ‘according to the Director’s proposal’. Second, if the Director and the owner-operators did not agree on matters related to ‘operation’, the Mining Office was to make the final decision. Third, the ‘Tithing Accountant’ was to make sure that the owner-operators

⁴⁸ Privatarxiv 211, Røros kobberverk, 4, instrux, Peder Hiort, 1690

⁴⁹ *Kongelige reskripter...*, Bd. 1-2., 3. august 1689

provided ‘correct deliveries’. Fourth, a mining office for the ‘Northern part of Norway’ was established in 1689 in Trondheim, which was much closer to Røros than Christiania. With this new office, the public mining administration increased, and state monitoring and inspection became easier to carry out.

‘External monitoring’ of accounts and systems were used from early on in different places in Europe. In the 18th century, mining companies in England had success with regular inspection of Court members and hundred years earlier, the surveillance of the Dutch East India Company’s directors seemed to pay rewards. The Bragernes and 1688 commissions, then, might follow an international trend of overseeing businesses using external agents, yet for Røros, the new surveillance ensured that the ultimate control was anchored in the state (see Appendix 3).

The increased state involvement also included more directly involved in the recruitment of directors and middle-managers. This was in line with the old and more general idea that recruiting workers and managers with specialised technical and managerial skills – particularly in large businesses – was important to ensure ‘efficient operation’, and seemed to be linked to the fact that between 1646 and 1689, five out of eight directors at Røros were fired (Henning Irgens twice). Joachim Irgens – in particular – put his family members – notably his brother, his brother-in-law and nephew – in strategic positions without the consent from the other owner-operators. From 1651 to 1684 (except from 1659 to 1663) – more than 30 years – the Irgens family both managed the corporation and controlled most of the shares. From 1685, Heinrich Schlanbusch acted similarly to Joachim Irgens by putting German contacts in managing positions without consent.⁵⁰ Therefore, from 1688, the owner-operators needed the approval from the public Mining Office to hire and dismiss people in strategic positions. The owner-operators should find ‘experienced persons’ and suggest these to the mining officials at the Office, who in turn should choose the most ‘capable’ ones.

4.3 The Reforms: enabling improved operational and economic conditions

The new regulations seemed to influence the owner-operators to fulfil their obligations, and they seemed to have an overall stabilising effect on the local administration and a positive effect on the operation and general economy of the Copperworks. First, the intense firing of directors during the first decades ended in 1699. From then on, instead of being fired, reasons

⁵⁰ Peder Hiort, *P. Hjorts og P.S. Krag's Efterretninger* (Røros, 1846), 21-23

for retirement were old age, illness or death.⁵¹ Appendix 1 shows a clear shift after 1699, the year Henning Irgens died; from which year hired directors were less bound to family ties and instead recruited based on relevant education and work experience. The new hiring system seemed to lay the foundation of a new tradition of employing directors and middle-managers with mining education and long work practice and ended the overwhelming control of members from the Irgens family.⁵² Third, there is evidence that after the reforms, the owner-operators normally delivered the agreed inputs and money, and in the early 18th century, profit was made.⁵³ This was connected to a general copper production increase from the late 1680s – except in the late 1690s, when the mine Old Stortvart had to close due to the exhaustion of high quality ore – as well as an increase in the population in Røros. Ole Øisang writes that in the 18th century, the Copperworks was ‘the best business in Norway’ and ‘one of the richest mining works in Europe’ (see Appendix 2 of production).⁵⁴ Better economic conditions in Norway during the 18th century might contribute to ease the problems with capital shortage, but the ownership and organisational reforms probably contributed to the Copperworks’ long-term stable financial conditions and surplus from the early 18th century. The new-established institutional framework seemed to affect the behaviour of the stakeholders.

In the end, King Christian V, through these royal commissions, probably prevented the Copperworks from shutdown. It should be noted that other royal commissions were organised to deal with debts, delayed wage payments etc. at other Norwegian mining works after the ‘Røros commissions’, which might indicate that they were seen as examples to follow.⁵⁵

5. The Role of Miners, Smelters and Farmers in Pressuring the State

How were the reforms implemented? Miners, smelters and farmers at Røros were not directly involved in making the reforms, but they pressured state officials at the Mining, County and Central Government Offices, and Kings Frederick III and Christian V, to do something about the owner-operators who often failed to pay wages and set high prices on food supplies. From

⁵¹ Harald Dahle, *Røros kobberverk 1644-1894* (Trondheim, 1894), 485-489

⁵² From 1760, the owner-operators acquired once again increased flexibility in hiring processes, but under the conditions that they gave an ‘oath of allegiance’ to the Mining Office, including confirming the annual account reports made by the owner-operators. The state control over the owner-operators, thus, continued: *Kongelige reskripter...*, bd. 2, 25. Mars 1760

⁵³ Ida Bull, *Thomas Angell* (Trondheim, 1992), 119-120

⁵⁴ Ole Øisang, *Rørosboka: Røros kobberverks historie*, (Trondheim, 1942), 128

⁵⁵ For example Kongsberg Silverworks in 1732: Odd Arne Helleberg, *Kongsberg Sølvverk 1623-1958* (Kongsberg, 2000)

the 1660s, which was when the problems with the lack of provisions and cash began, workers regularly complained in written form to the Director and owner-operators, first and foremost to Joachim Irgens, and asked to be paid ‘correctly’ what they were entitled to.⁵⁶ As the problems with irregular payments were not solved, workers began writing letters and petitions to state officers at the Mining Office, the Bailiff, the County Governor, the Deputy Governor as well as directly to the King. Between 1665 and 1699, dozens of letters and petitions were sent – sometimes ‘daily’, according to a state official at the Mining Office – and signed by up to thirty miners, smelters and ‘coal burners’ – or simply signed by ‘all workers in Røros’.⁵⁷ There was a clear indication of frustration in the letters. The letters varied in length, some of them were several pages, yet certain points were repeated, which were (1) that wages were paid late, irregularly, and sometimes not at all, and that overtime work was not paid. In 1670, for example, workers wrote that they had not received wages in one and a half to two years. Others had not been paid in seven or eight years, and when they asked for their wage, they were met with violent ‘punches and kicks’ by the Director; (2) that they were often ‘forced’ to be paid in credit slips instead of cash, which they had to trade with merchants in the city. The merchants paid less for the credit slips than the wage value, which meant that the workers ended up with less money; (3) that they depended on daily food supplies from the warehouse, which they in principle could choose to buy, or exchange instead of cash as part of their wage, but that they were sometimes ‘forced’ to accept overpriced and ‘rotten’ products, which led to unbearable conditions for their families.

The letters suggest that the living and work conditions for the employees and their families at Røros were insufferable, and so the question is, how did they survive without money and inedible food? Most of the employees owed some land and supplemented the income from mining with that from farming, which suggests that they acquired food from other sources than the Copperworks.⁵⁸ Miners seemed mostly to stay and work at the mines during the week and to come back home in the weekends where their wives and children meanwhile were looking after the animals and crops. The work at the smelters were characterised by seasonal work. The smelters worked in shifts and spent more time at their

⁵⁶ See for example Privatarkiv 211, Røros kobberverk, 20, letters 25/10 1673 ; 28/3 1674; 12/11 1679; 15/11 1679

⁵⁷ See for example Privatarkiv 211, Røros kobberverk, 20, letters 4/3 1666; 17/3 1666; 7/5 1670; 7/7 1670; 31/5 1670; 4/4 1674; 4/5 1674; 3/1 1683

⁵⁸ J. H. L. Vogt, *kobberets historie* (Kristiania, 1895).

farms, which might put them in a better position than the miners.⁵⁹ The complementary farming might partly explain why the owner-operators held back wage payments.

The general problem, which the letters indicate, was late and irregular wage payments, while not being paid for several years only seemed to apply to some of the workers. Their bad social conditions was also related to often being paid in credit slips of little value, or in kind, i.e. overpriced, bad quality and limited provisions and food from warehouse, instead of in cash, which meant that they suffered significant losses. This did not mean that the employees at Røros were worse off than other places in Norway, and in fact, the number of employees at Røros increased from 195 workers in 1671 to 349 in 1685.⁶⁰ Working at Røros was voluntary and, according to Dahle, ‘fixed contract workers’ increased from the 1690s at the expense of ‘casual workers’.⁶¹ Røros seemed to be a rather attractive workplace despite wage payment irregularities and poor supplies. The message that can be interpreted from the workers’ letters was that the compensation for their work was not regular; it was not paid in a favourable way, and their work terms were often breached.

Why did the workers write to the authorities? In one of the petitions from 1683, miners, smelters and farmers requested to employ an ‘inspector’ to supervise the wage payments, which they offered to pay for themselves.⁶² Generally, however, their requests were more general. In essence, their demands to state officials were to get help to make sure that they were paid and that there was enough ‘good quality’ low-priced food in the warehouse. The workers’ suggestions included demanding the owner-operators, in particular Joachim Irgens, to pay them and, in the case of lack of cash, to sell the mined copper and use the cash returns to pay the wages. For example, in a letter dated 4 March 1666, six miners, six smelters and six coal burners requested the Mining Superintendent Jacob Mathias Tax for help in getting the owner-operators to provide them ‘the right payments’. In the same letter, it was suggested to use copper as payment.⁶³ Similarly, in 1674, workers sent a petition to County Governor Wind and asked him to help them to obtain payment and to ensure that there were goods in the warehouse so that they could buy food.⁶⁴ The workers’ long-lasting communication and meetings with the authorities might resemble what E. P. Thompson describes as ‘peaceful food riots’; referring to 18th century England, and their organisation

⁵⁹ Randi Borgos, ”En verksarbeidergård – Rasmusgården – hus nr. 7”, Verdensarven Røros bergstad og Circumferensen: <http://www.worldheritageroros.no/> [uploaded 1 May 2020]

⁶⁰ Volker Seresse, *Tysk bergverkstradisjon ved Røros kobberverk 1671-1685* (Trondheim: 1992).

⁶¹ Harald Dahle, *Røros kobberverk 1644-1894* (Trondheim, 1894), 54

⁶² Privatarkiv 211, Røros kobberverk, 20, 3/1 1683

⁶³ Privatarkiv 211, Røros kobberverk, 20, letter 4/3 1666

⁶⁴ Privatarkiv 211, Røros kobberverk, 20, 4/4 1674

and clear demands in terms of wages and work conditions, might resemble an early informal form of work union.⁶⁵

As the problems with wage payments and supply deliveries continued, employees went further in their measures to pressure the authorities for assistance. Twice in 1670, workers walked to Copenhagen from Røros to acquire an audience with King Christian V.⁶⁶ Joachim Irgens arrested Spell-Ola - one of the workers - for meeting with the King, and in the extension of this event, workers physically attacked Joachim and Henning Irgens and demanded that Spell-Ola be set free. In 1679, workers threatened to leave their work if wages were not paid and food provisions were not regulated.⁶⁷ In 1682 and 1683, worker delegations went to Copenhagen with a complaint to King Christian V and to Christiania with another written complaint to the Mining Administrator. One of the workers, Jacob Knudsen, was again imprisoned for contacting the authorities upon his return to Røros, and further violent incidents occurred. Some years later, in 1686, farmers left work – i.e. went on strike – and payments were then increased to 8 sk. per ‘lest’. Another strike was organised in 1698 after tariffs were reduced in 1691.⁶⁸

State officials explicitly condemned the violence carried out by workers. A Commission was established to examine the reasons for the assault of Joachim and Henning Irgens in 1670, and the state official Ove Juel warned the workers of ‘punishment’ if they did not keep ‘calm’.⁶⁹ Some years later, the County Governor Joachim Frederich Wind warned in a letter to ‘all workers and mining people at Røros’ about their tendencies to resort to ‘violence and power’.⁷⁰ Similarly, in 1683, Deputy Governor Just Høeg warned ‘the workers at the Works’ against proceeding with ‘rebellion’.⁷¹ Furthermore, the Bragernes Commission in 1685 dismissed workers who had been guilty of ‘disorders and illegalities’.

However, although the authorities reacted strongly against the violence, they responded to the workers’ cause. The state officials at the Mining Office, the Bailiff, the Deputy Governor, the Country Governor – and the Kings when asked directly – answered the workers and farmers’ petitions first by instructing owner-operators, the Director and middle-managers to make sure that the unpaid wages were settled. In 1666, for example, the Mining Administrator ordered the Mining Superintendent to travel to Røros and ensure that correct

⁶⁵ E. P. Thompson, «The Moral Economy...», *Past and Present*, 50 (Feb. 1977), 76

⁶⁶ Gunnar Brun Nissen, *Røros kobberverk* (Trondheim, 1976), 40

⁶⁷ Peder Hiort, *P. Hjorts og P.S. Krag's Efterretninger* (Røros, 1846), 31-32 and 91-92

⁶⁸ Ole Øisang, *Rørosboka* (Trondheim, 1942), 83 and 97

⁶⁹ Privatarxiv 211, Røros kobberverk, 20, 19/11 1670

⁷⁰ Privatarxiv 211, Røros kobberverk, 20, 1/5 1674

⁷¹ Privatarxiv 211, Røros kobberverk, 20 21/4 1683

wage settlements were made.⁷² In 1669, a written reprimand was sent from the Mining Assessor and the Mining Superintendent to the Director and Supply Accountant with a warning to not treat the workers so ‘ruthlessly and unchristian’ and a demand to pay them what they owed.⁷³ In a Royal decree signed 8 September 1670 – after the four workers had met with the King – King Christian V instructed the owner-operators to make sure that there was enough money to pay the workers ‘in Danish current’ each month so that the workers could buy food and supplies ‘according to their own wishes’. Furthermore, the workers should obtain full payment for weekends and the coal burners should be paid as agreed ‘on the spot’.⁷⁴ In 1670 and 1682, the authorities demanded that the imprisoned workers be released and be given their job back.⁷⁵ The Bailiff sent two letters with warnings in 1674 to the Director Henning Irgens and royal letters were sent again in 1684, 1686 and 1687 with similar instructions to owner-operators.⁷⁶ In a report sent by the County Governor Wind to Irgens 4 April 1674, it was explicitly declared that the King’s interest was to make sure that there was no ‘lack of provisions’ and cash to pay wages.⁷⁷ The Mining Assessor Jens Hansen Collin visited Røros and wrote to the Mining Administrator 12 November 1684 that workers ‘suffered famine’ and some of them were at times without job due to lack of ‘needed materials, such as iron and steel’. He went on to state that ‘most [owner-operators]’ had not delivered the required supplies and the workers had not received their ‘deserved salary’.⁷⁸ There seemed to be a general support in the state apparatus for the employees at Røros and their demands for fair work compensation.

The workers’ demands were taken into account in the Royal Commissions’ new regulations. One of the aims of the Royal Commissions were to make sure that the workers ‘acquired their wages’. The workers’ claims about high prices and right payments in cash were mirrored in the reforms. The Bragernes Commission specified in its report that the owner-operators should deliver ‘good’ quality supplies, which was a direct answer to one of the workers’ demands. Furthermore, the follow-up clarifications that workers should be paid ‘at the end of each month’; that they could ‘decide freely’ to be paid in provisions or money, and that they should be paid in Danish money, were directly linked to the workers’ requests to

⁷² Privatarkiv 211, Røros kobberverk, 20, letter 7/3 1666

⁷³ Privatarkiv 211, Røros kobberverk, 20, letter 11/9 1669

⁷⁴ *Kongelige reskripter...*, Bd. 1-2. 8. sept. 1670.

⁷⁵ Privatarkiv 211, Røros kobberverk, 20, letter 11/12 1682,

⁷⁶ Privatarkiv 211, Røros kobberverk, 20, letters 4/4 1674; 1/5 1674; *Norske kongebrev* bd. III, hefte 2, 1683-84. 16/8 1684; Kongebrev 27.02.1686 and 12.02.1687, i *Norske kongebrev*, bind IV, 1686-1689

⁷⁷ Privatarkiv 211, Røros kobberverk, 20, 4/4 1674

⁷⁸ Privatarkiv 211, Røros kobberverk, 20, 12/11 1684

the authorities for help to get settlements for their work. Although wages were reduced, the new regulations evidently echoed the workers' demands to acquire right payments.

The wage reductions were, of course, not popular among workers and famers. The reductions meant that they were paid less money each month. In practice, however, the wage reductions and new fixed tariffs seemed to help making payments easier and more tolerable for the owner-operators, which in turn led to more predictable pay-outs. A couple of years later, in 1690, a royal decree clarified that the owner-operators no longer could pay the workers with the much despised credit slips, but that they instead had to come up with actual cash.⁷⁹ This was repeated in the written instruction for a new mining accountant that was hired the same year.⁸⁰ Furthermore, food prices sold at the warehouse were reduced. The work at the mines and smelters was a dangerous job also after the reforms, but workers were paid in cases of injury, pension arrangements were settled, and they had acquired more free time to do harvest work.⁸¹ The reforms, in turn, despite wage reductions, formally clarified the employees' rights to get compensation for their work, and enabled fixed and predictable payment arrangements.

6. The Role of the State in Enabling the Reforms

In particular, the ownership and organisational changes of Røros Copperworks seemed to be based on a comprehensive understanding of business systems and local conditions at Røros. The members of the Bragernes Commission was given the order – due to the 'lack of order that ha[d] prevailed' at Røros – to assess how many shares each investor should own, calculate the debts, and recruit a 'qualified' director. These direct instructions suggest that the Central Government had an idea of what the roots of the problems were, namely embezzlements and misdirection, and that each share corresponded to too much inputs and money annually for the owner-operators – whose financial situation was described as 'too weak' – to handle at the time.⁸² King Frederick III and King Christian V, and their employed officials, acquired insight into the issues partly through correspondence and meetings with workers, who gave them first-hand information about the operational and social challenges, which they in turn could use to assess what to do next. Thereafter, the members of the Commissions analysed the accounts and the supply delivery and wage payment systems in

⁷⁹ Harald Dahle, *Røros kobberværk 1644-1894* (Trondheim, 1894), 84

⁸⁰ Privatarkiv 211, Røros kobberverk, Instrukser 4, instrux, Peder Hiort, 1690

⁸¹ Ole Øisang, *Rørosboka* (Trondheim, 1942), 129

⁸² *Norske kongebrev*, bind IV, 1686-1689, 104, 20.03.1686. NM T XIII 297a-298b

practice, through which they gained further insight into the underlying causes of the problems.

But why would the King establish the two Commissions? The King's creation of the Commissions and the adoption of the reforms was particularly related to his own earnings from the Copperworks. In 1678 and 1679, Røros was invaded twice by Swedish troops, and buildings, houses, supplies and other constructions were burned, and mines were filled with water. The King gave 24,000 rigsdaler to the Copperworks to pay for reconstruction, and it was explicitly stated in the instructions for the Bragernes Commission that members were to 'figure out how this money was spent' and to make sure that the King acquired his tithe. The King was probably concerned with the risk that one of the largest businesses in Norway would go bankrupt and would have strong motivations to ensure that Røros continued operation. State authorities probably benefitted from the annual tithe and payments from customs and taxes, especially since wars with Sweden in the 1640s and 1650s had been expensive and resulted in huge territory losses. Without ensuring materials and supplies to the mines, plants and warehouses, and making sure that workers had their basic needs covered, the business could not continue, and the large sources of income would end.

More generally, the reforms should be understood as part of an increased state involvement in the economic sphere, which might be inspired by 'mercantilist' and 'cameralist' thoughts of the time. King Frederick III set the basis for direct intervention in the economic sphere in 1660 by establishing Absolute Monarchy, and the formation of his absolute power in *Lex Rexia* of 1665. With the King's absolute power also came certain responsibility for the people, which can be interpreted as having an obligation to intervene in cases of misuse of power. The principle concerning 'popular sovereignty', which says that political power is legitimate only when the executive has been assigned by the 'people', is found to be widely accepted in Denmark by the end of the 18th century.⁸³ Was the King's intervention in Røros an indication of an early acceptance of this code? If so, the King might feel responsible for improving the conditions for the employees and their families in Røros. It was as an Absolute Monarch that King Christian V met with the workers in 1670 and the early 1680s, which might reflect quite unique circumstances. The meetings might reflect a more equal society – which is indicated that especially Norway, with few nobles, and Denmark, was – compared to other European countries at the time. The relatively socially equal society, as it was, might lead the King to accept such kinds of audiences.⁸⁴ In line with

⁸³ Jens Arup Seip, *Det opnioinstyrte enevelde* (Oslo, 1958), 11

⁸⁴ Jan Eivind Myhre, *Norsk historie 1814-1905 : å bygge ein stat og skape ein nasjon* (Oslo, 2015)

this, in 1683, two years before the Bragernes Commission came to Røros, King Christian V introduced a new Mining Ordinance in which he declared that owner-operators of ‘some of the mining works’ – referring indirectly to Røros – did not act ‘according to the issued regulations and the Mining Office’s dispositions’. He continued by stating that ‘some’ owner-operators ‘had free hands to act at will to the greatest harm to farmers and workers’.⁸⁵ The Ordinance presented multiple detailed directives about payments and supply deliveries and was a clear reminder, and an order, to the owner-operators to comply with the established rules. In 1684, another Royal Commission was sent to analyse Director Henning Irgens’ accounts, the owner-operators’ shares and input deliveries, and in particular how the Works had been ‘operated since its foundation’ in 1646, and ‘how workers and farmers [had been] paid.’⁸⁶ Thus, the establishment of the Bragernes and 1688 Commissions should be understood in the context of a more general increase of state involvement in business development. Only a couple of decades later, in 1716, the public official and Mining Superintendent Anders Swab began a far-reaching reorganisation of Falun, in Sweden, with the aim of reducing the control of powerful and predominant mining investors – known as ‘guards’ – and increase the use of employed middle-managers and miners.⁸⁷ This shows that the Swedish state also took an increasingly active role in developing mining businesses through reforms.

But, why were the state reforms, which showed to work quite efficiently, not introduced earlier? After all, the problems and conflicts at Røros continued for decades before the system was changed. The reasons seemed to be manifold, and partly related the Kings Christian IV, Frederick III and Christian V’s relationship with Joachim Irgens. Irgens became King Christian IV’s chamberlain in 1634, and he lent the Kings large sums of money to pay for warfare with Sweden in 1643-45 and 1657-60. In 1657, King Frederik III owned Irgens 60,000 rigsdaler. The King lacked money, and paid back Irgens’ debt by providing him multiple privileges and estate properties in Denmark and Norway, one of which was the right to own the largest share in Røros Copperworks from 1650, and dismissing the Director and founder of the copper business – Lorentz Lossius – in the process.⁸⁸ From the early 1660s, Irgens’ estates gave little returns, and the financial problems began. Irgens was bankrupt when he died in 1675.⁸⁹ The three Kings were, thus, indirectly responsible for Irgens’

⁸⁵ Berg-Ordinance 23 June 1683, Jacob Henrik Schou, *Chronologisk Register*, deel 1 (1822)

⁸⁶ Norske kongebrev bd. III, hefte 2, 1683-84. 29/8 1684. NM T XIII 58b-60b

⁸⁷ Sten Lindroth, *Gruvbrytning och kopparhantering vid Stora Kopparberget*, Del 1, Uppsala 1955

⁸⁸ Norske kongebrev bd. II, hefte 4, 1676-1680. 27/2 1678. ÅB R XIII 243b-250a

⁸⁹ Gunnar Brun Nissen, *Røros kobberverk* (Trondheim, 1976), 37-47

economic problems and this might be why King Christian V did not reorganise Røros while he was alive, and instead waited until after he died. For decades, the owner-operators were given warnings, but in practice left alone to sort out the problems. Yet, the problems worsened, which was an indication that the owner-operators were not able to solve them themselves. In two ways, the reforms were an indication that the King no longer trusted the owner-operators, and that he considered his state officials to have a clearer idea of how to run the copper business. First, the King appointed state officials to the Royal commissions, and not any of the owner-operators; and second, the reforms resulted in a reduction of the owner-operators' control and increased the daily engagement and responsibilities of the managers and state officials.

7. Concluding Remarks

This paper has sought to complement the literature with an analysis of the implications of the state reforms that were adopted at Røros Copperworks in 1685 and 1688, how and why they were introduced, and why they were formed the way they did. Røros was founded in 1646 as a form of early modern joint-stock company, it was the largest copperworks in the Oldenburg Monarchy and on the verge of shutdown by the early 1680s. The detailed reports of the Royal Commissions, which were established to deal with severe operational, social and economic problems which had developed in the 1660s, 70s and early 80s, indicate that the new regulations led to changes in the institutional framework which resulted in a quite advanced business system for its time; decades before the Industrial Revolution. The Commissions organised debts and introduced changes that altered key stakeholders' control and responsibilities by reducing the extensive freedom that King Christian IV had given to the owner-operators in 1646; delegating more control to the Director and middle-managers, and increasing state involvement and control. The systems entailed (1) spread of ownership, (2) increased responsibilities to the Director and middle-managers, (3) complex control mechanisms to ensure supply deliveries and wage payments, (4) increased state control through monitoring and (5) wage reductions and clearer instructions and penalties for the Director and middle-managers. The state from then on took an active part in daily operation and recruitment. The state reforms were inspired by Continental business development, yet also partly a forerunner in Europe.

The way in which these changes were adopted seemed to be quite unique for its time. Employees at the Copperworks and the state both played key roles in implementing the reforms, which probably prevented the business from shutdown. Miners, smelters and farmers organised

themselves in an early informal form of work union and demanded wage payments and better work terms. Two Royal Commissions with state officials were established after long-lasting conflicts, and several meetings and communication between miners, smelters farmers, state officials and King Christian V. The Commission members meticulously went through the accounts and work practices, and – even if wages were reduced – largely considered the employees’ demands by changing introduction regulations that ensured regular and correct payments. The King, on his part, had clear economic interests in Røros, but was also indirectly responsible for the problems at Røros, which were related to highly concentrated ownership and bankrupt owner-operators, and did not directly intervene until after several decades with severe social, operational and economic difficulties, and two Swedish invasions.

The increased active role of the state in organising the Copperworks was in line with ‘mercantilist’ and ‘cameralist’ thoughts of the time. King Christian V thus followed a Continental trend. The increased state involvement in daily operation seemed to be related to a lack of trust in the investors in how they run the business. The King had already invested in Kongsberg Silverworks – producing a more precious metal – in Southern Norway in 1624, and the Treasury was almost empty, which made state monitoring of Røros a feasible option.

Appendices:

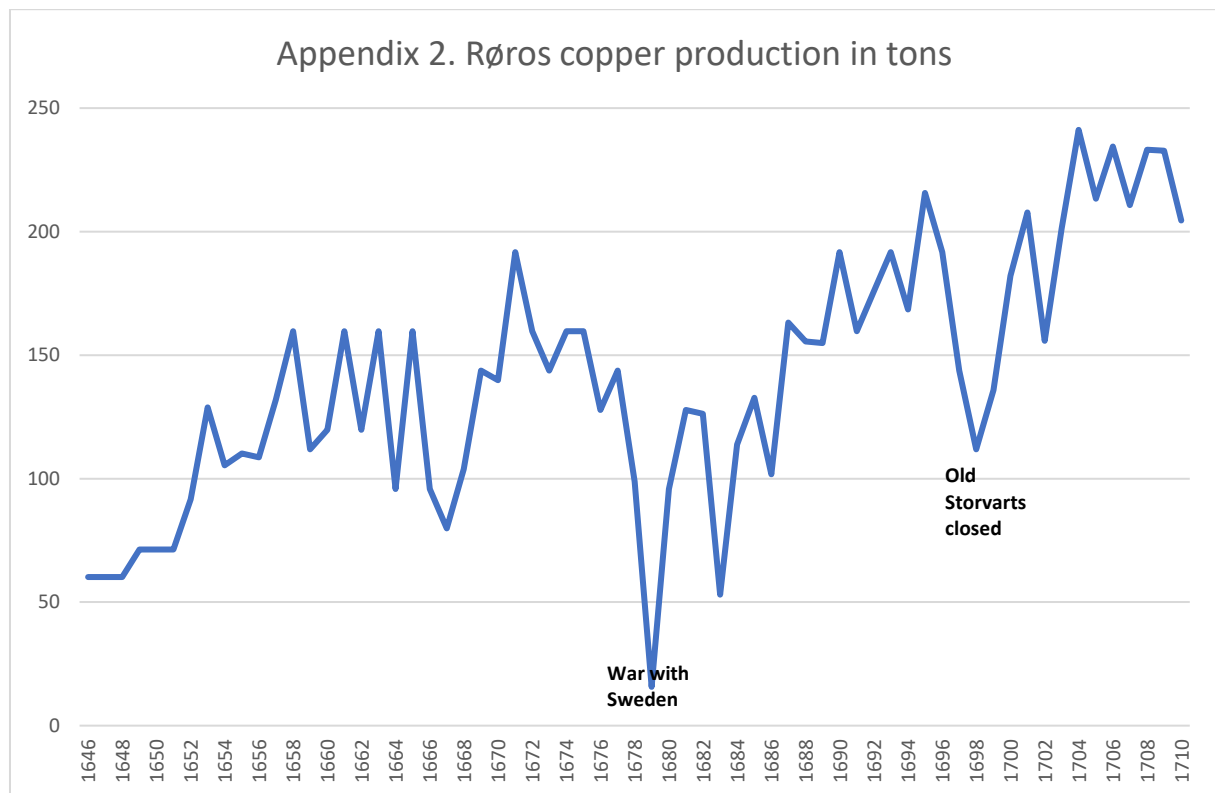
Appendix 1. The family background, education and work experience of the directors at Røros Copperworks (1644-1857)

Name	Family background	Education	Work experience	Comment
During the first decades, most of the people in the director position were in the same family as Joachim Irgens:				
Lorentz Lossius (1646-1651)	Born in Germany (his father was probably a priest)	Drawing and mathematics from the University of Leipzig	‘Skiktmester’ at Kongsberg silverworks, Sandsvær copperworks and Kvikne copperworks	Founded Røros Copperworks
Johannes Irgens (1651-1659)	Joachim Irgens’ (one of the largest owner-operators of the Works) brother. From Holstein.	Graduated as a doctor from the University of Padua		
Jacob Mathias Tax (1659-1663)	From Sachsen and came to Norway in 1652.		Advisor for the mining committee Gjedde in Kongsberg; skiktmester at the copper works in Kvinnherad in 1654; mining superintendent in 1656 and Director at Løkken in 1657 and Director at Ytterøya in 1659.	He opposed Irgens and was ‘concerned about the welfare of the workers’.
Christian Arnisæus (1663-1669)	Joachim Irgens’ brother-in-law			
Henning Irgens (1669-1884)	From. Slesvig-Holstein. Joachim Irgens’ nephew	Graduated as licentiatus in medecinae at the University of Kiel.		Became mining superintendent the same year as he became Director (1669).
Anders Lossius (1684-1685)	Lorentz Lossius’ son			
Henning Irgens (1685-1687)	(see above)			
Johan Georg Tax (1687-1688)	From Sachsen and came to Norway in 1652. Jacob Mathias Tax’ brother.		Regimentssekretær and auditør at Tr.heim nasjonale infanteriregiment, captain of ‘de miniers’ from 1676. Bergtiendeskriver from 1680 and member of myntkommissjonen from 1685.	
Michael Weichardt (1688-1689)	From Freiburg in Germany.		Assessor at Nordenfjeldske	

			bergamt and member of Overbergamtet. Worked with mining.	
Henning Irgens (1689-1699)	(see above)			
Shift: in 1699, the Irgens legacy ended and directors with work experience in mining or mining education were recruited to the Director position:				
Theodorus Bergmann (1699-1719)			Smelter accountant from 1692 to 1699 before promoted to Director.	
Hans Bredal (1719-1737)			Bookkeeper before promoted to Director when Bergmann died.	
Leonhard Christian Borchgrevink (1737-1772)	From the Netherlands.		Spy for the Norwegian forces during the war in 1718-19. Mine manager before he was promoted to Director after Bredal died in 1737.	
Peder Hiort (1772-1789)	From Røros and son of Bergskriver Peder Hiort	Studied theology at the University of Copenhagen.	The supply accountant in 1743, then bookkeeper after 20 years, before becoming Director	
Erich Otto Knoph (1789-1812)	From Copenhagen	Studied at the Mining Seminar in Kongsberg	Became Director after having studied in Kongsberg.	Became mining superintendent in Nordenfjelske district in 1812
Den adm. Kommissionen (1812-1813)				State of emergency: the bookkeeper, the smelter accountant and the supply accountant managed the Works.
Joachim Fredrik Daldorph (1813-1827)			Manager at Foldal Works before he became Director.	
Johannes Aas (the youngest) (1827-1828)			Manager of mines before he was appointed 'acting Director'.	
Peter Ascanius Schult (1828-1857)	From Sparbu	Graduated as mining engineer from the University of Oslo	Worked at a middleschool in Kongsberg and Bergkadettskolen in Røros from 1827 before becoming Director	Mining superintendent from 1840 (one year). Mayor in Røros 1846-47.

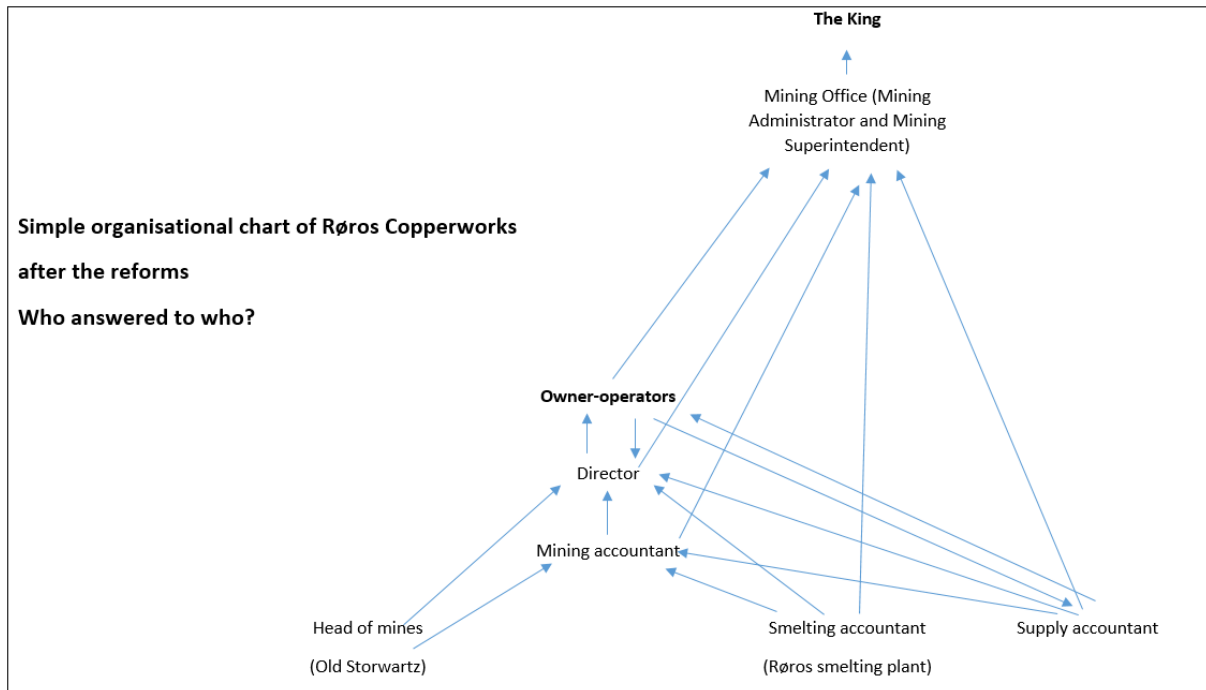
Sources: Harald Dahle, *Røros kobberværk 1644-1894* (Trondheim, 1894); Gunnar Brun Nissen, *Røros kobberværk* (Trondheim, 1976); SNL (www.snl.no, accessed 28/12/19), Bergstaden (www.bergstaden.no, accessed 28/12/19)

Appendix 2. Røros copper production in tons



Source: Based on numbers taken from Øystein Pettersen, "De tørre talls tale", Rørosmuseets samlinger (Røros, 2003)

Appendix 3. Simple organisational chart of Røros Copperworks after the reforms. Who answered to who?



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