Thesis for the degree of Licentiate of Philosophy

SILK-WEAVING IN SWEDEN DURING THE 19TH CENTURY.

Textiles and texts - An evaluation of the source material.

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Illustration:
Brocatell, interior silk woven for Stockholm Royal pallace by Meyersson silk mill in Stockholm 1849, woven from silk cultivated in Sweden, Eneberg collection 11.183-9:2 (Photo: Jan Berg Textilmuseet, Borås).

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Abstract

Silk-weaving in Sweden during the 19th century. Textiles and texts - An evaluation of the source material.

With the rich material available, 19th century silk-weaving invites to studies on industrialisation processes. The purpose of this licentiate thesis is to present and discuss an empirical material regarding silk production in Sweden in the 19th century, to examine the possibilities and problems of different kinds of materials when used as source materials, and to describe how this material can be systematized and analysed in relation to the perspective of a textile scientific interpretation.

The introductory sections of the thesis provide a background to the subject of textile science. This is followed by an overview of previous research on silk-weaving in Sweden and a historical overview of silk-weaving in Sweden, the Jacquard machine, and the K.A. Almgren Sidenväveri, where large parts of the source material have been preserved. After these overviews, the research material is described and systematized: first the main materials, textiles, machines and other objects, and then the various written sources. The empirical material is summarized in a critical discussion where the various groups of materials are evaluated in comparison to one another. A discussion on theory and methodology regarding objects as sources and the use of experience-based knowledge in academic research is developed in connection to the critical discussion. Finally, the potential of the material is demonstrated through a textile example.

The presentation is an introduction to the cultural-historical analysis that will follow in the PhD thesis. Here, the empirical material will be analysed through the use of knowledge in handicrafts, which may give new insights in the Swedish silk production and the complexity of the industrialisation process.

Keywords: Silk Weaving, Jacquard Loom, 19th Century Sweden, K.A. Almgren Sidenväveri, Object Based Research, Material Culture, Experience Based Knowledge.

Contents

1 PROLOGUE

1.1 My background

My fascination with silk awoke already during my education in dressmaking. The material was laden with notions of great value, luxury and refinement. The sheen, the lustre and the colours surpassed those of all other materials I had previously worked with. As soon as I had familiarized myself with the basics of weaving, I tried using silk in my weaves. Handling the fine threads required patience, but they were strong and pliable. The history of textile technology and development of complicated looms, which early on caught my interest, proved to be closely associated with silk as a material. I was fascinated by the patterned silk fabrics and became increasingly interested in understanding how they were manufactured.

In parallel with my undergraduate studies in the history of art, ethnology, archaeology and textile science at Uppsala University, I have been learning and also been professionally active in handicrafts: dressmaking and, primarily, weaving. Historical development and technologically advanced looms were always a great interest of mine. In my work as a designer and manufacturer of church vestments, I used hand looms with figure harness and adapted historical techniques to modern qualities. During my studies under Christina Rinaldo at the hand weaving program at the University of Borås, I was given the opportunity to perform my degree project by setting up a silk in a Jacquard loom. My education was then continued through several soujourns at Fondazione Lisio, Florence, a century-old silk-weaving mill which also holds courses in Jacquard weaving. I was also given the opportunity to complete a placement with the design studio at Rubelli, a modern full-scale silk-weaving mill in Venice. I have added to this practical experience through courses in textile analysis at CIETA (Centre International d'Etude des Textiles Anciens), Lyon. Through my contact with textile archaeologist Lise Bender Jørgensen, I have been given opportunities to participate in several textile archaeological research projects. These projects have developed methods combining experiments and reconstruction with theoretical reasoning. In recent years, my knowledge in silk-weaving and textile history has taken on concrete form through my work with Durán Textiles AB, where I have been making full-scale reproductions of silk fabrics from museum collections with the aid of modern technology.

An important part of the empirical material in this thesis is the silk products manufactured at K.A. Almgren Sidenväveri ('the K.A. Almgren Silk-Weaving Mill') at Repslagargatan in Södermalm, central Stockholm. The first time I visited the weaving mill was in 1992, when it

was run by Oscar Almgren. My first impression was that time had been standing still and that the factory environment had been left untouched since the 19th century; but the looms worked! The silk threads were no ticker than strands of hair, thousands of threads in each warp and the warp threads were directed by advanced Jacquard machines using punched cards. The technology appeared to be incredibly advanced and trying to understand and master it was a challenge.

When the silk-weaving mill was transformed from a private business to Stiftelsen K.A. Almgren Sidenväveri och Museum (the Foundation K.A. Almgren Silk-Weaving Mill and Museum, in the following abbreviated SKAASoM) in 2001, it was opened to research. The combination of textiles, a preserved environment, machines, and written records was the reason behind my choice of this place as the starting point of my PhD project. In addition, Swedish bureaucracy has produced an extensive archive material as a complement to the collections. Here, there was an opportunity to study advanced weaving technology and put it into a context that made it possible to project an image of Swedish society in a dynamic era. My practical knowledge and experience in silk-weaving provides me with the opportunity to understand and analyse the material. Practical knowledge may generate a special kind of narrative, one that is just as important as the theoretical content of literature and written sources. The Swedish School of Textiles, University of Borås is financing my PhD-project. In addition, the Agnes Geijer Foundation for Nordic Textile Research have contributed financially to the initation of this project and a grant from Fondazione Famiglia Raussing made a longer sojourn at Fondazione Lisio possible. My participation in the research project, ”Dolda innovationer under 1800-talet” (Hidden Innovations in the 19th century), directed by economic historian Klas Nyberg and funded by Handelbankens forskningsstiftelser, has also been of great importance to the development of my research.

1.2 The fabrics sing

This special kind of narrative about experience and knowledge is also about myself and my beloved teacher and mentor in dressmaking and costume history, textile scientist and fashion creator Viola Germain, who passed away suddenly and unexpectedly in January 2008, leaving her own PhD thesis unfinished.

I met Viola for the first time when I was eighteen years old, in connection with the production of costumes for two major chronicle plays in Uppsala. I was not in possession of any “natural talent” for dressmaking, work was slow and things often went wrong; however, my stubbornness and enthusiasm made up for these shortcomings. I became her apprentice and assistant. Initially, she showed me how to sew. It was practice and exercises devoid of reflection, in achieving

discipline of the body, sewing “per hand” (i.e. carrying out working operations in the same direction as that of the body and the material) and “working in the box” (i.e. working with great care for accuracy, in a controlled manner, and not spreading the pins all over the workbench). While learning to sew, I received unspoken instruction in how to organize my work and in professional ethics, about why one sews and how to do it the “right” way. At first, I worked under her supervision and showed her everything I did, at all stages of the process. When I had worked for her for a few years we were able to “sew on the phone”, as I had learned her language and her entire view on textiles and dressmaking. Viola taught me a feeling for materials. I learned to appreciate and recognize fabrics of high quality. We could amuse ourselves by spreading silk fabrics, stroking our hands over them, admiring their sheen and lustre, making them flutter in the air. This is where my fascination for silk as a material first awoke.

Later, when I turned my interest more to weaving and textile research, I continued to show my work to Viola. We created the “pastry seminar”. I bought some pieces of pastry and she made strong coffee. We discussed dressmaking and weaving projects, seminars we had participated in, essays, articles and educations, and looked at fabrics and new books. I was introduced into a view on research where craftsmanship, reflection, practice and theorizing connected.

After Viola’s passing, I helped clean out and sort the contents of the large store room where theatre costumes and fabrics from numerous projects had been mixed with garbage, furniture, paper and a life’s worth of collections. From the inside of a bag, a few strips of silk protruded – navy blue crêpe georgette. When I touched them, they sang: *See, See even night herself is here…*”the Night” from Purcell’s “The Fairy Queen”, for which we made costumes in 1990. The singer entered in a dark blue silk dress with a train; after her there are dancers in toe shoes and georgette dresses. They spread large veils of the silk georgette, representing the wings of night. It was breathtakingly beautiful. The costume itself was nowhere to be found, only these rumpled silk strips, cut out to even a hem.

Fabrics sing to me. How am I to convey this?

All pieces of fabric have a story to tell – as materials and objects, both created and used by people. To understand the textile material, I have good use of my knowledge in handicrafts. They become tools for interpreting pieces of silk, putting them into a greater context and making the fabrics sing.

2 BACKGROUND

2.1 DISPOSITION

The thesis begins with a prologue that provides my personal background in textile research and the choice of topic for the thesis. This is followed by a presentation of purpose, research questions, delimitations and the method chosen for this thesis. The chapter on theoretical perspectives provides a background on textile research and the subject of textile science. It is then followed by an overview of previous research on silk-weaving in Sweden and a description of K.A. Almgren, his silk-weaving mill and its development, which in turn leads to a more comprehensive historical overview of silk-weaving in Sweden. The Jacquard machine and its introduction in Sweden are presented in two chapters. Then, the research material is described and systematized: first the main materials, textiles, machines and other objects, mainly collected at K.A. Almgren Sidenväveri, and then the various written sources. Finally, the empirical material are summarized and evaluated in a critical discussion. A discussion on theory and methodology regarding objects as information sources and the use of experience-based knowledge in academic research is developed in connection to the critical discussion. The last part of this thesis demonstrates the possibilities created by the methodology through a textile example.

2.2 PURPOSE

The purpose of this licentiate thesis is to present and discuss an empirical material regarding silk production in Sweden in the 19th century, to examine the possibilities and problems of different kinds of materials when used as source materials, and to describe how this material can be systematized and analysed in relation to the perspective of a textile scientific interpretation.

2.3 RESEARCH QUESTIONS

The main research questions in this thesis relates to the material and the method. What is the composition of the empirical material about K.A. Almgren and silk-weaving in Sweden in the 19th century? How can it be used, processed and analysed? What critical considerations must be addressed in relation to the sources? How does my methodological reasoning regarding knowledge transferred through experience and object analysis work out when tried against the research material?

2.4 DELIMITATIONS

The thesis focuses on silk production in Sweden in the 19th century, where K.A. Almgren Sidenväveri is central because of the extensive source material available. The study concerns itself mainly with textiles and information sources relating to technology. The reason for choosing the year 1800 as a starting point was to have the study cover a period of time prior to the development of the Jacquard machine as well. It has been necessary to incorporate a few retrospective journeys back to the 18th century to be able to explain the background of silk-weaving in Sweden. Although K.A. Almgren Sidenväveri was operational as late as in 1974, the 20th century is dealt with only briefly, because silk-weaving in Sweden was in decline already by the end of the 19th century.

2.5 WORKING METHODS

In this investigation, I have used a comparative method divided into two main activities: analysis of the textiles and processing of the archive material. The two are complemented by investigations into the technical context in which the silk products were manufactured and also by information on silk-weaving from literature. In addition, the different groups of materials have been evaluated in relation to one another.

The appearance and construction of the silk fabrics have been studied in detail. Textiles in several collections have been photographed, documented and technically analysed. In practicality, technical analysis involves counting threads, drawing weave diagrams, and evaluating and describing qualities, techniques, manufacturing methods, colours and patterns. This information may then be connected to other fabric samples, to designations in the archive material, to preserved machines, to technical drafts, to design drafts, and to clients.

Processing of the written material has mainly been conducted through excerpting from and compiling the factory reports and systematizing them in diagrams showing the development of the production and changes during the period. Information on technology, which is a prerequisite for understanding the products, their designations, appearance and production, has been gathered by going through various kinds of archives. In addition, I have compared and compiled earlier research results and archive material on the buildings and social context in which the production of silk took place.

On the whole, this comparative method aims to provide an overall picture of technology, materials and products in harmony or disharmony with its day. In the end, despite quantitative methods being used to describe and analyse the textiles, the research questions and results will be qualitative. It is about creating an understanding for the people, the society and the ideas materialised by the textiles.

2.6 THEORETICAL PERSPECTIVES

2.6.1 Textile research and textile science

Both textile research and textile science are material-oriented concepts which will not be limited to any none faculty. The perspective of research is ever changing, methods vary, and studies make use of different supporting sciences, depending on the research material and the research questions.

For a very long time, textile research has been carried out within several disciplines, such as Archaeology, Ethnology and Art History. Since the 1990's, textile science has developed into an independent discipline at several seats of learning. The fact that the subject is relatively young opens up opportunities for creating new research methods and profiles, while at the same time it proves to be an obstacle as there is a lack of established research methods and theories.

At "Textilvetenskaplig konferens på Nordiska museet" ('Conference on Textile Science at Nordiska museet') in October 2009, the interdisciplinary nature of the subject and the breadth it has developed over the past thirty years were discussed. Here, it may be relevant to refer to a paradigmatic shift regarding research topics, how research is carried out and also who is regarded a scientist. Academic researchers and doctoral students in Art History,

History, Ethnology, Economic History, Archaeology, Gender Research, Fashion and Textile Science, who in the past often have been quite isolated in their disciplines, met and shared their perspectives on textile research. A more remarkable change was that museum staff, the folk costume movement, handicraft educations, craftsmen, curators and reconstruction projects were able to participate on the same terms as theoretical and academic researchers – this would have been inconceivable thirty years ago, when textile research would only be considered worthy of the name if conducted by academics or curators at the major museums. This change can be explained with the transformation of practical educations into university colleges and universities, but also with a change of perspective on experience and practical knowledge as a form of knowledge in research. The latter can be traced back to a general change affecting the entire research society in Sweden, including examples from research in the fields of health care, art and music, system and working environment and design, etc.

At Uppsala University, Textile Science has moved from the Department of Domestic Sciences to the Department of Art History and developed into an entirely theoretical subject, called Textile Studies, focusing on textile history. Knowledge in handicrafts is regarded background knowledge which supports the historical-theoretical arguments. Five doctoral theses have been defended at the department[1], all of them focusing on a theoretical analysis of textile objects and the production of them. However, the use of practical knowledge, which is a prerequisite for the investigations, has not been emphasized and discussed to any great extent. This may be due to the influence of the Uppsala university environment, which is rich with traditions and also characterized by the somewhat outdated notion that practical knowledge is incompatible with academic writing.

The Swedish School of Textiles (Textilhögskolan) in Borås has chosen to focus more on the practice and application of textile knowledge. Theoretical and historical discussions are held only in the background. Four theses have been defended at the School. Until 2010, when the Swedish School of Textiles was granted the right to provide postgraduate education itself, the postgraduate education program was held in collaboration with other universities and university colleges. Two doctoral theses have been published in Textile Design, where focus

1 Candréus, Cecilia, *De hädangångnas heraldik: en studie av broderade begravningsfanor ca 1670-1720*. Aneer, Cecilia, *Skrädderi för kungligt bruk: tillverkning av kläder vid det svenska hovet ca 1600-1635*. Holmberg, Annelie, *Hantverksskicklighet och kreativitet: kontinuitet och förändring i en lokal textillärarutbildning 1955-2001*. Rasmussen, Pernilla, *Skräddaren, sömmerskan och modet: arbetsmetoder och arbetsdelning i tillverkningen av kvinnlig dräkt 1770-1830*. Dahrén, Lena, *Med kant av guld och silver: en studie av knypplade bårder och uddar av metall 1550-1640*.

is placed on product development and applied research with practical experiments.[2] In the two theses written in Fashion Design, emphasis is placed primarily on the exploration of the researcher's own creative process and means of expression.[3]

This licentiate thesis has been carried out at the graduate school "Design and Human Factors" at the Department of Product and Production Development at Chalmers University of Technology, as it was begun prior to the Swedish School of Textiles being granted the right to provide postgraduate educations.

2.6.2 Previous research: Silk-weaving in Sweden and K.A. Almgren Sidenväveri

As an introduction to the subject, this chapter presents what has previously been written on silk-weaving in Sweden and about K.A. Almgren Sidenväveri. Here, the various researchers are presented with short references to which faculty and perspective they belong and also in what way they have used the textile material in their research.

Printed sources contemporary with the Swedish silk industry consist of a publication by Professor Carl Palmskjöld at Teknologiska institutet ('the Technological Institute') and a few travellers' accounts.[4] Some information, particularly regarding product names, is also found in Swedish product dictionaries from the 18th and 19th centuries.[5]

Early on, silk-weaving in 18th century Sweden caught the attention of several researchers. In the 1920's, ethnologists connected to Nordiska museet, Ingegerd Henschen, Gösta Selling och Sigurd Wallin, took an interest in the textile material, although they mainly focused on archive material. Their results were published in minor articles.[6] Ethnologist Elisabet Hidemark is the scientist who has published textile material, primarily from fabric sample

2 Berglin, Lena T H, *Interactive textile structures: experimental product design in smart textiles*. Zetterblom, Margareta, *Textile sound design*.

3 Thornquist, Clemens, *The savage and the designed: Robert Wilson and Vivienne Westwood as artistic managers*. Eriksson, Kajsa G., *Concrete fashion: dress, art, and engagement in public space*.

4 Palmstedt, Carl, *Om silket och sidenväfnadsindustrien, förnämligast i Sverige: föredrag, hållet på föranstaltande af sidenfabriks-societeten i Stockholm, den 20 Januari år 1861 ... jemte åtskilliga ämnet tillhörande meddelanden, upplysningar och underrättelser*.

5 Orrelius, Magnus, *Köpmans- och material-lexicon.* Synnerberg, Lars Nilsson, *Svenskt waru-lexicon.* Almström, Per Olof, *Handelsvaru-kännedom* .

6 Henschen, Ingegerd, *Svenska sidenvävnader från 1700-talet*. Wallin, Sigurd, *Siden-droguet*. Selling, Gösta, *Artur Hazelius födelsehus I. Den Fritziska Sidenvävargården*.

collections from the mid-18th century, and connected them to the archive material.[7] In the publication of the Anders Berch collection, Ulla Cyrus-Zetterström published analyses of some of the techniques and a book containing analyses of silk in the collections of Livrustkammaren includes several fabrics produced in Sweden.[8] However, these publications do not contain any in-depth studies of weaving technology and its connection to market and society. At the moment, a series of anthologies edited by economic historian Klas Nyberg are being published, where the last part contains the publication of three Swedish fabric sample collections from the 18th century and the connection between archive material and textiles is the subject of an in-depth study.[9]

In economic history, silk-weaving has had a place in the debate regarding the importance of the manufacturing system in the 18th century to the development of the textile industry in Sweden in the 19th century. Using the same archive material, Eli Heckscher claimed the manufacturing system was a failure and that it did not continue into the industrialization, whereas Per Nyström and Lennart Schön, on the other hand, stated that the manufacturing system was transformed by the end of the 18th century and became the foundation for Swedish textile industry.[10] Klas Nyberg proposes a similar view on the early Swedish industrialization.[11] In an unpublished paper in economic history, Ann Svennilson-Collste discusses K.A. Almgren Sidenväveri and its strategies in the economic development during the 19th century.[12] These researchers have focused on interpreting the archive material and they hardly regard the textiles as a source material.

Art historian Marita Lindgren-Fridell, on the other hand, uses textiles in her history of K.A. Almgren Sidenväveri.[13] They are used primarily as examples illustrating the history of the company in relation to the stylistic development in the 19th century. Thus, she does not go deeper into technical details. Gerd Almgren's article focuses mainly on the history of the

7 *1700-tals textil. Anders Berchs samling i Nordiska museet*. red. Elisabet Stavenow-Hidemark. Stavenow-Hidemark, Elisabet, *Nya källor till 1700-talets svenska textilmanufaktur*. Stavenow-Hidemark, Elisabet, *Ett fynd på riksarkivet*... Berg, Jonas & Hidemark, Elisabet, *Stockholms Stads Sidenmanufactorie*.

8 Cyrus-Zetterström, Ulla & Ekstrand, Gudrun, *Royal silks*,

9 First part: Nyberg, Klas (ed.), *Till salu: Stockholms textila handel och manufaktur 1722-1846*. The text on fabric sample collections is still only a draft.

10 Heckscher, Eli F., *De svenska manufakturerna under 1700-talet*. Nyström, Per, *Stadsindustriens arbetare före 1800-talet*. Schön, Lennart, *Från hantverk till fabriksindustri: svensk textiltillverkning 1820-1870*.

11 Nyberg, Klas, (red.), *Dolda innovationer på 1800-talet. p.*10-38.

12 Svennilson-Collste, Ann: *Almgrens sidenväveri och den svenska sidenindustrien*.

13 Lindgren-Fridell, Marita: *Sidenfirman K.A. Almgren* 1833-1910.

silk-weaving mill and textiles are reduced to illustrations presented without interpretation.[14]

Ethnologist Eva Bergström presents K.A. Almgren Sidenväveri in two books, founded on an extensive research endeavour which, however, partly have been given the form of fiction.[15] Her perspective primarily focuses on the people behind the archive material and the situation of the women workers. No closer examination of the silk fabrics and weaving technology are carried out. This also goes for Linnéa Andemar's biographic article about women silk weavers, the recruitment of whom are also analysed in an unpublished paper in ethnogeography by Linda Lundberg-Kuhmonen.[16]

Several studies of objects and archive material related directly to K.A. Almgren Sidenväveri at Repslagargatan in Stockholm has been conducted in connection with and after the transformation of the mill into a museum. The inventory conducted by Stockholms stadsmuseum (the Stockholm City Museum) in the 1980's resulted in a short article and an unpublished catalogue by Inger Frankow and Anette Åström.[17] The investigations conducted in connection with the renovation of the property present the buildings and their history, but do not provide any analysis of the factory operations.[18] Kerstin Sjösten Wölling, curator at SKAASoM, has in unpublished papers presented and systematized the written material preserved at the mill.[19] This material will be very valuable when analysed together with my research material. The group of objects receiving most attention is perhaps the silk kerchiefs. In her article from 1933, local historian Elin Håkansson puts the kerchiefs in the context of Swedish history and social circumstances and accounts for technical details pertaining to them, adding references to foreman Holmberg of K.A. Almgren Sidenväveri.[20] In a short text, ethnologist Christina Lindvall-Nordin sheds light mainly on the patterns of the kerchiefs.[21] In an unpublished paper, Marie Louise Wulfcrona-Dagel, who was a textile restorer at Nordiska

14 Almgren, Gerd, *K. A. Almgrens sidenväveri.*
15 Bergström, Eva & Öhrlén, Peter, S*iden*. Bergström, Eva: Väverskor och mästare. Om arbetarna vid K.A. Almgrens sidenväveri.
16 Lundberg-Kuhmonen, Linda, Till verkstad och väveri. Arbetarrekryteringen vid Stockholmsföretagen Almgren, Bolinder och Hierta år 1855, ur rumsligt socialt och utbildningsmässigt perspektiv. Andemar, Linnéa *En sidenväverska berättar.*
17 Frankow, Ingrid & Åström, Anette, *Almgrens Sidenväveri. Inventering av föremålsbeståndet 1985-1986*. Frankow, Ingrid & Åström, Anette, *En sidenfabrik på söder*.
18 Bergquist, Göran, *Västergötland 6 Götgatan 32 – Repslagargatan 15 Antikvarisk förundersökning*. Restaurator, *Almgrens sidenväveri Kulturhistorisk värdering*.
19 Sjösten Wölling, Kerstin, *En 200-årig sidenfabrikörs livsverk*. Sjösten Wölling, Kerstin, *Bevarad bokföring berättar*. Sjösten Wölling, Kerstin, *Bevarad bokföring berättar mer*.
20 Håkansson, Elin, *Sidenhalsdukens bruk och tillverkning.*
21 Lindvall-Nordin, Christina, *Mossrosor och hjärtblomster*.

museet, describes and systematizes the large collection of silk kerchiefs from K.A. Almgren Sidenväveri donated to the museum.[22]

In summary, it can be said that in previous research relating to silk-weaving in Sweden, textiles have often been treated as illustrations or been studied primarily in order to relate their own history. Although my research takes its point of departure in the textiles and the technology, it aims to put them into a wider context. Through my textile scientific competence I am able to use the textiles as source materials, which in combination with other sources allow me to draw conclusions on historical processes and changes in society.

22 Wulfcrona-Dagel, Marie Louise, *Schaletter och halskläden i Nordiska museet vävda hos K.A. Almgrens sidenväveri i Stockholm.*

2.7 HISTORICAL OVERVIEW OF K.A. ALMGREN AND HIS SILK-WEAVING MILL

Fig. 1. Knut August Almgren, family photo album, private collection.

Knut August Almgren was born in 1806 as the youngest of 15 siblings.[23] (Fig. 1.) His father, who was a county secretary and a magistrate, died in 1816 and after finishing school in 1822, Knut August, who was then 16 years old, moved to Stockholm to live with his twenty years older half-brother Johan Gustaf Almgren. Johan Gustaf worked at Mazer & Co., a business that ran one of the more important silk-weaving mills in Stockholm, in addition to wholesale trading including import of silks, wine and luxury products from France. Almgren worked as a salesman and proved to have an aptitude for business. In 1827, his brother writes:

> With great pleasure we received your letter via the one-day postal service from Skänninge – and were truly astonished that you, who are new in town, were able to sell silk products for 6000 Rdr. [trans.note: 'Riksdaler', official currency of Sweden, 1776-1829] – I consider this a good beginning.

23 The biographic information on K.A. Almgren is primarily based on Lindgren-Fridell, the Indebetou family archives in copies at SKAASoM, and Almgren's own biography in Almgrenska släktarkivet, RA.

In 1828, K.A. Almgren fell ill with tuberculosis and travelled with a ship owned by the company to France in order to receive treatment at a sanatorium in Montpellier.[24] He studied French during his convalescence and once he regained his health he travelled to Lyon. On 28th May 1829, he writes:

> … For over a month I have been to this the home of silk mills and try to absorb as much as I possibly can, and in order to be able to see and learn, one must not be a foreigner, because there is great resentment, and I am therefore no longer Swedish, but a Frenchman from Strasbourg where I work with my masters at the factory branch…[25]

K.A. Almgren managed to buy and bring home Jacquard machines to Sweden, where they were, until he could start his own mill, at first installed at Mazer & Co. In May, 1833, he was authorised by Kommerskollegium (the National Board of Trade) to manufacture silks, Madras-weaves (half-silks), silk ribbons, and sewing silk. In November, he reports that he had nine looms operating during the year and the year after he had 16 looms operating. The first mill was situated at Svartens gränd near Mosebacke, Södermalm.[26] Here, Almgren rented several halls as workshops and, initially, also lodgings for his family and some workers. In 1837, he married Albertina Campbell, who had been employed as a woman silk weaver at the factory. Already in the 18th century, there had been a number of silk-weaving mills in and around Mosebacke.[27] The mill appears to have been located in houses that were not specifically built to function as weaving mills. His cousin and brother-in-law, C.G. Indebetou, writes: "He rented a hall at Svartens gränd, where his mill was stowed in quite uncomfortably."[28] Weaving requires good light conditions and the Jacquard looms needed a ceiling height of three metres, why some modifications of the buildings may have been required.

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24 A journey to Norrland was the cause of the illness. The journey is described in diaries, which are in the possession of the Almgren family. Almgren, p.30.

25 Letter to C.G. Indebetou, copy at SKAASoM.

26 The Häcklefjäll district, lot No. 22 "fabriksrum" ('factory hall'), the residence was in No. 20 (Mantalsuppgifter, 1835). Unless specifically stated, information on the properties originates from Bergström 2007.

27 Nyberg, Klas (ed.), *Till salu: Stockholms textila handel och manufaktur 1722-1846*. 2010, p.69.

28 Höjer, Torgny (red.), Hist. handl. 36:3. *Handlingar ur Indebetouska arkivet*, 1958, p.248.

Knut August obviously was an able businessman. C.G. Indebetou characterizes him in his notes:

> He was cut out to be a businessman and in addition he was sensible enough, …not to fly any higher than his wings would carry him…a good many of his brothers in the trade were ruined in the same time young Almgren earned a fortune. … Knut Almgren was a master in arranging matters wisely and sensibly for himself…He did not purchase a house for himself until he had come far enough for the cost not to matter to him.[29]

In 1840, K.A. Almgren Sidenväveri may be referred to as a medium-sized weaving mill with four Jacquard machines, four mechaniques d'armure, and 24 looms for plain weaves. K.A. Almgren Sidenväveri received a royal warrant in 1844.[30] Orders were placed for silks for the furnishing of palaces and silver fabric for coronation dresses for queens.[31] Almgren took up politics and in 1844 he was made a representative of the burghers of Stockholm to the Riksdag, the Swedish parliament. As a manufacturer, he was a protectionist and worked in vain to prevent the abolishment of tariffs and barriers to free trade.

In 1847, the mill moved to a lot which had ben acquired by K.A. Almgren and reached from Repslagargatan to Götgatan.[32] A previous owner of the lot was silk hosier Carl Toutin (1732-1812).[33] Two new floors were added to an existing one-storey house and became a functional mill with high ceilings and high windows. The house functioned as a mill until around 1900. The premises also held housing for workers, stables, sheds for carriages, and outhouses. The Almgren residence faced Götgatan and had a garden on the yard. Although having gone through rebuilding, the houses are still standing.

In 1852, a house was acquired on 44 Stora Nygatan, Gamla Stan (Old Town) and the company head offices were set up there. It also housed a shop for the selling of products from the mill. The house was sold in 1887 and the head offices and the shop were moved to 22 Lilla Nygatan, on the corner of Kornhamstorg. The shop closed down in the early 20th century, while the offices and storing facilities resided in the building until the 1960's.

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29 ibid, pp. 247.

30 There is a receipt from 16th November 1844, for 199 ½ cubits of damask furnishing silks in Slottsarkivet, 1844:1271.

31 For Queen Josefina 1844, Lindgren Fridell p.116 (According to Ekstrand, Gudrun,*Kröningsdräkter i Sverige*.p.124 the fabric was, however, woven by Mazer & Co). For Queen Sofia 1873, Ekstrand p.159. There is a receipt in the Royal Palace Archives, 1873:44, and a sample at Nordiska museet, NM 312.399.

32 The Västergötland district No. 6 and 9.

33 Lindgren-Fridell p.114.

Fig. 2. The Almgren silk-weaving mill at Repslagargatan (Photo: Klas Nyberg).

A new factory building was erected in 1862 along Repslagargatan on the same lot as the original mill. (Fig. 2.) This building is still standing and is relatively untouched, a characteristic sample of factory architecture from the middle of the 19th century.[34]

The trade agreement signed with France in 1865 meant low import tariffs on French silks in exchange for Sweden being allowed to export wood products and iron ore to France. K.A. Almgren worked vigorously against the agreement. His success in business and his political involvement saw him establishing personal connections with the royal family and the uppermost classes of society. In 1838, he became a member of the Masonic Order and he was awarded Knight of the Order of Vasa in 1850.[35] These social networks were probably important to receive orders for the exclusive furnishing silks. Almgren was also very successful in a financial sense. In the book *Svenska Millionärer* (*Swedish Millionaires*) he was described as one of the wealthiest individuals in the country.[36] He left an estate worth 1.8 million kronor.[37]

34 Restaurator 2002. Bergqvist 2000.
35 K.A. Almgren Autobiography, Almgrenska släktarkivet, RA.
36 Lazarus, *Svenska millionärer: minnen och anteckningar. 1. Saml*, pp. 102.
37 Stockholms Stadsarkiv, boupptecknings 1884 nr. 218.


Fig. 3. Silk weaving mills at 13 S:t Paulsgatan and 16 Ragvaldsgatan (Photo: Klas Nyberg and Martin Ciszuk).

After 1869, only K.A. Almgren Sidenväveri and Casparsson & Schmidt were still in business, but were enjoying good times and were able to expand. Between 1872 and 1890, K.A. Almgren Sidenväveri owned the property on 13 S:t Paulsgatan, where earlier the Meyersson silk-weaving mill had been.[38] (Fig.3 left.) It had a factory hall of 100 m^2 on the second floor and also lodgings for workers. During the financial boom of the 1870's, K.A. Almgren Sidenväveri reached its zenith. In 1875, when the weaving mill was more successful than ever, Almgren acquired another lot in the same neighbourhood and built another mill. This was situated on 16 Ragvaldsgatan and was a four-story building with weaving halls on the second and third floors. (Fig. 3 right.) The house was sold in 1912.

K.A. Almgren died in 1884. His son Oscar Mauritz, born in 1842, who had worked in the company since 1858, took over. (Fig. 4.) He was sent on an education journey to Italy and Horgen in Switzerland in 1861[39] and was made a partner in 1869. In 1868, he married Louise Schmidt, the daughter of the owner to the company's only competition, Casparsson & Schmidt. The house on Götgatan was rebuilt in 1884 and became a palatial residence for a successful bourgeoisie family.[40] The Svindersvik estate on the outskirts of Stockholm served as the family's country house between 1862 and 1952, when it was sold to Nordiska museet.[41]

38 The Laxen district No. 4.
39 Lindgren Fridell s.129.
40 Restaurator 2002.
41 Lindblom, Andreas (red.), *En bok om Svindersvik*.

Oscar Mauritz Almgren, like his father before him, became a member of the Riksdag and was strongly committed to community involvement. He was, however, more of a liberal, worked for free trade, initiated a consumer's cooperative society for the workers at his mill and set up a, for the day and age, modern system with health insurance and retirement funds. The mill was run in the manner of a patriarchal factory town. Oscar Mauritz called himself a wholesaler and imported and traded with silk products. The business was expanded also to involve ready-made clothing: Almgren Kravattfabrik (Necktie Factory) in 1867 and Almgren Kappfabrik (Coat Factory) in 1930.

Fig. 4. Oscar Mauritz Almgren, photo album, SKAASoM.

Oscar Mauritz passed away in 1910. His son Oscar Almgren did not want to head the family business and instead became a professor in Archaeology at Uppsala University. The employees asked the widow for permission to run the company and in 1916 a limited liability company was formed and took over the business. It was directed by Viktor Brattberg, who previously had been a bookkeeper at K.A. Almgren Sidenväveri. In 1924, Viktor Brattberg replied to a letter from Kommerskollegium regarding the income of the silk-weaving mill by saying: "The business operates to employ old, women factory workers and has not generated any profit this year." Already Oscar Mauritz stated that he ran the unprofitable weaving mill for the sake of his employees and set aside a fund that would provide life-time pensions to all those employed prior to his passing.[42] In 1909 the weaving mill was called "a dying

42 Almgren, p.40.

Swedish industry" in a newspaper article and in 1925 K.A. Almgren Sidenväveri was called a "factory of the old people".[43] Factory space was reduced and around 1928 the finishing machines from the house of Sidenfabrikssocieteten were moved to the second storey. After 1945, several limited liability companies were formed and divided the business between the four sons of Viktor Brattberg: 1. the main company, Almgrens AB – an import business (Anders Brattberg), 2. Almgren Sidenväveri (Silk-weaving mill, Erik Brattberg), 3. Almgrens Konfektionsfabrik (Ready-made clothing factory), and 4. Almgrens Kravattfabrik (Necktie factory). Three of the companies were liquidated in the 1950's, but Erik Brattberg, who was a trained textile engineer, ran the weaving mill until 1974.

When the weaving mill was closed down, the furniture and halls on the second storey remained essentially intact. This was probably due to the great importance the silk-weaving mill had once held for the Almgren family, who still owned the building, and the fact that Bertil Almgren, who was a professor in Archaeology at Uppsala University like his father, was aware of the historical value of the mill. In 1985-1986, Stockholms stadsmuseum inventoried the property in order to add it to the museum, but this was never completed.[44] Instead, the business was revived by Bertil Almgren's son, Oscar Almgren, who ran the silk-weaving mill from 1992 to 2001 and started a private museum. The financial basis for silk-weaving in Sweden was, however, insufficient for a profit making operation of the mill and in 1996 the premises were sold to the construction company Olov Lindgren. In 2001, Stiftelsen K.A. Almgren Sidenväveri och Museum was founded and took over the property and the operation of the mill. The building was renovated and opened in 2005, with the weaving mill on the second floor and an exhibition hall in the attic. Objects for which there was no room were transferred to the storehouse of Svensk Museitjänst (Swedish Museum Services) in Tumba.

43 *Svenska Dagbladet* 6/7 1909, press clipping in Edvard Linés's book NM 116 294, *Dagens Nyheter* 1925 quoted in Bergström 2007 p.97.
44 Frankow & Åström 1989.

2.8 SILK-WEAVING IN SWEDEN

In the following chapters, I will use a specialized terminology to describe details in silk-weaving and textile technology. I am aware this may cause difficulties for readers who are not familiar with the subject, but the terms are necessary to be able to provide exact descriptions of the objects and the vocabulary is one part in the creation of a textile scientific research language.[45]

2.8.1 Silk-weaving in Sweden in the 18th century

The first Swedish silk-weavers were called upon by Queen Kristina around the mid-17th century to provide the nobility and royal family with the necessary luxury products. The first silk-weaving privilege was granted already in 1624, but the first known active silk-weaver in Sweden was Jacob van Utenhofen, who was brought in from Holland in 1649. Very little is known about the early production and no textiles have been preserved. The crisis following the wars at the beginning of the 18th century caused silk-weaving in Sweden to cease. In the 1730's and 1740's, however, a great deal of government funding went into rebuilding the silk industry through grants to the weaving mills and to immigrating artisans. Mercantilist ideas governed financial policies, where domestic production was favoured over import.[46] "The usefulness of luxuriance" was propagated in discussions, which meant that luxury production would generate capital to the country through decreased import and increased consumption of capital goods. The production of silk focused on patterned and brocaded (woven with floral patterns) fabrics after French models.[47] Silk-weaving mills were also started in less populated areas, although the production was concentrated to Stockholm. After the crises and political upheaval in the mid-1760's, the grants were withdrawn and the number of mills declined. However, the Swedish silk industry recovered and once again flourished around 1785. The production value increased while the number of looms and mill employees decreased. The cause was a change from importing reeled raw silk to importing finished silk yarn instead and also a change in production, where the proportion of patterned fabrics

45 For an explanation of terms, the reader is directed to works on textile terminology such as: Strömberg, Elisabeth, Geijer, Agnes & Hoffmann, Marta (red.), *Nordisk textilteknisk terminologi: förindustriell vävnadsproduktion : definitioner på svenska och synonymer på danska, isländska, norska och finska samt på engelska, franska och tyska*. Burnham, Dorothy K., *Warp and weft: a textile terminology*. Tortora, Phyllis G. (red.), *Fairchild's dictionary of textiles*. Hardouin-Fugier, Elisabeth, Berthod, Bernard & Chavent-Fusaro, Martine, *Les étoffes: dictionnaire historique*.

46 Magnusson, Lars, *Merkantilismens teori och praktik: utrikeshandel och manufakturpolitik i sitt idéhistoriska sammanhang.*

47 There are good examples in the Anders Berch collection, *1700-tals textil*. 1990, nr 71-88.

decreased and the proportion of plain fabric increased, e.g. for taffeta, twill and rep, and silk kerchiefs. These circumstances both made production less labour-intensive.[48]

In summary, it can be said that silk-weaving in Sweden in the 18th century initially may be characterized as a state-subsidized luxury production after foreign model. However, during the last part of the century it adapted to suit the demand of the broader social classes.

2.8.2 Pattern constructors and Sidenfabrikssocieteten

Although silk-weaving was organized in manufactories and as such independent of the guild system, the silk manufacturers formed an interest organisation already in the 18th century – Sidenfabrikssocieteten (the Silk Mill Society). The society reported to Kommerskollegium and to other authorities and tried to influence the financial policies and customs policies in order to promote silk production in Sweden. Fragments of the society's archives are kept at Nordiska museet. Sidenfabrikssocieteten also performed practical functions. Already by the mid-18th century, silk manufactories were provided designs through a central, state-subsidized studio.[49] From 1775 to 1906, the society owned a finishing mill at Tavastgatan, Södermalm, where silk fabrics where pressed, dressed and smoothed after weaving.

Silk weavers were trained at the mills. Despite the manufactories being independent of the guild system, the titles apprentice, journeyman and master were used and the various occupational ranks were regulated through examinations and requirements on period of apprenticeship. In the last part of the 19th century, however, both titles and examinations were removed. By the end of the century, men were instructed in silk-weaving at vocational schools, e.g. Lennings in Norrköping. Women, however, were trained only within the factory system and were given titles depending on their tasks: "spolerska" ('spooling woman'), "vinderska" ('winding woman'), "skärerska" ('warping woman'), "väverska" ('woman weaver'), and "dragerska" ('draw-girl').[50] During the course of the 19th century, the female workforce came to dominate weaving, although the foremen were always men. Swedish silk mills seem to have preferred native foremen; however, in connection with the introduction of the Jacquard technique, two men from Lyon are mentioned: F.M. Crozet at Mazer & Co. in 1830 and Claude Crozet, who worked at the Meyerson mill, in 1835.[51] "Dessinatörerna",

48 Nyström, p.163-187.
49 Malmborg, Gösta. *Jean Eric Rehns första verksamhetsår vid manufakturkontoret*. p.108.
50 Bergström 2007, p.85. SSA, Hall och manufakturrätten: Förteckningar över arbetare.
51 Palmstedt, p.16, 21.

the pattern constructors, who drew designs and created weave compositions, were trained abroad. Already by the mid-18th century, Jean Erik Rehn was sent to France to study and bring back knowledge about new technological and design features.[52] Two of the 19th century pattern constructors are known, as they were trained and employed on the expense of Sidenfabrikssocieteten: C.A. Borgström, commissioned between 1838 and 1847 and L.G. Horngren, who was commissioned between 1847 and 1865.[53] During the first half of the 19th century, Lyon was the centre of the European silk industry and it was here that Almgren, Borgström and Horngren studied. From the end of the 18th century until 1830, international contacts appear to have gone into decline, possibly due to the decrease in production of patterned fabrics in Sweden. Between 1830 and 1860, however, contacts flourish again and an increasing number of people went abroad to study, which is a result of the industrialization and interest in the technological development. During the second half of the century, Germany becomes the main influence on Sweden, both in industrial and cultural terms. The foreman at K.A. Almgren Sidenväveri, Lars Holmberg, studied in Krefeld between 1886 and 1888.[54] This is also reflected in the machines found at SKAASoM, where the Jacquard machines and tools that were obtained for the new mill in the 1860's and 1870's were manufactured in Lyon, whereas the ribbon looms from the 1880's and the mechanical looms obtained in the 1890's were German-made. Erik Brattberg, the last director of K.A. Almgren Sidenväveri, also studied in Krefeld between 1922 and 1924.[55]

2.8.3 Silk-weaving in Sweden in the 19th century

In his product dictionary, P.O. Almström characterizes the Swedish silk industry in 1845:

> In particular, our domestic mills produce excellent plain silk fabrics and patterned kerchiefs and in addition ribbons and gauze.[56]

52 Malmborg, p.107.
53 Nordiska museet, Sidenfabrikssocietetens arkiv. Palmstedt, p.23. Borgström's textbooks and design collection are kept at Nationalmuseum n.p.d.153/1891 I-V.
54 His handwritten textbooks are kept at Textilmuseet BM 48 485 and SKAASoM.
55 His textbooks in five volumes are kept at SKAASoM.
56 Almström, p.489, 505.

And a British visitor to Sweden in the early 1860's wrote:

> The articles produced in the several manufactories of silk, stuffs, and velvet, are far superior to those imported from Germany, but such is the prejudice of the shopkeepers, they neither offer anything of home manufacture, nor will they refer strangers to the depôts of native industry. A market is alone found among the peasantry, who on high days and holidays wear silk shawls and head-kerchiefs, and those in easier circumstances black silk dresses. Black and white satins of the richest quality, with silks both ribbed and plain, as well as for furniture, form the bulk of the stock in trade.[57]

Svennilson Colleste and Schön divide the development of the silk industry in Sweden during the end of the 18th century and the 19th century in four periods. [58]

1785-1820 Decline. In 1806, there were 43 silk mills, all of which were located in Stockholm. The crisis during the Napoleon wars brought about the ruin of primarily the small mills. Patterned fabrics made up a smaller portion of the production and instead plain fabrics and silk kerchiefs came to dominate.[59]

1830-1855 Stability and expansion. Rationalizations, the introduction of the Jacquard machine, and the construction of larger production units increased production quantities per worker and loom. Tariffs still limited the import of silk fabrics and protected the domestic production. In 1855, Jacquard-equipped looms made up almost 60 percent of all looms. In 1847, Lars Johan Hjerta opened the first silk-weaving mill with power looms at the Barnängen mill, which did not last long despite its initial success. International contacts increased and the industry received encouragement through both Swedish and international industrial exhibitions. Interest in domestic production of the raw material mulberry silk, which began in the 18th century, continued with royal support in several places around the country, despite relatively poor results and low profits.[60]

57 Marryat, Horace. *One year in Sweden. p.*478.
58 Svennilson Colleste, p.6-10. Schön, p.161-167.
59 Nyström, p.175.
60 Ragnar, Martin, *106 kg gotländskt mullbärssilke: av kvinnor och maskar för kungliga begär*.

1855-1870 Decline and concentration. The severe crises in 1857-58 and 1867-68 left only two major silk-weaving mills after 1869: K.A. Almgren Sidenväveri and Casparsson & Schmidt. However, the two were able to expand and utilized the workforce from the closed down weaving mills.[61] The liberalization of trade barriers in 1856 and a trade agreement with France in 1865 caused an increase in the import of silk. In 1870, 87 percent of all looms were equipped either with a Jacquard machine or with a mechanique d'armure (dobby).

1870-1910 Varying economic cycles toward decline. A good year in 1873, decline in the 1880's, a boom in 1893-95. In the 1870's, production was focused on silk kerchiefs, but already in 1885 the Swedish market became unstable due to new fashion trends. Instead, the silk industry appears to have shifted toward production of ribbons and, after 1893, neckties and black dress silks, so-called "damassetyg" ('Damasse silk'). During the period, there is a fourfold increase in imports of silk to Sweden.[62]

When Casparsson & Schmidt closed down in 1905, K.A. Almgren Sidenväveri was the lone survivor until 1974, but ran without noticeable profit or investments. During the 20th century, silk-weaving in Sweden wanes. Although new silk-weaving mills were opened in Uppsala, Helsingborg and Malmö in the 1920's and 1930's, they produced only machine woven piece-goods in the new material viscose.

In short, the silk industry in 19th century Sweden was influenced by economic conditions as well as by changes in consumption behaviour and by fashion trends. Technology development was the prerequisite for the expansion of the industry, but became less important during the second half of the century. The organisation of the industry, which was founded in the manufactory system of the 18th century, was conservative and despite large-scale production, the silk-weaving industry still bore the mark of a traditional craft industry.[63] During the second half of the 19th century, the other branches of the Swedish textile industry developed in another direction, toward mechanization and mass production. K.A. Almgren Sidenväveri and Swedish silk production were entirely dependent on the consumers' use of the silk kerchief. When this mass market failed, the weaving mill waned.

61 Lundgren-Kumonen p.115, letters of reference from women weavers at Almgrens, SKAASoM.
62 *Textil- och beklädnadsindustrien*. p.157, 212.
63 Nyberg (red.), 2012 in print, p.125-126.

2.8.4 The Jacquard machine

The Jacquard machine is one of the innovations forming the foundation of the mechanization of the textile industry in the 19th century. Until the beginning of the 19th century, patterned fabrics were made on draw looms. The selection of the pattern was done by an assistant, “dragare” (‘draw-boy’) or “dragerska” (‘draw-girl’), who would stand beside the loom while the weaver worked the treadles of the loom, threw the shuttle, and beat the wefts. The pattern was formed when the pattern heddles in the figure harness were raised by pulling draw cords leading down the side of the loom. Markings of threads, so-called lashes, showed which draw cords were to be used for each pattern shed.[64]

The Jacquard machine was invented in 1804 by Joseph Marie Jacquard. The innovation was based on several attempts at mechanizing the patterning of fabrics during the 18th century.[65] Already in 1725, the Frenchman Basile Bouchon had constructed a machine that guided the draw cords with needles and hooks and in 1734 the inventor Jean Falcon developed it to replace the lashes with punched cards. The machine still required the work of an assistant in addition to the weaver and it was used in Lyon until the beginning of the 19th century. Around 1760, Jaques Vaucanson, who became famous for his mechanical inventions, constructed an automatic loom for weaving of patterned fabrics. The pattern was controlled by a machine with needles, hooks, and lifting knives, which was placed on top of the loom. Instead of punched cards the machine used a perforated cylinder. However, this weaving machine never came into practical use.[66] Jacquard, who was the son of a silk weaver in Lyon, combined these three machines. What was revolutionary about the Jacquard machine was that the machine, using a single treadle, simultaneously controlled the pattern and opened the shed, thus allowing the loom to be worked by a single weaver, and that the punched cards made it possible to construct very large designs. The assistant who handled the figure harness was no longer needed, which caused riots in Lyon when half the town’s workers saw their jobs disappear. After some improvements by constructors Bretton and Skola in Lyon in 1815-17, production of the machine began and it soon reached large-scale use in France.[67] Despite efforts to protect the invention, it was spread to England and the rest of Europe in the 1820’s and the French export ban ended in 1830.[68]

64 See Becker, John, *Pattern and loom*. pp. 270 for an overview of the development of the draw loom.
65 Eymard, Paul. *Historique du métier jacquard*. Lyon. p.4-8.
66 A model of a similar machine from the 1780’s is in the collections of Nordiska museet, NM 403337.
67 Eymard, p.19.
68 Almgren, p.33.

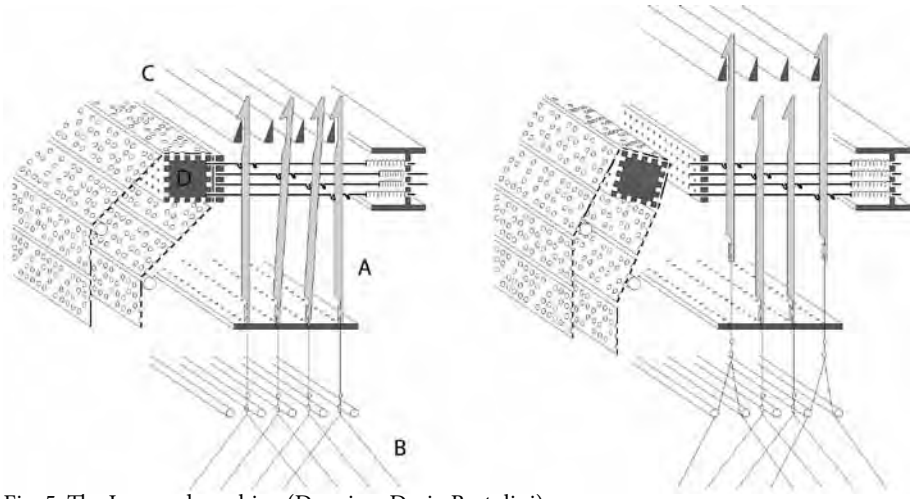


Fig. 5. The Jacquard machine (Drawing, Dario Bartolini).
A: Hooks. B: Neck cords and harness cords. C: lifting knives. D: perforated cylinder and the chain of punched cards.
To the left: The cylinder with a punched card is pressed against the needles.
To the right: The top of the machine is raised, the lifting knives raise the selected hooks and the harness cords connected to them.

The Jacquard machine makes it possible to weave patterned fabrics with the help of punched cards. The machine consists of a coordinated system of hooks, needles and lifting knives. (Fig. 5.) The punched cards are pressed against the spring-mounted needles by a four-sided, perforated card cylinder. The needles are connected to the hooks and the needles that do not find a hole in the punched card will push the corresponding hooks and cause them not to be caught by the lifting knives. Only those hooks where the corresponding needles find a hole in the card will be caught by the lifting knives. By depressing the treadle, the top section of the machine with the lifting knives is raised and the hooks that have been caught goes up with them. At the same time, the card cylinder rotates and puts the next card into position. From the hooks, harness cords connect to the heddles, where the warp threads are inserted. Thus, some threads in the warp are raised after the pattern programmed onto the punched card. When the treadle is released, the machine falls back down because the harness cords and the heddles are stretched by lingoes, leaden weights. Then, the next card is pressed against the needles by the card cylinder, preparing a new pattern shed.

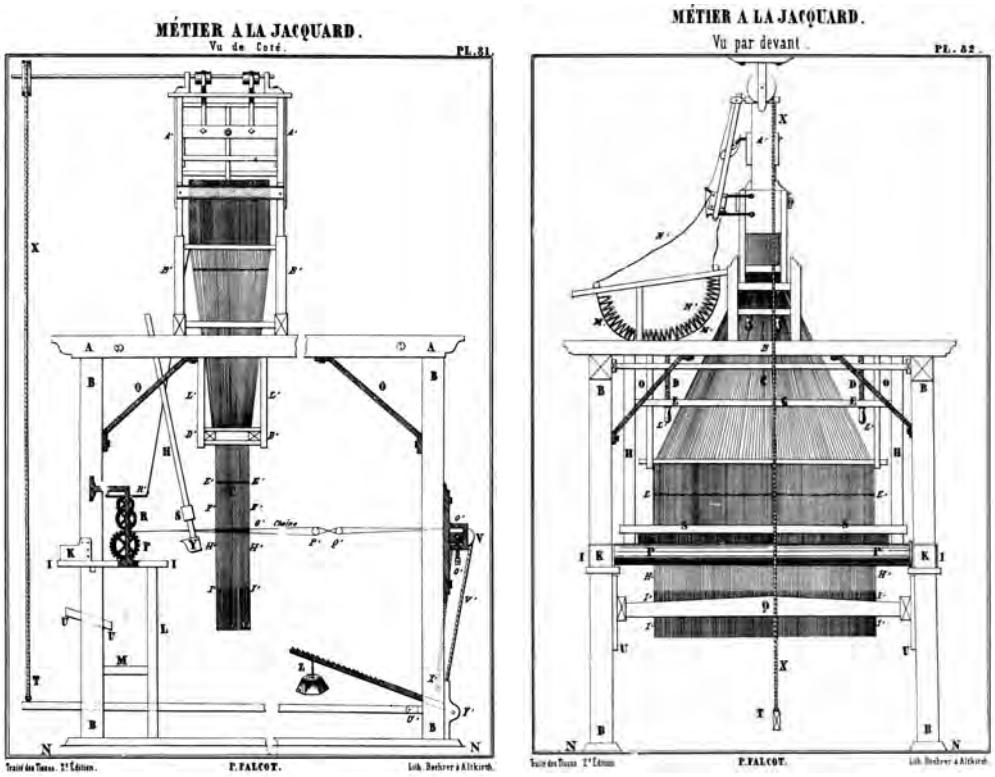


Fig. 6. Jacquard loom without shafts or tringles. To the left: seen from the side. To the right: seen from the front (Falcot 1852)..

The first Jacquard machines had needles, hooks, and lifting knives in metal and a frame of hard wood, but there were machines with wooden hooks as well. By the end of the 19th century, Jacquard machines were made entirely in metal.

In the Jacquard loom, several harness cords attached to each hook, making the pattern repeat several times over the width of the warp. (Fig. 6 and 11.) The harness cords are threaded in a perforated comber board, which is adapted for the warp density and the width of the warp. By arranging the harness cords in different ways, different kinds of pattern repeats can be achieved, e.g. straight repeat, mirrored repeat or in field and border repeats. To increase the size of the pattern, several threads can be threaded in the same pattern heddle, which is called “maillong” (‘decked heddle’) or ”glas” (‘glass’) in the Swedish notes (because they were made in this material).

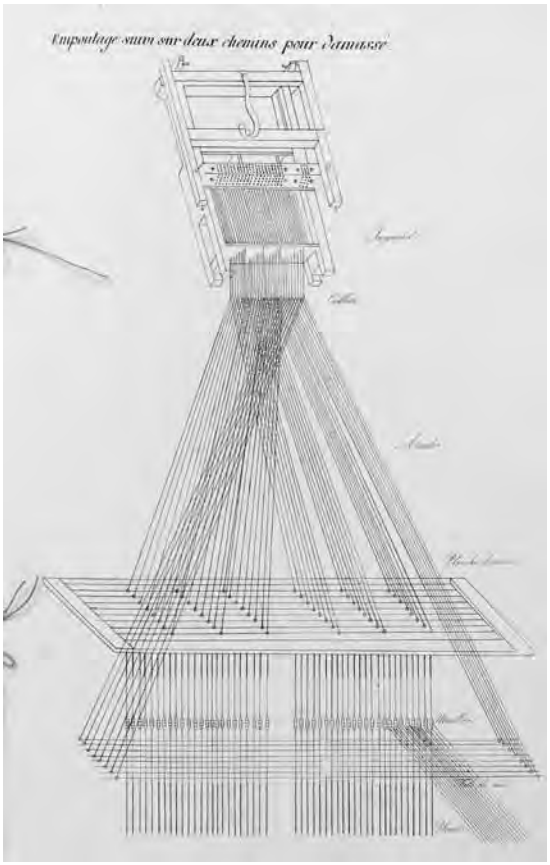


Fig. 7. Mounting for Jacquard loom with six repeats combined with rising shafts for a ground weave, Horngren's book (Photo: Nordiska museet).

In addition, the Jacquard machine is combined with shafts that are able to do a ground weave of the fabric or control a binding warp that has not been entered in the pattern heddles. (Fig. 7.) The shafts may be controlled by treadles or by a separate dobby machine, but may also be hung on hooks in the Jacquard machine. The shafts are either placed in front of the pattern harness as ground or binding shafts or inside the harness under the comber board as so-called "tringles". The combinations of pattern harness, shafts and harness threadings can be made to be very complicated and the textbooks in silk-weaving often contain a number of descriptions and drawings of various mountings. The capacity of the machine, i.e. the width and complexity of the pattern repeat, is decided by the number of hooks in the machine together with the threading of the comber board. Jacquard machines normally have 200-1500 hooks.

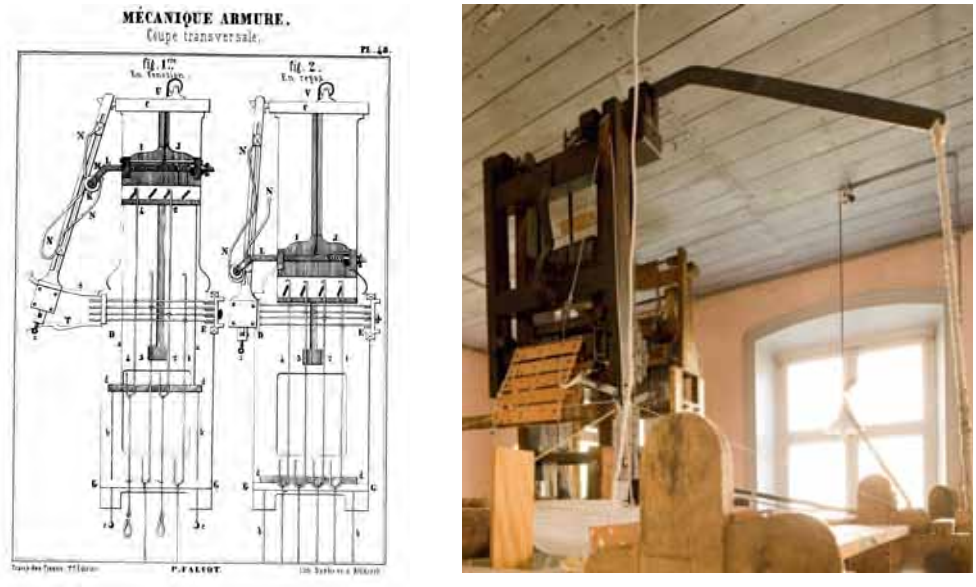


Fig. 8. Mechanique d'armure, dobby machine, in Falcot 1852, and at SKAASoM, 1870's (Photo: Klas Nyberg).

A smaller variant of the Jacquard machine is called a dobby machine ('skaftmaskin') or, in 19th century sources, mechanique d'armure (armure from Fr. 'weave'). This variant only has up to 100 hooks, which are connected to shafts to make plain or small-patterned fabrics. (Fig. 8.)

Fig. 9. Card punching machine, ”Berliner lisage” probably from 1847, SKAASoM (Photo: Klas Nyberg)..

The punched cards are made from hard cardboard based on the technical draft or “mise en carte”, a technical drawing of the pattern, using a card punching machine, a so-called lisage machine or reading unit. (Fig. 9.) Punching holes in the cards is called to “läsa” (‘read’) the technical draft in Swedish notes about silk-weaving (compare: Fr. ‘lisage’, Eng. ‘to read’).

The technical draft is done on graph paper where every column corresponds to a hook in the Jacquard machine and every row corresponds to a punched card. The pattern repeat is transferred to the graph paper and the squares are filled in with different colours. (Fig. 10.) Although weaves are sometimes drawn in the pattern, the colours are often codes for weaves and effects and rarely correspond to the colours of the finished fabric. The drawing is read row by row, following the instructions needed to interpret the colour codes. Depending on the technique and the number of pattern wefts, several cards may sometimes represent a single row.

Fig. 10. Fragment of technical draft (Mise en carte) for silk kerchief, ”damasserad duk”, SKAASoM. The reading note translates: “punch red, leave blue and black, make tabby on the paper” (Photo: Stiftelsen föremålsvård i Kiruna)..

Fig. 11. Jacquard machine with 600 hooks, 1870's, SKAASoM (Photo: Klas Nyberg)..

The punched cards are then tied together to form a chain, which is mounted on the card cylinder in the Jacquard machine. (Fig. 11.) A card chain of several thousand cards may be required for a large and complicated pattern. Every card corresponds to one weft or, if the ground weave is done with separate shafts, to a pattern shed. If the technical draft is adapted to the mounting of a loom that is already threaded, it is very simple to change patterns by inserting a new card chain in the Jacquard machine.

2.8.5 The introduction of the Jacquard technique in the silk-weaving mills in Sweden

While K.A. Almgren is usually credited with introducing the Jacquard weaving technique in Sweden, he had predecessors. The Jacquard machine appears to have been used already in the late 1820's. The technique is presented in the *Journal för Handel Slöjd och Konst* (the Journal of Trade, Handicrafts and Art) in March 1824.

> The Jacquard loom
>
> In No. 14 of this journal, we have mentioned the great benefits, which regarding the production of silk fabrics and artistic weaves in cotton, also regarding the production of kerchiefs and ribbons, the use of the so-called Jacquard loom brings about, we have also communicated, that in Lyon where this loom was invented 18 years ago, over 6000 such [looms] are active. – in connection with this piece of information we consider it proper for us to mention, that already almost six years ago such a loom was brought into our country by the former factory owner Dislin, who in return for 1300 Riksdaler Banco delivered it to Modellkammaren ['the model hall'] in this city, where it is probably still stored and may be seen by anyone, who so desires.
>
> Whether any of the Swedish factory owners yet have copied and used the Jacquard loom we do not know; it would, however, be desirable if some attempt along those lines would be made, preferably by representatives of the silk, silk ribbon, stuff, and linen and cotton factory societies in Stockholm, whose opinions were collected, prior to acquiring the loom in question using state means, explaining, that the by Dislin imported mechanical device in effect has proven to possess several great advantages and appears to be both simple and not very costly, why the representatives were of the opinion, that its use at Swedish factories would be of great benefit.

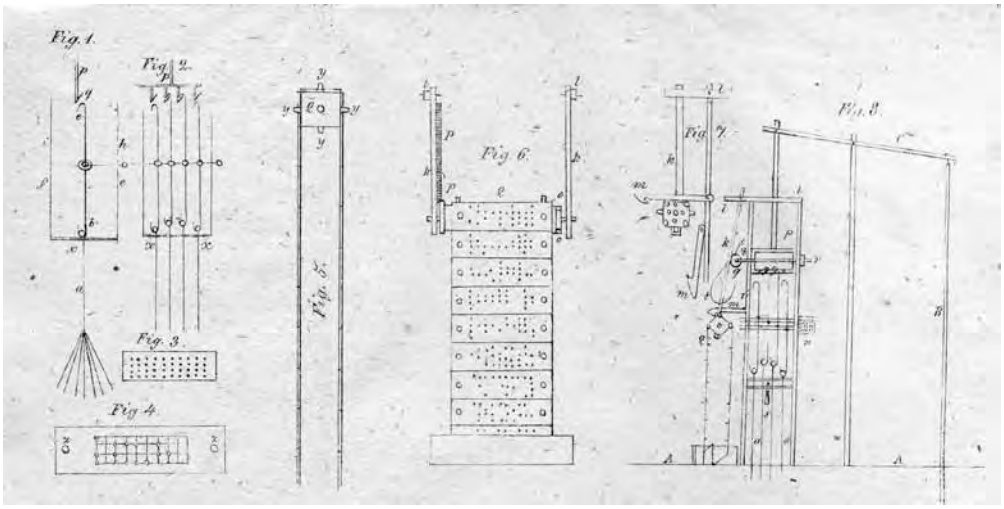


Fig. 12. Jacquard machine in Journal för Manufakturer och Hushållning, 1825.
Fig 1 and 2: harness cords, hooks, needles and lifting knives. Fig 3: comber board. Fig 4: punched cards. Fig 5 and 6: chain of punched cards on cylinder. Fig 7: the cylinder seen from the side. Fig 8: the Jacquard machine seen from the side, the treadle lifts the machine and the cylinder turns.

An article from 1825 in the *Journal för Handel Slöjd och Konst* contains a drawing for a Jacquard machine (Fig. 12.) and states that:

> In Sweden this machine was used already several years ago, according to the belief of this journal, by a foreign factory owner Mr. Dislein, who because of it entered into a lengthy controversy in Stockholmska Dagbladen with a Swedish factory owner, Mr. Thalén. Mr. Dislein later on returned abroad, and a loom á la Jacquard long stood unused as a model, in the model hall in Stockholm, where it may still be viewed. It was only a few years ago, that it occurred to another Swedish factory owner – Mr. Hiessleiter – to set up such machines to make damask, with as exquisite patterns as they are artistic, garlands, coats of arms and inscriptions; and samples of these productions were generally admired at the Handicraft Exhibition in Stockholm during the Riksdag of 1823. This notwithstanding it appears that Mr. Hiessleiter's example has been followed all too little; shortly after the aforementioned time everywhere one was able to observe our women take lessons in the art of weaving patterned fabrics in the old way with many treadles.[69]

69 *Journal för Manufakturer och Hushållning* 1825. p.73.

One of the Jacquard-woven damask linen napkins from Hiessleiter's production has been preserved.[70] At the Handicraft Exhibition of the Teknologiska institutet in 1828-29, he exhibited six flowered kerchiefs woven in a Jacquard machine.[71] Casparsson & Schmidt are also reported to have been in possession of a Jacquard machine already in 1828.[72] On 28th May 1829, K.A. Almgren writes in a letter from Lyon to his brother-in-law Carl Gustav Indebetou:

> … my time here is unfortunately all too short to be able to gain any real knowledge of the new mechanisms which are so advantageously used in the factories. Our poor Sweden is a long way behind in terms of manufacturing…[73]

There was obviously opposition to the new technology among the silk-weavers in Stockholm; one reason for this may have been that training in Sweden only took place at the mills. K.A. Almgren, on the other hand, realized the advantages of the new technology and how it was to be used in production in Sweden. On 6th August 1829, he writes:

> … I am now occupied with trying to con out of France the mechanisms etc. that I have bought and set up here, and I can assure you this is not the easiest thing one may become involved in, but with care and daring everything will hopefully work out…

According to the family tradition, K.A. Almgren dismounted the machines and packed them in boxes with dried fruit or empty cognac barrels, which were then sent home to Mazer & Co, where he was employed.[74] The annual report of Kommerskollegium of 1829 (dated February 1831) states:

> … Among the silk mill owners, who have distinguished themselves in their efforts to put their factories in a productive state, particular notice may be given to the above mentioned company, Mazer & Co., and as proof of its merits in this regard, the Board considers itself obligated to note the company's venture to send a person to France to collect knowledge about the silk-weaving craft and the new and improved machines,

70 Eldvik, Berit, *Den dansande damastvävaren. p.*177.
71 Exhibition catalogue 1829, KTH Library.
72 Palmstedt, p .15, 21.
73 Letter in the Indebetou family archive, copy at SKAASoM.
74 Letter from Gouvert Indebetou quoted by Lindgren Fridell, p.112. Almgren, p.33. A similar story is told about the first Jacquard machines brought into Britain in 1817 by Barlow, Alfred, *The History and Principles of Weaving by Hand and Power*. p.147.

> which are used there for silk production and also the manner in which they are used. This person, who after staying two years at the silk factories in Lyon, recently returned home, has there on behalf of the company bought and with great difficulty and at considerable expense brought home, in addition to a great amount of here unknown devices for the perfection of silk production, 24 so-called Jacquard looms for figured fabrics, of which some are already set up in the factory, and through which after what the Board, during inspection of the place, gathered, are saved a great deal of expense and labour.[75]

There can be hardly any doubt these are the same machines K.A. Almgren writes about in his letter. On 15th October 1830, Almgren, who now plans to open his own mill, writes to Carl Gustav Indebetou:

> … My efforts regarding the mill, God be praised, proceed as planned, I now have two machines up and running and in a few days I will receive two more, thus I am satisfied and calm and do not need to fear that I am in over my head and am now able to show Brother, that the great expenses I have caused will soon be repaid and you can imagine, that all the other mill owners now become wary and think hard on what will come…

In the annual report of the Stockholms Hall och Manufaktur Rätt (trans. note: the court in Stockholm overseeing factories and manufactories between 1739 and 1846) of 1830 (dated 28th June 1831) it is called to attention that:

> … the very high expense, the company Mazer & Comp. have spent on its silk mill through the purchase and setting up of several Jacquard looms, on which the most elegant kerchiefs and fabrics have been on display.[76]

It should, however, be pointed out that among the signers was J.G. Almgren, K.A. Almgren's half-brother, who was one of the partners in Mazer's business. There is a possibility he only mentioned the success of his own business and was uninterested in reporting the development of other mills. Almgren himself writes in 1840:

> … Eleven years ago, in 1829, there were at the silk mills in Stockholm neither

75 RA Kommerskollegiums skrivelser t. kungl. Maj:t 1831.
76 RA Kommerskollegium Kammarkontoret Årsberättelser 1831; Fabriker mm.

> any Jacquard machines, nor any reading units. Nowadays, all patterned weaves are produced on Jacquard looms and the patterns are made after the drawn design with lissagemaskiner [‘reading units’], and this is not all, the so-called mecaniques d’armures or the new invention on so-called plain looms through which also on these minor designs are able to be affixed on plain weave have been here introduced and the same goes for the with the lissagemaskinerna combined repiccagemaskinerna [‘re-recording machines’]…[77]

However, the statement that all patterned fabrics were made in Jacquard machines in 1840 is not entirely correct. The factory reports of 1847 still record some “dragerskor” (‘draw-girls’), which indicate that the old draw looms were still used in some weaving mills.[78] In a draft for a letter to Kommerskollegium written about 1830, K.A. Almgren writes:

> … On the request of ~~Mr. President etc. Poppius~~ the highly esteemed Kungliga Kommerskollegium the undersigned has presented himself at the Model Chamber here, to inspect the so-called Jacquard loom stored there, and found that it is of the model of which the Jacquard looms were made in their first invention or about 20 years ago, but as these mechanisms afterwards have undergone considerable improvements, and the perfection of this mechanism through patent for 5 and 10 years has been awarded by the French government at various times, both Mr. Bally, as well as W(?) Bretton, and later on F(?) Weesly and others in Lyon, we are able to due to both complete knowledge in the matter, and also through our own experience certify that the Jacquard mechanism at the Model Chamber nowadays, since the mentioned mechanisms time and time again have undergone such considerable improvements, cannot be in any way more useful than the ordinary looms, and do not bring about the great advantages at making patterned pieces as Jacquard looms do – In addition we will have to remark that at the Model Chamber here there are no mechanisms and presses for the reading of designs and pressing of paper etc., which now have been imported also by JP(?) Mazer & Co., and as these mechanisms make up the most essential and principal parts for the running of Jacquard looms, we have to add that

77 The re-recording machine was used to copy punched cards. Quote from Lindgren Fridell, p.123.
78 Hall- och Manufakturrättens arkiv SSA.

> if the loom in question at the Model Chamber would be a now working and properly made Jacquard loom, it would not fulfil the desired purpose, while Jacquard looms without reading units, press and re-recording is merely a part of what [is?] the purpose of silk production, but not a whole, which may contribute to its perfection.[79]

A request seems to have been sent from Kommerskollegium to find out whether the machine in the model hall was a suitable model when Jacquard machines were to be manufactured in Sweden. Obviously, the machine in question is the Dislein machine, which was mentioned in the Swedish journal articles above. Almgren rejects the machine as obsolete and provides an explanation as to why it did not become generally used before – equipment for making the punched cards seems to have been lacking in Sweden.[80] In the article from 1825, where the Jacquard machine is described, this information is also missing. The drawing of the machine in this article, however, does not have the old-fashioned appearance referred to by Almgren.[81] It probably does not depict the machine in the model hall, but ought to have been made by someone who has seen the machines in Europe, perhaps in Vienna, from where Jacquard machines are mentioned in an earlier newspaper article.[82]

The French traveller Alexander Daumont describes the silk industry from his journey to Sweden in 1830:

> … The production in silk mills have increased, silk kerchiefs generally used by working class members of the fair sex, constitute a large industry, the remainder consists of Gros de Naples, Taffeta, Levantines and ribbons. There are 42 silk mills which employ 951 workers and the production of these mills amount to a value of 620,000 Riksdaler. The silk import rose in 1831 to 18,000 pounds [appr. 7650 kg]. The Swedish manufacturers compete intensively in the perfection of this branch, which has undergone major improvements through the introduction of looms á la Jacquard, which have been imported from France…[83]

The last part surely refers to Mazer's loom, which K.A. Almgren "conned" home from

79 Page inserted into Theorie-bok, Almgrenska Släktarkivet VI "angående sidenfabriken" RA.
80 Palmstedt draws the same conclusion, p.21.
81 The clattering "cart" which was replaced with the swing arm of the card cylinder by Breton and Skola 1815 -1817. Eymard, p.8.
82 *Journal för Handel, Slöjd och Konst*, 17 feb 1824.
83 Daumont, Alexander. *Resa i Sverige år 1830: innehållande underrättelser rörande detta rikes handel, sjöfart, jordbruk, bergsrörelse* ... p.64.

France. A rapid development process appears to have ensued after Almgren showed how the technology was to be used and the French export ban was lifted. In an account of the Handicraft Exhibition in 1834, samples of Jacquard-woven silk by several producers are mentioned and "that these machines now are in general use".[84] In 1835, the number of Jacquard looms is reported for the first time in the basic data for the factory reports.[85] By then, 8 out of 21 mills used the new technology and the number of Jacquard looms had already reached 64. Several of the manufacturers expressly stated that the new looms were used for weaving "dukar", i.e. silk kerchiefs. Silk manufacturer Grapengeisser also described two machines as "manufactured here". They were exhibited at the Handicraft Exhibition in 1834 and show that Jacquard machines were manufactured in Sweden already by then. This production likely was not particularly extensive, because it required special skills and expensive precision-tool equipment.[86] According to their markings, all but one of the preserved machines at SKAASoM were manufactured in Lyon.

The fact that it took until 1830 for the Jacquard machine to impact the silk-weaving industry in Sweden, despite the technology being available, may be interpreted as an effect of the conservative attitude at the Swedish manufactories. The 1830's, on the other hand, saw the expansion of the textile industry in Sweden, an increased demand for textiles, and an increased interest in international contacts.

84 *Journal för Manufakturer och Hushållning*, July 1834. p.235.
85 Förteckningar över arbetare, Hall- och Manufakturrättens arkiv SSA.
86 Palmstedt, p.22.

3. THE RESEARCH MATERIAL

In this chapter, the various kinds of source materials used in the thesis are presented and evaluated. Textiles and objects are presented first, followed by archive material. Some sources, such as the handwritten textbooks in silk-weaving and some of the fabric sample collections, are found in both these categories as they contain both text and textiles. The different sources complement one another and shed light on silk-weaving in different ways. In some cases they contradict one another and comparisons between different sources form a basis for source-critical discussions.

3.1 TEXTILES

Textiles are in focus in the investigation and may as a result of my specialist knowledge be studied as a historical source material, complemented by other sources. They are spread over a number of collections and preserved in different contexts and for different reasons. They are presented here ordered by product, because this division works best in connection with the other sources. The textiles have been divided into plain fabrics, furnishing silks, silk kerchiefs, patterned clothing fabrics, and woven images and texts.

3.1.1 Plain fabrics

Plain fabrics are unpatterned or small-patterned fabrics which have been woven in looms without any extra equipment for pattern weaving. A great deal of the plain fabrics made in Sweden in the 19th century has been preserved in fabric sample collections. The fabric sample collections contain small fabric samples attached to paper with notes on the designation and production of the fabric. They have been compiled by different people and for different reasons, which influence the way they have been put together. Five collections of Swedish silk fabrics from the 19th century has been studied and documented. In this thesis they are called: The Eneberg collection, Horngren's book, disposition books at SKAASoM, the Eduard Liné book and customs samples 1831.

3.1.1.1 The Eneberg collection

The Eneberg Collection was established as instructional material at Teknologiska institutet, which later became Kungliga Tekniska Högskolan (the Royal Institute of Technology, abbr.

KTH) in Stockholm.[87] The collection came to belong to Tekniska museet (the National Museum of Science and Technology) in Stockholm, but was later transferred to Textilmuseet in Borås. It contains a great number of Swedish and foreign samples of fabrics, yarns and fibres in varying materials. Among those, there are a number of Swedish silk fabrics. The oldest fabric samples are from the 1820's, but the collection has been updated with materials all the way up to the 1940's.

Fig. 13. Plain silks with Swedish prices, the Eneberg collection
(Photo: Jan Berg Textilmuseet, Borås).

A group of larger fabric samples in the collection were most likely manufactured in Stockholm in the 1820's or 1830's. (Fig. 13.) The silk samples correlate well in terms of names, colours and qualities with factory reports from the 1820's and the 1830's and with plain fabrics in K.A. Almgren's textbook from Lyon in 1829. Several of them are mounted on marbled covers, others are attached secondarily on sheets of cardboard.[88] Notes pinned to the samples state the product designation and colour in Swedish and also the price in Riksdaler, shillings and runstycken (trans. note: 1 shilling = 12 runstycken). Most samples are entire

87 Knuts. Eva, *Lapp på lapp, men ingen söm.*
88 The Eneberg collection Inv. No. 180.45, 11.183-11, 11.183-16, 11.181-28, 11.181-28.2, Textilmuseet, Borås.

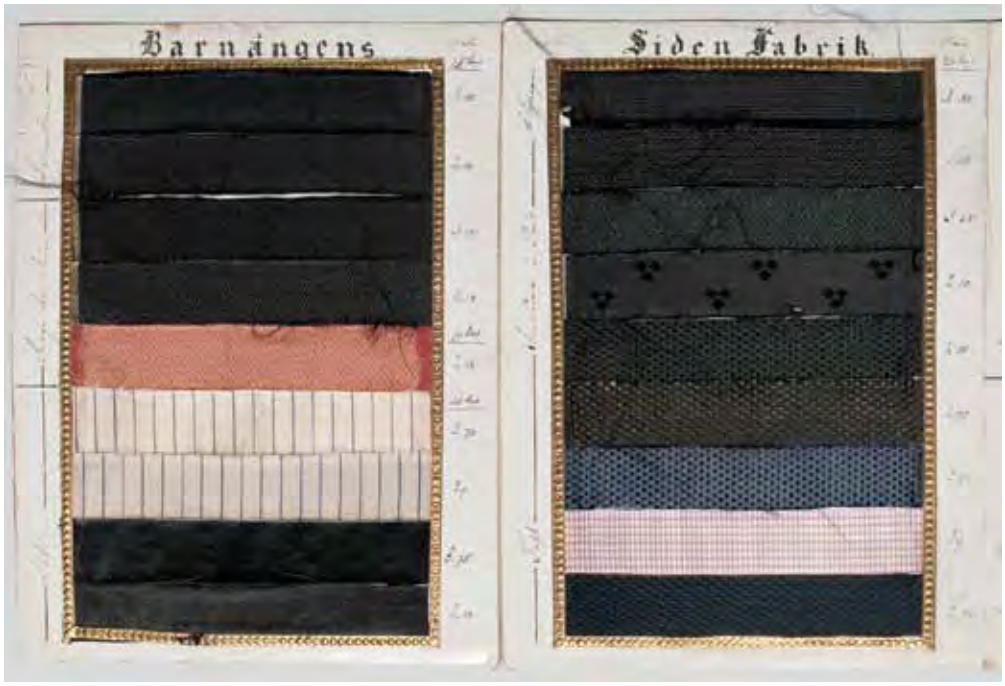
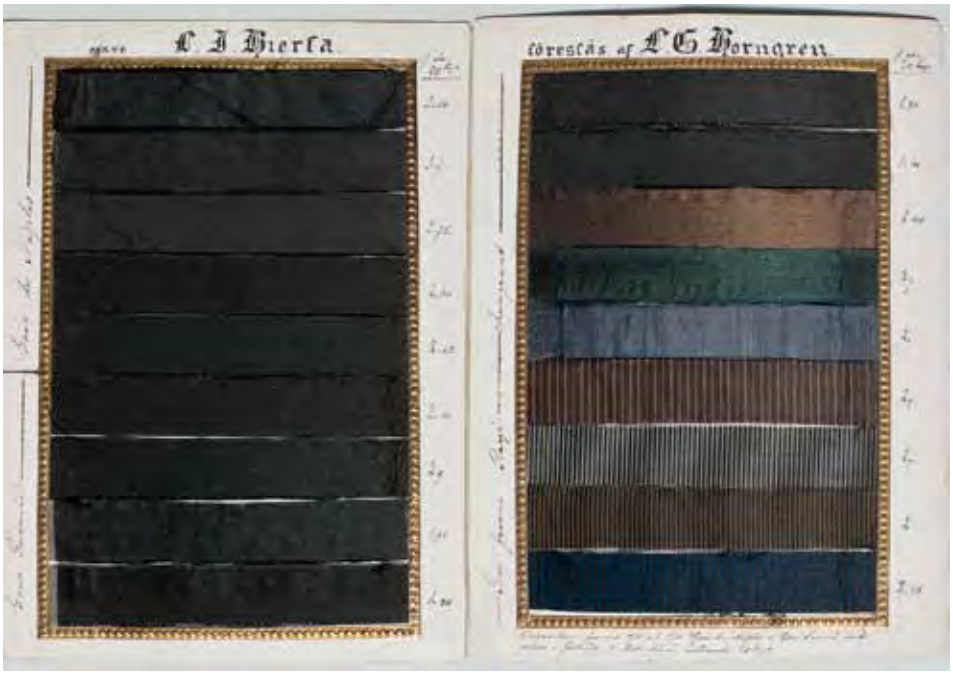


Fig. 14. Silk samples from the Barnängen silk mill, the Eneberg collection

widths with two selvages preserved. Some have woven weft stripes as end markings, but no hall marks or production marks woven into the fabric have been preserved.

The Eneberg collection also includes collection samples from various mills, both Swedish and foreign. In a black, marbled cover, 36 silk fabric samples have been attached to cardboard with a gilded border.[89] (Fig. 14.) The heading reads “The Barnängem silk mill owner L.J. Hjerta managed by L.G. Horngren”. The product designation, width in inches, and prices in Riksdaler riksmynt and öre have been written next to the samples. The mill operated between 1849 and 1867, but the prices date the samples to after the first currency reform in 1855, when one Riksdaler riksmynt was divided into 100 öre. Hjerta introduced the first power looms for silks at the Barnängen mill. Unfortunately, there is no way of telling whether the samples were made on these looms. It is, however, a likely scenario, even though there were hand looms at the mill. This may also be the reason for the samples turning up in the Eneberg collection, as examples of new technology. The samples are obviously fabrics to be sold by the ell. K.A. Almgren mentions

89 The Eneberg collection Inv. No. 11.183-11, Textilmuseet, Borås.



(Photo: Jan Berg Textilmuseet, Borås).

in a letter dated 29th December 1854, "…that he himself had grown tired of moving the sheets of samples…" which indicates that silk fabrics were presented to clients in this way.[90] Despite the slight deviation in terminology, the fabric samples are a good match to the factory reports of the 1850's and Horngren's book.

The materials laboratory at Teknologiska institutet performed material analyses and strength tests on fabrics. Loose pieces of silk for which there are no notes in the Eneberg collection likely belong to these sample series.[91] Some may be connected with preserved test reports and approved samples from the last part of the 19th century to the silk fabrics used to make flags for the army.[92]

3.1.1.2 Horngren's book

90 The Indebetou family archives, copy at SKAASoM, quoted by Lindgren-Fridell, p.125.
91 The Eneberg collection Inv. No. 11.183-11, large box, Textilmuseet, Borås.
92 Test reports at Armémuseum AM 088648, AM 088652. Fabric samples e.g. AM 010199, AM 010401, AM 088643, AM 088644, AM 088645.

Fig. 15. Horngren's book, "Taft med pohl" ('taffeta with floating warp', photo: Nordiska Museet).

In the collections of Nordiska museet, there is a book with brown covers and sewn-in sheets, stamped "Stockholms Hantverksinstitut" (the Stockholm Handicraft Institute).[93] (Fig. 15.) Year and date is missing, but on a loose piece of paper the book is attributed to L.G. Horngren:

> This book has been put together and written by Silk manufacturer Lars Gabriel Horngren during the time he studied silk-weaving in Lyon, France in the 1830's and 1840's. Horngren introduced power looms for silks in Sweden. In connection to this, he experienced a great deal of controversy with the hand weavers, who were worried their profession would disappear. Newspapers wrote that the silk was stretched and thus it was fragile, etc. However, the power looms soon proved their worth. Horngren was also the first to weave portraits in Sweden. The first portrait was of Oscar I. It was

93 Nordiska museet NM 311 855.

mounted and woven by Horngren at K.A. Almgren Sidenväveri in Stockholm in 1846. In the mid-19th century, L.G. Horngren was the manager of the Barnängen silk mill in Stockholm. In addition, he was the pattern constructor of Sidenfabrikssocieteten. He was a representative at the exhibitions in Paris and London.

Lars Gabriel Horngren (1817-1881) was the son of a silk weaver and learned silk-weaving at Mazer's mill.[94] In 1841-42, he studied in Lyon on grants from the company and worked as the pattern constructor of Sidenfabrikssocieteten between 1848 and 1863.[95]

The book is written mostly in Swedish. The final pages with comber board threadings are printed in French and are the same as those in Borgström's textbooks from 1836-38. In the beginning of the book, there is a notebook with translations of silk-weaving terms from French to Swedish, together with loose patterned samples of fabrics and ribbons. The book contains 42 dispositions with 29 preserved fabric samples. Most of these are shaftwoven plain fabrics 20 inches wide. There are several examples of warp prints and also a sample of silver lamé. Only two mountings for patterned fabrics are presented: a dress fabric and a kerchief. They are followed by a detailed text in Swedish with descriptions of mountings for looms with Jacquard machines.

Some information on the loose sheet may be questioned. Rather than a textbook from Lyon, which ought to be written in French and contain several complicated techniques, the book could contain dispositions from K.A. Almgren Sidenväveri and the Barnängen mill, where Horngren worked. It may also be a textbook for education in Sweden with examples from Swedish manufacturing. In the mid-1850's, the workers were instructed in silk-weaving at the Barnängen mill.[96] Instruction appears to have taken place at the opening of the mill, but it is unclear when Horngren took up his position.

94 The whole family was employed by the company, SSA Hall och Manufakturrättens arkiv Förteckning över arbetare 1841. His brother, Karl Horngren, later became the foreman at Casparson & Schmidt, see Andmar, p.191.
95 Sidenfabrikssocitetens arkiv, Nordiska museet. Palmstedt, p.23.
96 Wieselgren, Harald, *Lars Johan Hierta: biografisk studie*. p.332.

For the most part, the techniques used to make the samples correspond to the product designations of the factory reports. The fabric samples probably date from the 1850's. The sample of silver lamé is likely one part of the 30 ells of "Silfer Brochard" ('silver brocade') which according to the factory reports were woven by K.A. Almgren Sidenväveri in 1850 in connection to the wedding of Crown Prince Carl (XV) and Lovisa.[97] There are great similarities to the samples from the Barnängen mill, which were described above. It is likely that most samples originate from there. Although the Barnängen mill used power looms from 1853, it is impossible to determine which of the fabrics were machine-woven, neither from the fabric samples, nor from the dispositions.[98]

Fig. 16. Book of dispositions, SKAASoM, "Flaggsiden" ('silk for flags', photo: Klas Nyberg).

97 The fabric was most likely used for the hassok. See the illustration in Rangström, Lena, *En brud för kung och fosterland: kungliga svenska bröllop från Gustav Vasa till Carl XVI Gustaf*. p.329, and compare the stated amount of fabric (32 ells) at the wedding of Oscar and Josefina, p.312.

98 Palmstedt, p.19. Power looms do not appear in factory reports until 1858.

3.1.1.3 Disposition books at SKAASoM

A black notebook at SKAASoM contains 93 small fabric samples and 103 dispositions with information on product designations, bindings, densities, materials, finishings, weaver's pay and, in some cases, on which looms the fabrics had been woven and when they were mounted. (Fig. 16.) From the notes, the book can be dated to the 1920's. Most of the dispositions are plain fabrics, but ribbons and kerchiefs are also found. A similar book dating from the 1910's contains 171 dispositions but lack fabric samples, which may have been moved to the later book. The information is very exact and constructed to allow fabrics which have been woven earlier to be woven again. Although the fabric samples and the dispositions reflect production during a period when K.A. Almgren Sidenväveri was in decline, they provide essential information which can be compared to the older material.

Among the objects donated to Textilmuseet in 1972, there is a collection of larger fabric samples with corresponding notes and dispositions on loose papers. They have been mounted on sheets of cardboard by Textilmuseet and categorized under the following headings: 108 pieces of "Church textiles, White and black ribbons, Document ribbons ('Ordensband'), Biblemarks, Flag ribbons, Colour samples", 43 pieces of "Kerchief weave, Black unpatterned silk weave, Black patterned silk weave", 60 pieces of "Curtain fabrics", and 35 pieces of "furnishing silks". The samples have been marked with dates ranging from 1889 to 1946, although the majority of them are dated between 1900 and 1930. Most of the fabrics are found in the disposition books above, which likely are clean copies of this material. However, some fabrics with dispositions come from Erik Holmberg's studies in Krefeld. The notes often contain product designations, information on which loom they were woven, many detailed technical notes, and sometimes pattern diagrams and technical drawings.

3.1.1.4 The Eduard Liné book

In the collections of Nordiska museet there is a small book labelled "Notes from the Eduard Liné (formerly Schönherr & Lundgren) Silk Mill in Stockholm by C.M.C-r".[99] (Fig. 17.) The book is marked with the ex-libris of Carlander and it is likely that he had the loose booklets and sheets bound into a book in the 1890's. One letter appears to be by his hand, probably when he worked for Edvard Liné in the 1850's. Edvard Liné took over the mill from Schönherr & Lundgren in 1844 and ran it until 1854. Most of the Swedish samples are dated

99 Nordiska museet NM 116 294.

1853-54. The book contains a total of 197 silk samples, 67 of which have been confirmed to originate from the Liné mill. Twenty-eight samples are older, one dating from the 18th century and the others most likely dating from the 1830's and the Schönherr & Lundgren mill. The rest are labelled "Dutch furnishing silks" and "Lyon Silk 1833". In addition, there are 13 small pieces which have been used primarily as colour samples. At the end of the book, two woven labels have been pasted into the book, one with Swedish text and the other from Basel. The majority of the samples are of plain fabrics, although some samples of Jacquard patterned parasol fabrics and kerchiefs are also found.

Fig. 17. Liné's book, "Parasol-ltyger" ('parasol silks'), in the middle: "Marceline" (Photo: Martin Ciszuk, by courtesy of Nordiska museet)

The text contains a number of technical details such as the reed widths, densities, colours and various types of silk for the different silk products. The client and the intended use of the fabric have also been stated next to some of the fabric samples. There are lists of the names of workers, what they wove on the different looms and calculations of the cost of materials and labour per ell of the different types of silk. Notes from when the mill moved in 1852 include descriptions of the work hall and the looms.

Fig. 18. Silk samples,"släta tyger" ('plain silks') in the archives of the Swedish Customs (Photo: RA, Landsarkivet i Lund).

3.1.1.5 Customs samples 1831

In the archives of the Malmö customs house, there is a collection of fabric samples containing 61 small samples of plain, shaftwoven silks and half-silks with their designations noted.[100] (Fig. 18.) According to the enclosed letter, the samples were sent by Kommerskollegium and were meant to guide the customs officers in recognizing the different qualities.

> To Mr. Head of the southern customs district
>
> Because His Royal Majesty as of the 10th of last June in his Grace has decreed that a sample chart of such woven silk fabrics, which through the method of weaving itself are referred to by the general description of plain, should through the agency of Kongl. CommercieCollegii ['Royal Board of Trade', Kommerskollegium] be sent to Kungliga GeneralTullstyrelsen ['the Royal Board of Customs'], and as the aforesaid Kongl. [Kommers-]Collegium on the 16th of this month handed over such a sample chart to [GeneralTull-]Styrelsen, the Kongl. [General-]Tullstyrelsen wanted

100 Landsarkivet i Lund. Malmö Tulldistrikt, Södra Tulldistriktchefsembetet Malmö E Ia:2.

> to send Mr. Head of District part of it, through the adjacent, in the same order as on the sample chart, mounted samples, so that Mr. Head of District, when doubt arises regarding the customs clearance of the mentioned silk fabrics, should be able to state an accurate report on whether they should be classified with the properties of plain fabrics of pure silk or half-silk or not.
>
> Stockholm, by Kungl. Generaltullstyrelsen on 20th August 1831
>
> In the absence of the Superintendent of the Kungl. Generaltullstyrelsen J.D af Billbergh, JD Valerius, R Winroth/H Kärrström

The fabric samples were obtained from Stockholms Hallrätt by Kommerskollegium, why they are most likely Swedish, although it is not clear which mill or mills manufactured the fabrics.[101]

Closer inspection showed that some samples have been placed under the wrong heading, but on the whole the fabric samples provide an accurate connection between technique, quality and designation. For the most part, the terms in the sample collection correspond to the terminology in contemporary factory reports. However, it is not possible to establish whether the recently imported dobby machines (mechanique d'armure) were used to manufacture the fabrics.

3.1.1.6 Summary of plain fabrics

The fabric sample collections provide concrete information about silk production in Sweden and primarily the supply of plain fabrics. They contain information on qualities, terminology, colours, patterns and techniques. Their greatest benefit to this thesis lies in that they are examples of silk fabrics combined with text. However, the terminology is ambiguous, which in part stem from the varying intentions behind the compiling of the fabric sample collections. Some are fabrics for trade and have product names, whereas others are connected to manufacturing and have technical names with carefully stated technical data. It is obvious that the same fabric sometimes has received different designations by silk-weavers, bureaucrats, merchants and users.

101 RA, Kommerskollegiums arkiv, Huvudarkivet, Kollegiets protokoll huvudserie AI ga: 4 (1831), minutes No. 16 August 1831, No. 1546, p.466.

Despite the fact that the collections of fabric samples cannot be considered to constitute a comprehensive material or to have been collected methodically, they provide a unique opportunity to study the great variety of colours, techniques and finishes concealed behind the brief headings of the factory reports. The same kind of silk may come in different colours, widths, warp densities, and with different wefts, which result in different prices and probably different areas of use. The fabric samples from the mills provide a detailed view of their production. Except for the textiles described below, the fabric sample collections are the only examples of, primarily, unpatterned silks from the 19th century which have been positively attributed as made in Swedish. Although there are probably many preserved examples of Swedish silk fabrics in dresses and objects in the collections of Swedish museums, their origins cannot be positively determined because they lack markings or identifiable patterns, why it is impossible to tell them apart from imported silks. Information on widths and the design of the selvages may, however, be used to characterize the Swedish silk fabrics and make attributions of Swedish fabrics possible outside of the fabric sample collections. The development of the fashion and the market is hinted in the colours and qualities of the dated silk samples. Technology development may in some cases be discerned through changes of technique, but it is rarely possible to determine which of the fabric samples have been woven in a treadle loom, a dobby loom, or a power loom.

All fabric samples were photographed. The samples that do not come with dispositions, i.e. lack written technical data, have been analysed. The weave of the sample has been noted and, where needed, weave diagrams have been drawn, material and colour stated, densities for the warp and weft calculated, and details about selvage, woven markings, and probable method of manufacturing noted. A great deal of the text in the Eduard Liné book and Horngren's book has been transcribed. Horngren's Swedish texts with descriptions of the entire mounting of the loom and the French-Swedish glossary are very valuable as they provide explanations of terms which were used exclusively in silk production in Sweden and which are no longer in use.

3.1.2 Furnishing silks

Furnishing fabrics in silks and half-silks from the 19th century often have floral motifs with large pattern repeats in Empire style or neo-Rococo style. They are woven on looms with special equipment for patterning, after 1830 with Jacquard machines. Less complicated furnishing silks in heavy qualities were woven as plain fabrics, e.g. striped reps and satin fabrics.

3.1.2.1 The fabric sample file

The fabric sample file is a blue file in folio format at SKAASoM. (Fig. 19.) In 27 sheets of brown wrapping paper there are 149 fabric samples of varying sizes, from entire widths and reports to pieces a centimetre across, pasted or held by paper strips, a few of them pinned. The majority consists of silks, but half-silks (silk combined with cotton or flax), woollen fabrics and fabrics in viscose are also represented. Some samples are missing and some have been inserted unattached between the last sheets. For the most part, the fabric samples are furnishing silks. There are a few plain fabrics, clothing fabrics and occasional ribbons, but only one sample of a kerchief.

Most of the fabric samples were woven at K.A. Almgren Sidenväveri. Some samples have end markings, warp fringes or open parts of the warp, where a stick has been inserted when the fabric was cut in order for the weaving to continue without having to retie the warp to the cloth beam. They have been cut from the finished lengths at the weaving mill, as are the fabric samples which are colour samples and experiments. On the other hand, many fabric samples have marks from stitches and nails and some are worn and bleached. These samples must have been collected from the original clients, long after the fabrics were made. Perhaps they came to the Almgren mill together with the pieces of fabrics from the Stockholms slott (‘Stockholm Palace’), which were donated to Nordiska museet in 1899 by Surveyor of the Court Böttiger, as some pieces display similarities.[102] These fabrics have been taken care of after re-covering of furniture and may have been donated to K.A. Almgren Sidenväveri because they were believed to have been manufactured at the mill or perhaps to become models for reproductions of old patterns. This does not mean they have always been manufactured at the mill. A few samples of half-silks and wool probably have nothing to do with K.A. Almgren Sidenväveri, but have for unknown reasons ended up in the sample collection.

102 Nordiska museet NM 87 173 and sub numberings.

Fig.19. File of silk samples, SKAASoM (Photo: Kerstin Wölling).

Fig. 20. ”Jacquardmönstrens nummer” (‘the numbers of the Jacquard designs’), SKAASoM (Photo: Kerstin Wölling).

Handwritten notes written in different hands attribute and date some fabric samples. They are written by different people, sometimes on the fabric, mostly on the paper, and are not always correct when compared to information on the design drafts, factory books and the

book of furnishing silks (see below). They are probably written from memory by foreman Holmberg, but perhaps also by Bertil or Gerd Almgren. The fabric samples appear to have been randomly inserted without ordering by chronology, technique or client and there are sometimes several pieces of the same fabric. A note saying that a missing sample has been photographed for St. Erik's yearbook, which ought to have been done in connection with Marita Frizell's article in 1943, indicates it is likely the fabric samples were mounted in the 1930's. The age of the samples vary between the 1840's to the 1930's. The most recent date found in any of the notes was made next to a light blue rep from 1931. Two samples have woven end markings (KA + a loom number). These are woven prior to 1862, when the hall marking and regulations on woven markings were abolished. Two other samples are part of the fabric woven in Swedish silk for Queen Josefina in 1865.[103]

The fabric samples have been photographed and analysed. The technical analyses document the various techniques used, e.g. damask and various kinds of lampas. From these analyses it is often possible to calculate the number of hooks in the Jacquard machine, the number of punched cards in the card chain, and the number of shafts for the weave of each fabric. The information provides an understanding of how the looms were equipped and information on the technical capacity of K.A. Almgren Sidenväveri. The analyses are helpful in connecting the fabric samples with design drafts and card chains. A catalogue of the furnishing silks have been put together in collaboration with Kertin Wölling, curator at SKAASoM, where all information about each pattern has been collected, such as technique, dating, client, size of the orders, design draft, design model, photographs of the fabrics in preserved furnishings, identified receipts, etc.

3.1.2.2 "Jacquard mönstrens nummer för möbeltyger mm."

"Jacquard mönstrens nummer för möbeltyger mm." ('The numbers of the Jacquard patterns for furnishing silks etc.') is a booklet at SKAASoM with 83 small samples of furnishing silks mounted on brown wrapping paper. (Fig. 20.) Each design has a number from 1 to 94. On some sheets there are no samples and on others there are several samples in different colours. The name, client and year when it was woven are written next to most of the samples, a few notes the loom used. The samples are dated 1885-1930. They are not chronologically or otherwise ordered, but the last sheets contain patterns from 1927 and 1930. There are

103 A piece of this fabric, which was exhibited at the Industrial Exhibition in Stockholm in 1866, is kept in the Eneberg collection 11.183-9:2 Textilmuseet, Borås. Also, see Ragnar, pp. 102.

pencilled notes regarding removed samples made in 1940. The booklet was probably put together by foreman Holmberg in the 1920's from information stated on the design drafts and in the book of furnishing silks (described below). The small fabric samples appear to have been cut from the larger samples in the book of furnishing silks and in several cases they can be fitted into those larger samples. The written information does not correspond entirely with what is stated in the fabric sample file, but is probably more accurate than the notes in the latter. The numbers of the patterns do not correspond to the pages of the book containing furnishing silk samples and it is not clear whether they correspond to any other numbering in the material at K.A. Almgren Sidenväveri.

3.1.2.3 Book of furnishing silks from K.A. Almgren Sidenväveri

The book of furnishing silks was donated to Textilmuseet, Borås, in 1971.[104] In connection to this event, 76 fabric samples were removed from the book and mounted on cardboard sheets with references to the pages in the book where they were found, either lying loose or pinned.[105] (Fig. 21.) The notes in the book contain the client's name and the date of the order and often there is information on the number of the loom, which of the women weavers made it and what she was paid. Sometimes the number of warp threads, wefts per centimetre, and the quality and colour of the silk are mentioned. In some cases there are weave diagrams and technical sketches of looms and mountings.

3.1.2.4 Unattached pieces of fabric at SKAASoM

In addition to the fabric samples mounted in files and books, there are a number of large and small pieces of fabrics in the collections. (Fig. 22.) A few of them have labels stating when the fabrics were produced, who the client was or in which exhibitions they were on display. Among those, there are entire lengths of furnishing silks produced by the Almgren mill in the 1860's and 1870's, which most likely were exhibited at some of the handicraft exhibitions and industrial exhibitions. Most of these fabrics are possible to identify using the book of furnishing silks, the fabric sample file, and the disposition books.

104 Textilmuseet, Borås BM48986.
105 Textilmuseet, Borås BM48987-BM49070.

Fig. 21. ”Tre kronor” three crowns, book of furnishing silks, and silk samples BM 49 001, (Photo: Martin Ciszuk och Jan Berg, Textilmuseet Borås).

Fig. 22. Unattached piece of silk, ”Svindersvik design 1897”, SKAASoM (Photo: Kerstin Wölling).

3.1.2.5 Preserved furnishings and unstitched furniture coverings

Furniture coverings that can be attributed to Swedish manufacturing are found both in preserved interior decorations and in unstitched furniture coverings. This material provides information on how furnishing silks were used by Swedish clients.

Kungliga Husgerådskammaren (the Royal Collections Department) has documented the furnishings of the royal palaces and collected fabric samples from worn-out and removed furniture coverings and wall coverings. In some cases there is information on the year of manufacture, the manufacturer, and where in the palaces the fabrics were used.

In the collections of Nordiska museet there are samples of silk fabrics woven by K.A. Almgren Sidenväveri and other Swedish mills. Some have been donated by Oscar Mauritz Almgren in 1902, others by Ulla Breitholtz (granddaughter of Oscar Mauritz Almgren) and two other relatives of the Almgren family in the 1970's, while others are part of the collection of fabric samples from royal palaces donated to the Kungliga Husgerådskammaren in 1899.[106] Still other samples have reached the museum in other ways, e.g. through the acquisition of the Almgren family country house in Svindersvik. Some of the fabric samples bear hall marks or woven markings showing that they are Swedish, others are recognized by descriptions in written sources or from other preserved fabric samples.[107] Sometimes the catalogue cards state that the donators themselves believed the fabrics to have been woven by Swedish manufacturers. Such information should, however, be verified through other sources. Also in this collection, there are several examples of 18th century fabrics and Empire style fabrics which were reproduced by K.A. Almgren Sidenväveri during the latter part of the 19th century.[108]

At SKAASoM, Nordiska museet, royal palaces, and other manors there are furniture and furnishings with coverings in Swedish silks. They have been photographed or documented through collecting older photographs and information on the original interiors. Two entire furniture sets furnished with Almgren silk have been preserved from the Chicago World Fair

106 Nordiska museet NM 87 173 and sub numberings.

107 Examples of woven markings NM 312 419 a yellow gongourang labelled IPM 26 (Jean Pierre Mazer), NM 87 173-19 a blue-white Brocatelle may through Palmstedt's description, recorded in Ragnar, pp.102, be recognized as the fabric made from Swedish silk that was woven for Queen Josefina in 1849 by the Meyersson mill.

108 Nordiska museet e.g. MN 99 090 with the pattern "Tre kronor" (trans. note: 'Three Crowns', the national emblem of Sweden).

in 1895 and the Paris World Fair in 1900.[109] A few large-patterned Swedish fabrics from the last part of the 19th century are also found among fabric samples for flags in the collections of the Armémuseum (the Army Museum).[110]

3.1.2.6 Summary of furnishing silks

Through the patterns, it is often possible to identify the furnishing silks present in interiors by comparing them to fabric samples found in various collections. The attribution to Swedish weaving mills is, however, not always obvious as, apparently, the designs were often copied on the request of clients. In addition, the same patterns were woven in different colours for different clients. Technical details such as ends per centimetre and loom widths may be of help when determining the manufacturing period, mill, and place of manufacture. Furnishing silks often represented complicated techniques and loom mountings. Despite constituting a fairly small part of the production at the Swedish weaving mills, both in terms of volume and economy, they prove a rewarding study. They were apparently considered status symbols by their time and the high value of the furnishing silks and their connection to clients resulted in a higher proportion of them being preserved compared to that of clothing fabrics, which makes it easier to connect them to archive material and other sources.

3.1.3.1 Silk kerchiefs

Considering the substantial production of silk kerchiefs in the 19th century, it is not surprising to find that this is the product from the Swedish silk weaving mills for which the greatest number of objects has been preserved.[111] According to the factory reports, kerchiefs were manufactured at all mills. The about 120 silk kerchiefs now present at SKAASoM are gifts to the museum by individuals over the past twenty years, while the kerchiefs and kerchief samples that were originally with the mill were donated to Nordiska museet and Textilmuseet in the 1970's.[112] Most Swedish museums in possession of textiles from the 19th century have kerchiefs in their collections. Textilmuseet in Borås has just over a hundred kerchiefs and the Elin Håkansson collection, now in the Katrineholm city archives, is also very extensive. A large collection, consisting of 180 silk kerchiefs, is part of the Torsten Nordstöm collection in Norrtälje. However,

109 Nordiska museet NM 252 170, 252 171 a-b, 252 172 a-d, and NM 93 281 a-x.
110 Armémuseum e.g. AM 010195, AM 100400, AM 010.409, AM 010412, AM 117799 and AM 117798.
111 Håkansson, Lindvall-Nordin and Wulfcrona-Dagel describe Swedish silk kerchiefs in great detail.
112 NM312 353-312 397 Ulla Breitholtz's donation in 1977, BM48974-48984, BM49143-49145 and 49074-49075, Bertil Almgren's donation in 1971.

Fig. 23. Stamped silk kerchiefs. To the left: the Stockholm hallmark, 1837 (Photo: M. Ciszuk, by courtesy of Örebro länsmuseum). To the right: The Almgren stamp, 1880's, Textilmuseet, Borås BM18347 (Photo: Martin Ciszuk).

the largest collection is found at Nordiska museet, consisting of around 400 kerchiefs. Many private collectors (e.g. the Löfgren family in Solna) and local history museums (e.g. Viby in Närke) have many kerchiefs in their possession. The lion's share of the older, colourful kerchiefs is owned by museums collecting folk costumes, while most of the black kerchiefs are found in private collections. The most likely reason for this is the black kerchiefs being younger and not having been used for folk costumes, why museums did not collect them to the same extent as they did colourful kerchiefs.

In written material from the 19th century, kerchiefs are often called "dukar". Sometimes words such as "schalar", "halsdukar" or "amier" are mentioned, without any clear distinction between appearances, sizes or use.

Many of the Swedish kerchiefs bear stamps on their reverse sides, positioned in one corner. Older, colourful kerchiefs often have black stamps, while the younger, black kerchiefs often carry stamps in red. (Fig. 23.) Until 1862, all Swedish products were to be hallmarked and imported kerchiefs were to be customs-stamped.[113] However, all preserved kerchiefs do not

113 One kerchief at Nordiska museet, NM 148550, bears a stamp indicating it was customs-stamped in Kalmar, probably from Germany.

carry stamps. They may have been washed off or disappeared when coloured kerchiefs were dyed black during the last part of the 19th century. There was also widespread smuggling of kerchiefs.[114] The stamps sometimes provide clues when dating kerchiefs. Their design can be followed in the archives of Kommerskollegium and Hallrätten, but different stamps seem to have been used simultaneously during transitional periods.[115] The Stockholm hall mark, its centre depicting St. Erik, is the oldest. It has been found on items dating from the mid-18th century to the 1830's. During the 1830's and 1840's, a round hall mark was common, stating the year and with a floral-like pattern at its centre. After 1852, a round hall mark carrying the initials of the manufacturer at its centre was used. Use of the last kind of stamp has only been documented for Casparsson & Schmidt, K.A. Almgren Sidenväveri, and Lars Johan Hierta's mill in Barnängen. After the regulation requiring branding of goods was abolished in 1862, the two remaining mills continued to brand their kerchiefs as a mark of quality. K.A. Almgren Sidenväveri and Casparsson & Schmidt used oval and square stamps, respectively, both of them with initials. Almgren's stamping equipment has been preserved at SKAASoM. From the 1870's onwards, kerchiefs were also branded with a number. These numbers referred to the quality, size and pattern of the kerchief. There are three registers, ranging from 1901-12, of the numbers of the kerchiefs manufactured by K.A. Almgren Sidenväveri.[116] It is evident that each design had a name, normally connected to flowers, but the same design could be woven in different quantities and sizes and thus have different numbers. Names, numbers and quality designations are often found on the technical draft at SKAASoM.

By analysing preserved and dated kerchiefs in combination with the archive material, it is also possible to draw conclusions regarding dating. Technical details may be used as arguments to determine whether a kerchief was woven on a Jacquard machine. The oldest patterned kerchiefs, which may be considered woven on draw looms, normally have larger steps (décopres) and smaller pattern repeats than the ones dated after 1830. The designs are difficult to date judging only from their styles, although some characteristic types may be discerned and compared with design drafts in the Borgström collection and at SKAASoM. Furthermore, techniques, colours and fringes follow the fashion of kerchiefs.

Written sources from the first half of the 19th century mention several kinds of kerchiefs. Sizes are stated in quarters of an ell and kerchiefs are called e.g. "Florsdukar" ('gauze

114 Lundqvist, Pia, *Förbjudna tyger*. p.202.
115 E.g. RA, Kommerskollegium, skrivelser från magistrater och underrätter, E VIII vol.24, 1831 No. 732.
116 Nordiska museets folkminnesarkiv.

Fig. 24. Silk kerchief branded 1837, ÖLM 22.523 (Photo: Martin Ciszuk, by courtesy of Örebro länsmuseum).

Fig. 25. Silk kerchief, ”Damasserad duk”, 1860’s, private collection (Photo: Martin Ciszuk).

Fig. 26. Silk kerchief, ”brokadduk”, 1880’s, SKAASoM, Duk 9 (Photo: Kerstin Wölling).

kerchiefs’), “Damastdukar” (‘Damask kerchiefs’), “Sargedukar” (‘Sarge kerchiefs’) or “Kypertdukar” (‘twill kerchiefs’), “Satindukar” (‘satin kerchiefs’), “Carlédukar” (‘Carlé kerchiefs’) and “Barcelonadukar” (‘Barcelona kerchiefs’). Several of these names can be tied to preserved kerchiefs. These older kerchiefs are often checked, woven in bright colours and sometimes have borders of floating warp and weft. (Fig. 24.) The colours of the borders can be asymmetrical. Two perpendicular borders often have colours deviating from that of the remaining two borders. Wearing the kerchief folded diagonally meant one could choose which side to show. It is characteristic of the older kerchiefs that they often have fringes made from threads extended from the warp and weft.

By the mid-19th century, two-coloured kerchiefs in darker nuances and with large pattern repeats become more common. (Fig. 25.) They are called “Damasserade dukar” (‘Damask kerchiefs’) or “Satin dukar” (‘Satin kerchiefs’). “Damasserade dukar” have tabby ground with pattern in satin and weft floats bound on the reverse side, while “Satin dukar” have satin ground with pattern in tabby and weft floats without binding on the reverse side. These kerchiefs are hemmed and have spaced, knotted fringes of hard plied silk yarn, often in several colours.

Fig. 27. Silk kerchief, ”Spetsduk”, 1890’s, private collection (Photo: Martin Ciszuk).

From the 1870’s and onwards, the production of black kerchiefs increases in comparison to the entire production. They dominate among the kerchiefs preserved from K.A. Almgren Sidenväveri. (Fig. 26.) Except for “Satin dukar” and “Damasserade dukar”, which are still in production, these are called “Brokaddukar” (‘Brocade kerchiefs’), “Damassedukar” (‘Damasse kerchiefs’) and “Brokatelldukar” (‘Brocatelle kerchiefs’). “Brokaddukar” have pattern of warp floats on a tabby ground. “Damasse dukar” have satin ground with pattern of weft floats bound on the reverse side, while “Brokatelldukar” are woven in a thick quality with pattern of weft floats on an eight-shafted satin ground. In addition, there are simple black kerchiefs in rep with edges in satin or cannelé, called “Generalsdukar” (‘General’s kerchiefs’), “Cannelédukar” (‘cannelé kerchiefs’) and “Taftdukar” (‘taffeta kerchiefs’). The black kerchiefs are hemmed and often have closely knotted, frizzled fringes in silk yarn.

The youngest type of kerchief is called “Spetsdukar” (‘Lace kerchiefs’) and was popular around 1890. (Fig. 27.) They are made of black piece-goods (so-called Damasse fabric, see clothing fabrics below), hemmed and with edges of broad lace. The last silk kerchiefs were woven at K.A. Almgren Sidenväveri in 1941.

Oscar Mauritz Almgren donated a collection of twenty-four silk kerchiefs to Nordiska museet in 1891 and in an enclosed letter he writes about the spread and popularity of

different designs and colours in different parts of the country.[117] This information may also be compared to kerchiefs in the collections of folk costumes at Nordiska museet, which are ordered by province. There, it becomes clear that some parts of the country preferred a certain kind of kerchief design, quality or colour scheme.[118]

Some twenty kerchiefs are representative examples of how the various types have been analysed. The technical analyses show varying technical solutions for the different types of designs and kerchiefs. Together with technical drafts and other sources, the analyses may be used to document the technical capacity of the Swedish silk-weaving mills. In addition, a large number of photographs of kerchiefs in various collections have been collected.

3.1.3.2 Summary of silk kerchiefs

Because silk kerchiefs were such a significant product for the silk-weaving in Sweden, both regarding volume and economy, they are important sources. They reflect the technological development of the 19th century and also changes in fashion and consumption. As detailed knowledge on the designs and colours of the kerchiefs and also on technical details regarding their weaving present itself, an opportunity arises for having a well-founded discussion on connections between designations and preserved objects and also on dating and distribution. The preserved kerchiefs provide considerably more information on the composition of the production than is found in the factory reports, in which kerchiefs are dealt with rather briefly.

3.1.4.1 Patterned clothing fabrics - dress silks, bonnet fabrics, Damasse silks, and necktie silks

One silk product which is specifically Swedish is the bonnet fabric, i.e. silk fabrics intended for “bindmössor” (‘frame caps’). (Fig. 28.) A hallmarked example of a bonnet fabric in black satin from 1852 with brocaded floral patterns intended for two frame caps are found in the collections of Nordiska museet.[119] The same design is found on a finished cap with a blue ground in the Nordstöm collection, Norrtälje. The fabric was probably woven by Casparsson & Schmidt which, according to the factory reports, was the only mill that still wove bonnet fabrics at this time. There was a large production of bonnet fabrics in the 18th

117 Nordiska museet NM 67 260-67 283 and enclosed letter.
118 Berit Eldvik, In print, *Den dyrbaraste gåvan*.
119 Nordiska museet NM 92 745.

Fig. 28. ”Mösstyg” (‘bonnet silk’). To the left: NM 92 745 hallmarked 1852 (Photo: Martin Ciszuk, by courtesy of Nordiska museet). To the right: Frame cap made of silk with the same design, the Nordström collection, Norrtälje (Photo: Kerstin Sandberg, Pythagoras industrimuseum).

century, but it decreased in the 19th century to a mere 500 to 1000 pieces per year, according to the reports for the period between 1810 and 1861 . Embroidered bonnet fabrics were also manufactured and sold as coupons, i.e. pieces sized to suit a specific product.[120] It is possible some of the bonnet fabrics reported by the silk mills were embroidered and not woven. No embroideresses were reported among the workers, but this kind of production may well have been handled through a putting-out system including no permanent employees.

Black Jacquard woven dress silks with black-in-black patterns in weft floats on a satin ground are called “Damassetyg” (‘Damasse silk’) or “Damassé” (the technique is the same as for “Damassedukar”, but different from that of the “Damasserade dukarna”). (Fig. 29.) The term is found in Holmberg’s German textbooks from the 1880’s but is no longer used in modern textile terminology. Damasse silks were produced at K.A. Almgren Sidenväveri during the last part of the 19th century. Initially, the fabric was woven in six different qualities: extra thick, prime quality, standard quality, secondary quality, third quality and also half-silk, and were priced at different levels. Three booklets at SKAASoM contain a total of 126 samples of Damasse silks with four-digit design numbers and information on looms and

120 A hallmarked coupon has been preserved, Nordiska museet NM 19 607.

Fig. 29. Samples of black dress silks, ”ord. damassetyg”, 1890’s, SKAASoM (Photo: Martin Ciszuk).

women weavers. The first booklet is probably from 1894, the second is from 1903 and the third can be dated to the 1920’s. A few larger samples of the same fabrics are also found in other collections. The designs can be connected to technical drafts with design numbers and notes on being “read”, i.e. transferred to punched cards, in the 1890’s. Many of the Damasse silks were woven on the power looms obtained in 1894.[121] At the 1897 Stockholm World’s Fair, Damasse silk was woven on a power loom at the exhibition stand of K.A. Almgren Sidenväveri.[122] However, an example where a sample attached to a paper at SKAASoM

121 Sjösten Wölling 2010, p.20.

122 A sample of this fabric of ”prime quality” with design number 3827 is in the collections of Nordiska museet, NM 312 400.

Fig. 30. ”Kravattyger ” (‘Necktie silks’), 1890’s, SKAASoM (Photo: Martin Ciszuk).

shows Damasse silks were woven at K.A. Almgren Sidenväveri already in the 1880’s. It is also possible to follow the production of Damasse silks in Almgren’s factory books from 1896 and onwards.[123] A great deal of the Damasse silks were probably used to make silk kerchiefs, the so-called “Spetsdukarna” described above. Unlike the furnishing silks, the black colour and the relatively smaller pattern repeats of the Damasse silks make it difficult to identify them among preserved dresses in private collections and museum collections, despite the fact that they are very likely to be included in such collections. Only a few of

123 Sjösten Wölling 2010, .p.20, and appendcies *Löpmeter per år* and *Samanställning av fabriksbokföring 1896-1952, p.*2-53.

the patterns appears to have been woven in any other colour than black.[124] The samples of Damasse silk have been photographed and compiled into a table containing information on price, quality, design number, and the corresponding technical draft.

Another patterned silk product from K.A. Almgren Sidenväveri was “Kravattyger” (‘Necktie silks’). (Fig. 30.) These have very small motifs of weft floats on a satin ground. A sheet holding sixteen fabric samples in light blue, light beige, and pink and with three-digit numbering between 205 and 291, has the heading: ”Necktie silks woven on looms No. 7 & 59 by C. Nilsson”.[125] The designs are found among the technical drafts, two of which have notes saying they were “read” in 1894. Necktie silks, however, are not found in the factory books, likely because the necktie mill had an organisation of its own, or maybe because production ceased before 1896. The necktie mill opened already in 1878. “Kravatten” (‘The Necktie’), where the neckties were sewn, was located in the attic above the offices of K.A. Almgren Sidenväveri at 6 Kornhamnstorg. According to the disposition book, ties were manufactured from black, plain fabrics. The last ties were made for the 1958 FIFA World Cup.[126]

There are only a few examples of Swedish-made patterned silks for clothing from the early 19th century to the middle of the century. In the Eduard Liné book there are samples of Jacquard woven Parasoletyger from 1852-53 and in Horngren’s book from the mid-19th century there is a disposition with samples of a dress silk in patterned double weave in brown and white. Borgström’s design collection contains only a few designs appearing to be intended for dress silks.

No examples of garments made in Damassetyger (with the exception of the so-called “spetsdukarna”), necktie silks or with woven labels made at K.A. Almgren Sidenväveri have yet been recorded outside SKAASoM, except for items donated by the mill to other collections. This is mainly due to the fact that it would require performing an inventory of museum collections of such magnitude that it yet has not been possible to carry out, although it may also be connected to the collection policy of the museums, where folk costumes have been seen as more interesting than fashion clothing from the late 19th century. Silk

124 Two Damasse silks in violet and cyan, one woven in 1920 and one in1933, are found in the fabric sample file at SKAASoM.

125 Lies loosely in ”*Damassetyg register*” at SKAASoM.

126 According to a statement by Mrs. Brattberg, recorded in the interview material regarding the K.A. Almgren Sidenväveri at the Stockholms stadsmuseum.

kerchiefs and woven images have obviously caught the interest of collectors already during the last part of the 19th century and, unlike the clothing fabrics, furnishing silks have often been preserved due to their higher financial value and their connections to prominent commissioners. Another possibility is that the black silk dresses have aged and worn out as the dyeing process for making silk black involves adding chemicals which make the silk frail. This is evident in many black silk kerchiefs which, however, have been cared for and preserved despite their poor condition. Another possibility is that the Swedish production of patterned silks for clothing simply was so small it left few traces.

3.1.4.2 Summary of patterned clothing fabrics

The patterned clothing silks preserved do not provide any comprehensive knowledge about the Swedish production. The textile source material gives the impression, as do the factory reports described below, that patterned clothing fabrics constituted a very small part of silk-weaving in Sweden prior to the 1880's. The origin of this impression can be traced to the concise descriptions in the factory reports and the difficulty in finding the Swedish fabrics in museum collections. Patterned waistcoat fabrics and dress silks are, however, referred to in newspapers and in accounts from Swedish handicraft exhibitions and industrial exhibitions. Thus, there is a possibility that the source material is misleading in this aspect. The Swedish clothing silks that have been preserved will, however, provide information on how patterns and techniques were used to make these products, as well as examples of their use.

Fig. 31. ”Schatterade lustrinsband” (‘shaded lustrin ribbons’), Stockholm, 1820’s, the Eneberg collection (Photo: Jan Berg, Textilmuseet, Borås).

3.1.5.1 Silk ribbons

Silks ribbons and document ribbons (‘ordensband’) were woven at the Swedish mills throughout the 19th century. The larger silk mills had their own ribbon-weaving facilities, while some mills specialized in ribbon-weaving and also made ribbons in cotton, flax and wool. After 1952, the only remaining product of K.A. Almgren Sidenväveri was document ribbon, then woven in artificial silk, viscose.

In the Eneberg collection, there is a book with marbled covers containing 76 ribbon samples pasted to the pages.[127] (Fig. 31.) The ribbon samples are most likely Swedish, because older, unattached notes with Swedish text, product names, product numbers (for different widths) and prices in shillings and runstycken have been pasted to the pages together with the samples. The price information provides a probable dating of the samples to the second quarter of the 19th century, because the coining of runstycken and shillings ceased in 1830 and 1855, respectively. The book contains ribbons in various techniques and widths, both

127 The Eneberg collection 11.183-11, Textilmuseet, Borås.

Fig. 32. Document ribbons, SKAASoM (Photo: Martin Ciszuk).

Fig. 33. ”Taftband” (‘taffeta ribbon’), SKAASoM (Photo: Martin Ciszuk).

plain and patterned, but has been partly plundered. There is no information at which mill or mills the ribbons were manufactured.

There is a large number of document ribbon samples from SKAASoM and a smaller number of samples of other patterned and plain ribbons.[128] (Fig. 32.) The document ribbons were ordered and catalogued in the early 1970’s. Small samples are still mounted on catalogue cards at SKAASoM with information on which order they were made for and which colours and widths were to be used for the various ranks. Most of the remaining store of document ribbons was donated to Tom Bergroth and Riddarhuset (the House of Nobility).

128 The fabric sample file 16.1 SKAASoM, and BM 49 128- 49 142 Textilmuseet, Borås.

At SKAASoM, a batch of monochrome ribbons in rolls with wax seals at both ends of the ribbon has been preserved. (Fig. 33.) The box where they are kept are marked “Old taffeta ribbons”. The seal carries the letters A.L. (difficult to read) and may possibly be woven by ribbon-weaver Anders Lundin, who was active between 1855 and 1885 according to the factory reports. Unlike the document ribbons, which were sold by the ell, silk ribbons were apparently sold in rolls, corresponding to the “pieces” mentioned in the factory reports. During the final thirty years of the existence of K.A. Almgren Sidenväveri, silk ribbons and document ribbons were the only products manufactured.

Silk ribbons made in Sweden are present in museum collections as parts of costumes and objects. It is, however, very difficult to determine their provenance due to their lack of labelling and specific technical details or patterns.

3.1.5.2 Summary of silk ribbons

The preserved samples provide important examples from the production of silk ribbons in Sweden. Ribbon samples display a greater variation in width, technique, colour and pattern than has been accounted for in the factory reports. There are, however, not enough samples to be able to state with certainty to what degree silk ribbon production in Sweden differed from that of e.g. France. French samples from the mid-19th century, on the other hand, show a greater variation regarding colours, techniques and patterns than their Swedish counterparts.[129] The ribbon samples from the Eneberg collection have been documented, analysed and compiled in order to bring together the technical details with the various designations of the ribbons. Two types of ribbon looms are mentioned in the written material. However, it is not possible to determine whether they have been woven in hand looms, so-called “enbandsstolar” (single ribbon looms), or on mechnical looms, so-called “möhlstolar” (silk throwing machines), where several ribbons were woven simultaneously.

129 See e.g. the Eneberg collection Inv. No. 11.183-15, Textilmuseet, Borås.

Fig. 34. Woven portrait of King Oscar I 1846, SKAASoM (Photo: Martin Ciszuk).

3.1.6.1 Woven images and texts

The Jacquard technique makes it possible to make fabrics with very large and detailed pattern repeats. Greyscales can be made by combining black and white threads in different weaves and technical drafts can be constructed the same way a rasterized photograph is, using denser or sparser binding points. Woven images were impressive demonstrations of the possibilities offered through the use of technology and they were displayed and sold as souvenirs at industrial exhibitions.

Several woven images were produced by Swedish silk-weaving mills. The oldest is the portrait of King Oscar I, which was woven in 1846 and in 1855 in two sizes on a white warp with black wefts by Lars Gabriel Horngren for K.A. Almgren Sidenväveri. (Fig. 34.)

The portrait was displayed at the World's Fairs in London, 1851, and in Paris, 1855.[130] Another woven image, "1866 års Industri-Palats i Stockholm" ('the 1866 Industrial Palace in Stockholm') is woven with white warp, white ground weft, and also a brown-black lancé pattern weft at Casparsson & Schmidt.[131] It was made for the 1866 Stockholm handicraft and industrial exhibition. A postcard-size woven portrait of King Oscar II at SKAASoM was woven during the last part of the 19th century by the same mill.

Two woven images are performed as a double weave with black/white warp and weft: "Nordiska museet" and "Industrihallen" ('Factory Hall').[132] These images were woven at the exhibition stand of K.A. Almgren Sidenväveri during the 1897 Stockholm World's Fair. Several other images in silk with white warp and black or brown weft were woven at K.A. Almgren Sidenväveri. Most technical drafts for these have been preserved at SKAASoM. At the 1909 art and industrial fair in Stockholm, three views were woven: "Kungl. Slottet" ('Royal Palace'), "Riksdagshuset" ('House of Parliament'), "Entrén" ('Entrance') and also a portrait of King Gustav V.[133] Five views were made for the 1914 Baltic Exhibition in Malmö: "Ryttarstatyn" ('The Equestrian Statue'), "Tornet" ('The Tower'),"Kastellet"('The Citadel'), "Restaurangen" ('The Restaurant'), "Konsthallen" ('The Art Gallery') and woven portraits of Crown Prince Gustav Adolf and Margareta.[134]

130 *Official descriptive and Illustrated catalogue of the Great Exhibition 1851*, vol. III foreign states, p.1351. Horngren's letter in Almgrenska släktarkivet, RA. Copies of the woven image, in two sizes, are found at SKAASoM, Nordiska museet NM 216 210 (stamped 1846) and NM 31 919 (signed 1855) and Upplandsmuseet UM 15 497.
131 The Eneberg collection 11.183-22, Textilmuseet, Borås. Nordiska museet NM 28 447, NM 266 532 and NM 200 816 and at SKAASoM.
132 The Eneberg collection 11.183-22, Textilmuseet, Borås. Nordiska museet NM 200 808 and SKAASoM.
133 NM 284 482, NM 284 478 and MN 284 479 and SKAASoM.
134 NM 279 042, NM 279 043, NM 279 044, NM 284 480 and NM 284 481 and SKAASoM.

Fig. 35. Woven political devices, 1860's, SKAASoM (Photo: Martin Ciszuk).

K.A. Almgren also used the Jacquard weaving technique for political purposes. A technical draft on which one could read "Lefve Danmark" ('Long Live Denmark') has probably been made in connection with the Second Schleswig War in the 1860's. Three woven political devices were preserved by the Almgren family and were donated to Nordiska museet: "SVENSKT ARBETE, SVENSKT BRÖD!" ('Swedish labour, Swedish bread!'), "Lefve Bondeståndet!" ('Long live the Peasants') and "BANCOVINSTEN åt INDUSTRIEN!!" ('The profits belong to the industry!!').[135] A length of fabric with the latter text is in the collections of SKAASoM (Fig. 35). These are obviously examples of products shown to the members of the Riksdag visiting the weaving-mill after dinners at K.A. Almgren's house.[136] Judging from the weaves, ends per centimetre, and pattern repeats they were made in mountings intended for kerchiefs. A technical draft at SKAASoM with the text: "När lifvet som bäst varit hafver har det arbete och möda varit 1884" ('When life was at its best it held work and toil 1884') is most likely connected to the funeral of K.A. Almgren in 1884.

135 Nordiska museet NM 312 417+.
136 Described in *Folkets Röst* 1854-03-08, p.1 column 4.

Fig. 36. Waistcoat with pattern with the name of King Charles XIV John
(Photo: Lars Sjökvist, Värmlands museum).

Fabrics with woven images and texts have, surprisingly enough, also been used to make clothing. These are very rare and should be compared to the woven political devices rather than to fashion fabrics. Four Swedish waistcoats, dated to the 1830's or the 1840's by their cutting, have the same design with lions holding the coat of arms of the Union between Sweden-Norway crested with a crown and the text "CARL XIV JOHAN" in cloud-shaped cartouche.[137] (Fig. 36, 50 and 51.) They are woven on the same brown-black warp, but with different colours for the weft: gold/brown, cerise/green, and red/yellow.

137 Värmlands museum inv. No. 24.600 , Nordiska museet NM 149 387, Livrustkammaren No. LRK 5787:98 NNR 20822 and the Östergötlands länsuseum inv. No. A1908.

The waistcoat silk is Jacquard woven but lacks woven markings proving it to be Swedish; this is, however, probably the case considering the motif. Two similar fabrics with the text "XVII MAI" (Norw. 'syttende mai', Eng. '17th May': the Norwegian Constitution Day) and "CONSTITUTION" have been used in seven waistcoats in Norway.[138] (Fig. 53.) The silk in the "syttende mai" waistcoat has been analysed and displays the same rate of ends per centimetre and pattern repeat as the Swedish waistcoat silks.[139] There is a possibility that they were woven by the same weaving mill in Stockholm. Although found in an object completely without practical function, the same kind of pattern is represented by woven pictures with the coats of arms of Sweden and Norway in gold thread on a red, white and blue ground manufactured at the Meyersson mill in 1862.[140]

Fig. 37. Woven labels, 1880's (Photo: Jan Berg Textilmuseet, Borås).

Woven labels carrying company names may be considered odd products. (Fig. 37.) Only three examples of such labels are found at SKAASoM. They were obviously ordered by ready-made clothing businesses or tailor's workshops to be sewn into new garments. There are, however, around fifty small technical drafts of such labels at SKAASoM. Most of them appear to have been woven on piece-goods and then cut to size. One technical draft is noted as having been "read" in 1894 and a preserved label with text in Swedish in Holmberg's textbook in silk-weaving shows that they were probably woven primarily during the 1880's and 1890's.

138 Astrid Bugge, *Constitutionsfeiring og 17. Mai-vester.*
139 Norsk Folkemuseum NF 1897-0530.
140 NM 54 722 and NM 54 723. They are described and admired by Palmstedt, p.12.

3.1.6.2 Summary of woven images and texts

The woven images and texts have been analysed to calculate the capacity and complexity of the looms they were made in. These specific products were not produced in large quantities and should most likely have had little or no economic importance to the silk-weaving industry in Sweden. They are, however, interesting to study as they represent an interest for the possibilities in weaving technology and a fascination for technology gaining the upper hand over all aesthetic judgments. They attracted attention in their day and are examples of the most technically advanced products of the silk-weaving industry in Sweden. This, in connection with the royal associations, is also the reason for them being preserved in relatively large numbers at museums and in private collections.

3.2 OBJECTS

One part of the source material is closely connected to the production of silk, but can be categorized neither as textiles, nor as written sources. This category involves objects in paper and cardboard, such as design drafts, technical drafts, card chains and also objects in wood, metal, etc. such as machines and tools and the preserved mountings and so-called “drömmar” (‘dreams’). These objects belong almost exclusively to K.A. Almgren Sidenväveri as there are practically no objects preserved from other silk mills. There is a possibility that some of the objects at SKAASoM were originally used by other mills as the company took over the premises of the Meyersson mill and the business of Casparsson & Schmidt, but this is very difficult to prove.

Fig. 38. Designs for silk kerchiefs, ”Almgren”, the Borgstöm collection (Photo: Martin Ciszuk, by courtesy of Nationalmuseum).

3.2.1 Design drafts, technical drafts and card chains

3.2.1.1 Design drafts

Three volumes of design illustrations donated by C.A. Borgström are found in the archives of Nationalmuseum. Two of them are described in the donation letter from 1891 as “2 books Preillustrations of older weaves, drawings after models” and contain design sketches for weaves and embroidery from the last part of 18th century and onwards. They were probably collected by Borgström during his stay in Lyon. Two illustrations are, however, signed

C.A. Borgström. In addition, there are floral studies on grey paper similar to those found among the design drafts in the collections of SKAASoM, one of which is signed Gustaf Gustafsson. A third volume is called “1 book Preillustrations of patterns for recent times, mostly performed in weave in Stockholm”. It contains pattern designs for a large number of kerchiefs, but also patterned clothing fabrics and furnishing silks. Some of these are marked “Almgrens” and “Casparsson & Schmidt” (Fig 38). The design illustrations are painted in gouache on ordinary paper or on a brown oiled glossy transparent paper which by now has become very brittle. The latter require restoration before further handling is possible.

Most of these design illustrations are obviously originals or sketches of designs constructed by Borgström during his days as pattern constructor for Sidenfabrikssocieteten. They show the manufacturing process of designs and may be compared to preserved textiles. They may also be put in connection with an invoice from C.A. Borgström in 1838 for “designs for kerchiefs and hat fabrics” in 1838 found in the bankruptcy document of Jonas Berger’s estate.[141] As only a few design drawings mention the client by name and none of them is dated, it is difficult to know to what degree the designs are representative of the silk industry in Sweden. The large number of kerchief patterns does, however, suggests that the drawings reflect conditions in Stockholm. When the collection has been restored and photographed, there will be an opportunity to find textiles made after the designs.

A hundred or so sheets with design drafts are found at SKAASoM. It is a mixed collection of design studies, printed design illustrations, coloured originals made by artists, copied and traced older designs, and sketches for how designs would be used on furniture, flags, etc. Most of them concern furnishing silks and may be dated through notes or comparisons with the book of furnishing silks to the years of foreman Holmberg from the 1890’s to the 1930’s. (Fig. 39.) Only a few of the drawings are originals for kerchiefs and “Damassetyg”, which implies these designs were purchased abroad or that new designs were not constructed for these products after 1890. Of the design drafts, only a few bear another signature than that of foreman Holmberg. Some models for kerchiefs carry text in French and were probably purchased in Lyon. Although not all of the drawings do, many of them have diagonally checked patterns for transfer to the technical draft and sometimes technical notes written in Swedish.

141 SSA Rådhusrättens arkiv, konkursakter 321/1839.

The design drafts have been photographed and documented in order to be able to bring them together with the catalogue of furnishing silks, which is where they primarily belong. They show the work process when a new design was created or an old one was recreated.

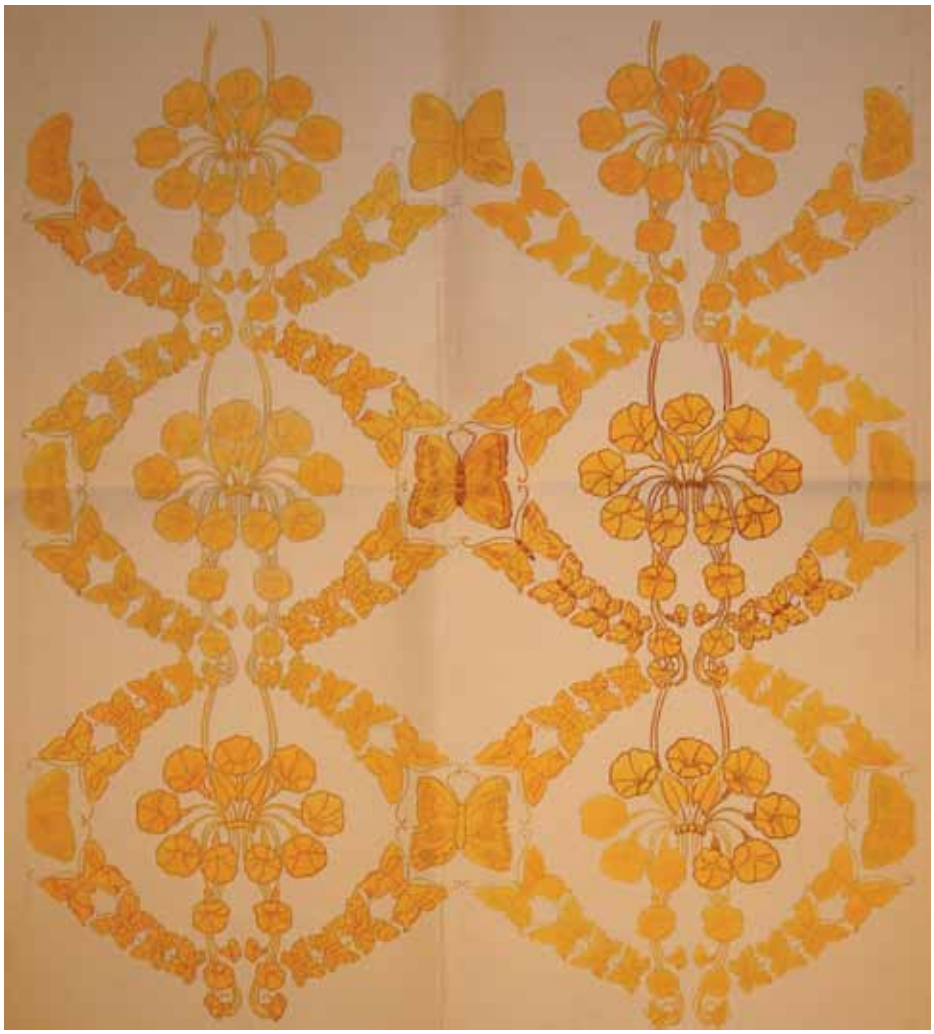


Fig. 39. Design draft signed Alf Wallander 1908, SKAASoM (Photo: Martin Ciszuk).

Fig. 40. Technical draft for ”damassetyg”, 1890’s, SKAASoM (Photo: Stiftelsen föremålsvård i Kiruna). Compare sample in Fig.29.

3.2.1.2 Technical drafts

At SKAASoM, there is a large collection of technical drafts, i.e. technical drawings on graph paper that formed the material for the making of the punched cards. (Fig. 10 and 40.) A few have been donated to other museum collections.[142] The exact number of design drafts in the collection is uncertain, but should be around 400. The technical drafts were stored rolled up, on shelves or in cardboard boxes in the attic of the mill at Repslagargatan. There, they have been exposed to dust, soot, moisture and dove droppings to varying degrees. The collection has been partly restored. A few design drafts have been pasted or rolled up in an unprofessional way. A group of drafts were cleaned, flattened, repaired and photographed at the paper preservation unit at

142 Textilmuseet, Borås BM52969, 52970 and 52971. Nordiska museet NM 312 403.

Stiftelsen Föremålsvård i Kiruna. Part of the collection has only been flattened and partly cleaned at the same studio. A great number of technical drafts are still rolled up and have received no treatment. Some of them are in very bad shape, dirty, torn, wrinkled and brittle, while others are merely sooty or dusty.

Most of the drawings were originally marked with labels in cardboard, attached with a piece of string tied to the rolled-up design draft. Many drafts have lost their labels when the paper was torn and there are several labels lying loose among the rolls. On the back of the design drafts and in the margins of their face sides there are often notes, some about the product: quality, measurements and design number; some about the manufacturing: client, date and name of the person “reading” the design draft (i.e. made the punched cards), instructions for reading and the number of hooks and wefts. Some furnishing silks have client and year drawn into the design draft, but this was not intended for “reading” or weaving. However, none of the technical drafts have been signed by the artist or the person who constructed the design. Some design drafts for kerchiefs carry notes on having been purchased and “read” in Lyon. Although some notes are in French, most of them are in Swedish. Some design drafts carry an old-fashioned marking with Roman numerals and text in a fractured typeface. They are likely among the oldest in the collection. A few of the design drafts are labelled Casparsson & Schmidt. These probably belong with the kerchiefs woven by K.A. Almgren Sidenväveri for its competitors in the 1890’s.

The oldest note where a date has been written out is found on a design draft for a kerchief from 1852, but some of the design drafts for kerchiefs are probably older still, perhaps from the 1830’s. Among the furnishing silks, however, there are no designs older than the 1880’s. A majority of the notes stating that the design draft has been “read” are from the 1880’s and 1890’s. Miss Tengelin is frequently mentioned among those, but so are other workers at K.A. Almgren Sidenväveri.

The technical drafts are painted by hand in gouache paint on printed graph papers. The papers used for the design drafts may often be one clue to the dating of the designs. Many of them are printed in Lyon and are probably among the oldest, others are marked “L.G. Horngren, Stockholm” and should be from the period between 1840 and the 1860’s, while those printed in Krefeld are likely to be from the 1880’s and 1890’s. However, the paper was stored and could have been used long after being printed. A great number of unused design draft papers of varying square sizes has also been preserved.

Technical drafts from K.A. Almgren Sidenväveri have been sorted by product and categorized in “Möbeltyger” (‘Furnishing silks’), Sjaletter (‘Kerchiefs’), “Amier/Långhalsdukar” (a kind of kerchief/’Long Scarfs’), “Damassetyger”, “Vävda bilder” (‘Woven images’), “Etiketter” (‘Labels’), “Vävda deviser” (‘Woven devices’), and “Kravattyger” (‘Necktie silks’). The point of departure in this system is primarily the notes on the design drafts or attached labels, secondly the appearance of the designs and technical details regarding the proportions of squares, number of colours, or the markings on ground weave shafts (the so-called “tringles”) at the edges of the design draft. (Fig. 40.) All technical drafts for furnishing silks, woven devices, woven images, labels and necktie fabrics have been photographed. Among the kerchiefs and Damasse fabrics, only the design drafts that have been flattened have been photographed. In connection to this, all information on notes, labels, colours, and graph papers have been documented and inserted into tables. Many design drafts have been very large and composed of several sheets which now have been separated. A first goal is to bring all the pieces together and then connect them with preserved design drafts, card chains, textiles, design indices, and loom numbers. This may lead to further discussions on the origins and dating of the designs. Technical drafts can be interpreted and may provide information on the technical capacity of the looms and about different technical solutions which have been used for the weaving of the various products. It is possible, however, that some design drafts were never made into card chains and woven fabrics.

Fig. 41. Chains of punched cards with labels, SKAASoM (Photo: Martin Ciszuk).

3.2.1.3 Card chains

A large collection of card chains have been preserved at SKAASoM. (Fig. 41.) They are marked with name or number of the design written on the first card. The card chains have not yet been catalogued. Many are very large and consist of thousands of punched cards. They are heavy and there is a risk that the cardboard will break if not handled with care. It is possible to use a machine that has been designed especially to read a card chain and print an image of the technical draft it was made from. This may be an interesting alternative for card chains that have lost their marking. The card chains provide information about the capacity of the looms, i.e. the number of hooks in the Jacquard loom. Sometimes, technical details such as ground weave shafts can be determined from the card chain, but without the technical draft and preserved fabrics it can be very difficult to guess at the equipment of the loom and how the pattern was repeated in the fabric. The card chains may be compared to technical drafts and preserved fabrics and perhaps add to the picture of the production of K.A. Almgren Sidenväveri.

Fig. 42. The preserved interior of KAAlmgren Sidenväveri, Repslagargatan (Photo: Klas Nyberg).

3.2.2.1 Machines, tools and buildings

A number of the machines and looms at K.A. Almgren Sidenväveri are still in their original places in the weaving mill at Repslagargatan and are listed in the inventory of the Stockholms stadsmuseum.[143] Several machines and tools were donated to Textilmuseet in Borås in the early 1970's.[144] Some looms are still used by Oscar Almgren in his work on Gotland. A great number of objects are kept at SKAASoM storing facilities at Svensk Museitjänst in Tumba. The well-preserved mill building facing Repslagargatan is in itself an artefact of great value as a piece of source material. (Fig. 42.) The mill was originally planned to be driven by a steam engine. This is mentioned in Oscar Mauritz Almgrens inaugural speech,[145] and the building has been given a large coal-cellar, but according to

143 Frankow Nyström, *ALMGRENS SIDENVÄVERI inventering av föremålsbeståndet 1985-86*.
144 Textilmuseet, Borås BM 52 933-52 968.
145 Lindgren-Fridell, p.129.

Bergström the steam engine was never installed and instead the machines were worked manually until 1881, when a gas engine was installed.[146] A partly preserved system of transmission shafts and driving belts were used to drive winding machines, spooling machines, a beaming machine, and power ribbon looms. Warping mills, Jacquard machines and dobby machines were obtained from Lyon during the 1860's and 1870's. Several of the looms preserved are marked with a year, ranging between 1874 and 1877, and the names of manufacturers such as Arnal, Boyer, Marat, and Delauzon. In 1894, mechanic Jacquard looms in cast iron, made in Germany, were installed.[147] These were placed on the bottom floor of the building. A drawing of the interior appeared in a newspaper article in 1907 and the interior was also photographed in a piece of printed matter from K.A. Almgren Sidenväveri made for the 1914 Baltic Exhibition in Malmö.[148] When the mill shut down parts of its operations during the 20th century, the functions of the factory halls changed to some extent. Around 1928, the machines were moved from the finishing mill at Tavastgatan to the second floor and a wooden wall was erected that split the hall in two. The top floor housed Almgren Kappfabrik ('Almgren Coat factory') between 1930 and 1950. When the weaving mill closed down altogether in 1974, it appears the tools on the second floor were the only ones in use.[149] At the moment, four loom frames are still mounted in the preserved weaving hall at Repslagargatan and are equipped with two dobby machines and two Jacquard machines, one with 600 hooks and one with 1200 hooks. In the storing facility in Tumba, there are over twenty Jacquard machines with 600, 900 and 1200 hooks and at least seven dobby machines with 100 hooks. In addition, there are several dismounted loom frames and a number of tools and loose parts for looms. These objects have not been completely inventoried and catalogued.

The first mill building at Repslagargatan are also still intact, as is the Almgren mill building at Ragvaldsgatan and the house on S:t Paulsgatan originally used by the Meyersson silk-weaving mill. All these buildings had, however, undergone major rebuilding already during the early 20th century and have lost all furnishing related to silk-weaving.

3.2.2.2 "Drömmar" and compacted Jacquard mountings

146 Bergström 2007, p.44.
147 Svennilson Colleste, p.28. A power loom BM 52 937 with Jacquard machine BM 52 943 are in the collections of Textilmuseet, Borås.
148 Svenska Dagbladet 6/7 1907. Almgren's brochure, Textilmuseet, Borås BM 48 987.
149 Sjösten Wölling 2005, s.89.

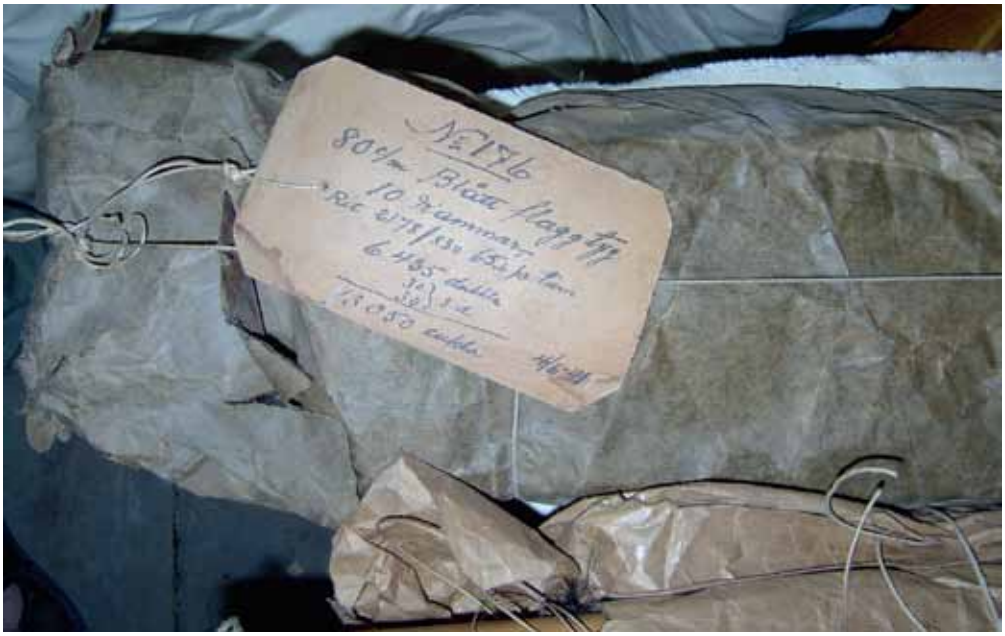


Fig. 43. ”Dröm” for ”80 cm Blått Flaggtyg” (‘Blue silk for flags’), SKAASoM (Photo: Kerstin Wölling).

In the collections at SKAASoM there are 40 so-called “drömmar” for plain silks. (Fig. 43.) The origin of the term is unknown, but it appears to have been used by foreman Holmberg. A “dröm” is a package where an entire mounting has been stored - a piece of the weave, reed, shafts with heddles, and lease sticks rolled up. When more of the same quality was to be woven, harness and reed were hung into the loom and the fabric was tied to the front beam. A new warp was rolled on the warp beam and tied, thread by thread, to the stored warp of the “dröm” and then the new warp was pulled with the knots through the heddle and reed. This method is much faster than threading and sleying the reed again. “Drömmarna” have been wrapped in brown wrapping paper and a cardboard label attached to them, describing the quality, width, ends per centimetre, and sometimes year, loom number and the name of the woman weaver. The information can be brought together with the dispositions in the disposition books at SKAASoM described above.

Mountings for Jacquard looms were stored in a similar way. The Jacquard machine with the entire mounting was lifted from the loom. A piece of the warp, with weave on its front

Fig. 44. Jacquard mounting, packed together. Comber board, harness cords and shafts (tringles), SKAASoM (Photo: Martin Ciszuk).

end and lease sticks at its back, was left in reed and heddles. The lingoes were bundled and put at the bottom of a sturdy wooden box, then the harness cords, harnesses, reed, lease sticks and comber board were put into the box and the Jacquard machine placed on top. Ten such mountings have been preserved at SKAASoM storing facilities. (Fig. 44.) They have been kept in the attic of the mill and are very dirty and dusty. Many of them are wrapped in newspapers dating the dismounting procedure to the end of the 1920's, probably in connection to when the finishing mill moved in on the second floor.

Documenting and examining the preserved equipment may shed light on the connections between technical draft, card chain and patterned fabric. Here, it is shown how many repeats

the mounting has, i.e. how many harness cords are tied to each hook, and how they are threaded into the comber board, which determines how the pattern will be repeated, straight or reversed. The reed width and the number of threads determine the density of the fabric and the number of threads in each heddle determines the detail drawing of the pattern. The number of shafts will determine the ground weave. Shafts intended for both raising and lowering were placed in front of the harness, while a kind of raising shafts, so-called “tringles”, were placed inside the harness, under the comber board. Shafts and tringles may have been connected to hooks in the Jacquard machine or may have been directed by a separate dobby machine. The analysis of the mountings may be illustrated by schematic drawings showing how the various parts have been combined and information on materials, reed width and ends per centimetre added to them. Mountings for different qualities and products can then be compared to the textbooks in silk-weaving and the recorded dispositions. This provides knowledge about how the Jacquard technique was utilized at K.A. Almgren Sidenväveri.

3.2.3 Summary of objects

Objects are essential sources to understand the silk industry in its entirety, especially the production processes. Just like textiles, objects require knowledge in the handicraft to be put into a context, described and interpreted correctly. The objects reflect the entire manufacturing process from design draft, through technical draft, tools for yarn preparation, looms and their mountings, all the way up to the completed silk fabric and its finishing. The large number of different objects in the material makes it difficult to overview, while at the same time it provides a broad foundation for a deeper understanding of the conditions and development of silk production in Sweden. Objects contain information about the technological development and the capacity of K.A. Almgren Sidenväveri, but may also be used in discussions on the competence and professional identity of the silk weavers.

3.3 TEXTBOOKS IN SILK-WEAVING

Textbooks in silk-weaving may be treated both as objects and as written sources because they contain both texts and fabric samples. Four handwritten textbooks in silk-weaving have been studied. They are written by Swedish students in Lyon in 1829 and 1836 and in Krefeld in 1886 and 1914, thus covering the international development in the field of silk-weaving during the 19th century. It cannot be determined whether the students in Lyon attended the same school and if so, how it was organised. The German books are from the Preussisshe Höhere Webschule in Krefeld, which was the centre of the silk industry in Germany during the 19th century. It may be discerned from the methodical disposition of the books that instruction appears to have followed a curriculum very much alike to that of modern theoretical weaving educations. The language in the French and German texts is fairly correct, which implies the textbooks were dictated or copied from the black board.[150] This kind of textbooks has its roots in a form of instruction in crafts where the examples of the master were worked out to become a collection of references to techniques and knowledge that were deemed essential to the practice of the craft.

3.3.1 K.A. Almgren's notebooks

K.A. Almgren studied silk-weaving in Lyon in 1829. Two notebooks with fabric samples are kept at SKAASoM and a third notebook, containing only texts describing looms, is in the Almgren family archives in Riksarkivet since 1977. (Fig. 45.) The text is in French. Only a few notes in Swedish on the reverse side of technical drafts pasted into the notebook confirm the authenticity of the notebooks, which could otherwise have been purchased by Almgren in Lyon. K.A. Almgren did not want to reveal his Swedish origins. In order to be able to study in Lyon he presented himself as a Frenchman from Strasbourg, which would explain his northern accent.[151] The notebooks contain so-called dispositions with all information needed to set up a weave. Most of the dispositions come with preserved fabric samples and describe materials, densities, weave diagrams, and the mounting of the loom. Notebook I contains 42 dispositions and firstly describes plain fabrics, many with names found in Swedish factory reports and together with fabric samples from the 1820's and 1830's. They are followed by patterned fabrics with text and drawings of looms and equipment. Notebook II continues with 30-odd descriptions of patterned fabrics and different types of ribbons.

150 The author of this thesis was himself educated in this way in Lyon in 2002 at the "Session technique" arranged by the textile research organisation CIETA.
151 K.A. Almgren's letters 28/5 1829 to C. G. Indebetou, copy at SKAASoM.

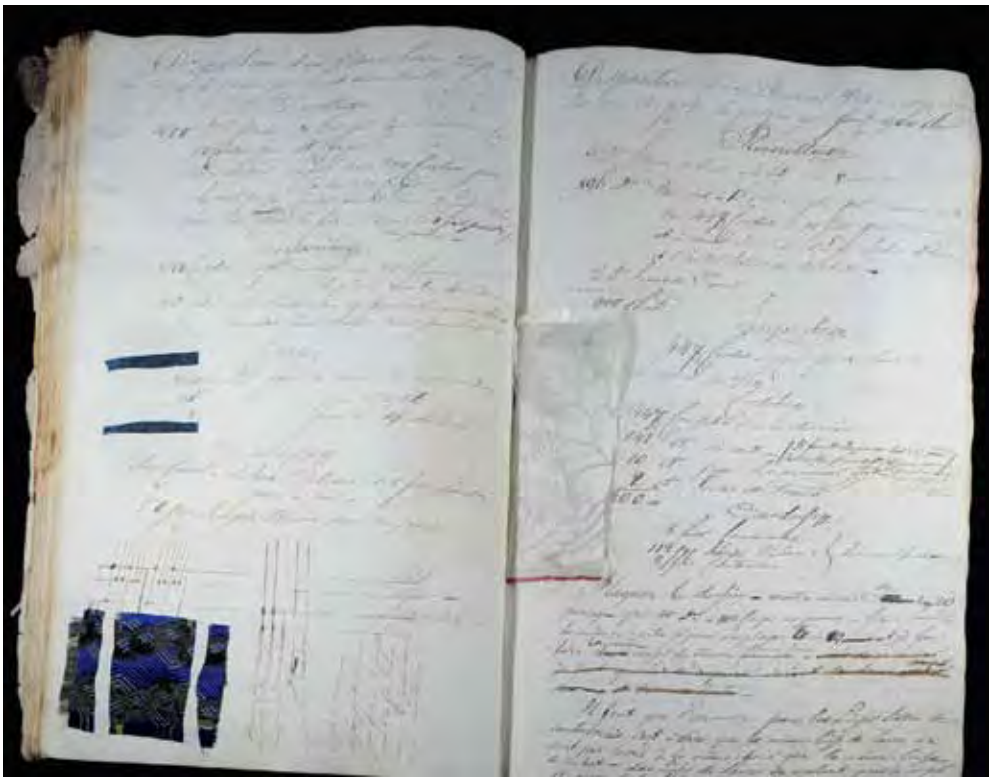


Fig. 45. ”Theorie” K.A. Almgren 1829, SKAASoM (Photo: Klas Nyberg).

The majority of the described fabrics are in silk, only a few in half-silk. All patterned fabrics are described as woven on Jacquard looms except one example which is woven “on an old draw loom”. Six different descriptions of “Mouchoires” - silk kerchiefs - obviously reflect a product that was modern also in Lyon at the time. The text and the drawings of mountings in the notebooks have been done quite offhandedly, perhaps in a hurry. Unlike the other books on silk-weaving described below, there is no clean copy of them. Almgren stayed in Lyon for a year and obviously tried to gather as much information as possible in a relatively short time.

Fig. 46. Borgström's textbook for silk weaving (Photo: Martin Ciszuk, by courtesy of Nationalmuseum).

3.3.2 C.A. Borgström's textbooks

Two volumes of dispositions and fabric samples are kept in the archives of Nationalmuseum.[152] (Fig. 46.) Year and name of the student and education are missing, but a loose table inserted in volume II states densities for reeds signed C.A. Borgström. He was sent to Lyon on the expense of Sidenfabrikssocieteten and worked as the pattern constructor of the society between 1838 and 1847.[153] Borgström donated the books together with fabric samples, a design collection, and other literature to Nationalmuseum in 1891. In the inventory of the donated items they are called "2 books Theory of the Art of Weaving prepared by the undersigned" but they are obviously handwritten textbooks from his stay in Lyon in 1836-38. The books are written in French. The first contains some 164 numbered

152 Nationalmuseum n.p.d.153/1891 I-II.

153 Sidenfabriksocietetens arkiv Nordiska museets folkminnesarkiv.

“dispositions” with fabric samples together with text and figures describing mountings and different kinds of Jacquard looms. The second book contains 46 dispositions without numbering. Some of the figures regarding looms printed on loose sheets have been bound into the book. Unlike Almgren’s notebooks, Borgström’s books have been carefully copied, but they follow the same outlay with simple shaftwoven fabrics first, followed by increasingly complicated Jacquard woven fabrics.

Fig. 47. The first pages in Holmberg’s silk weaving manual (Photo: Jan Berg Textilmuseet, Borås).

3.3.3 Erik Holmberg's textbooks

Erik Holmberg was a foreman at K.A. Almgren Sidenväveri in 1890-1948, where he succeeded his father.[154] He studied at the Preussische Höhere Webschule in Krefeld, southern Germany, in 1886-88 and 1889-90.[155] One of his handwritten textbooks, "Cursus Buch I", with fabric samples was donated to Textilmuseet in Borås by the Almgren family in 1971.[156] (Fig. 47.) A second book, without fabric samples, "Bindungslehre" ('weaving theory') are in the collections of SKAASoM. "Cursus Buch I" contains the entire weaving education from tabby and shaftwoven fabrics to advanced Jacquard patterned fabrics and silk ribbons. The majority is silk, but there are also samples of wool, cotton and flax. Dispositions are numbered 1-94 and contain 97 fabric samples. The book is written in German, but the outlay is the same as in the books in French described above. The first page is labelled "Crefeld November 1886 für Peter Pasch" and No. 52 is labelled "Sommer Semester 1887". There are also loose sheets:[157] "disp. 95-101" and "on my own, Stockholm 12 sept. 1888" written in Swedish and German, including "Ein Wiesses Kopf Tuch" ('a white kerchief').[158] Holmberg appears to have been an ambitious student who paid attention to details and had a genuine technical interest, unlike K.A. Almgren, who was more interested in production and sales.

Unlike K.A. Almgren's notebook from 1829, the book contains only a single description of a silk kerchief. This can be seen as characteristic because at this time the market for silk kerchiefs had begun its decline in Sweden and probably was only marginal in Germany. Instead, the book contains several new products that appear to have influenced the Swedish production and may be compared to fabric samples and technical drafts at SKAASoM such as necktie silks, Damasse silks, and woven labels.

154 Bergström 2007, p.145.
155 In the city archives in Krefeld he is first called "Webeschüler" ('weaving student') and later "Seidenweber" ('silk weaver'). Krefelder Melderegister p.196.
156 Textilmuseet, Borås BM 48 985.
157 Capsule 1 BM 48 987 Textilmuseet, Borås.
158 Several of these may be connected to the loose fabric samples with technical drafts which were mounted by Textilmuseet in Borås as BM 49 018 – BM 49 023 However, two of the fabric samples do not fit with any of the dispositions. BM 49 024 shows "German Tringle - with Kätteffekt (brocade), Skotteffekt (Damasse) and Taffeta".

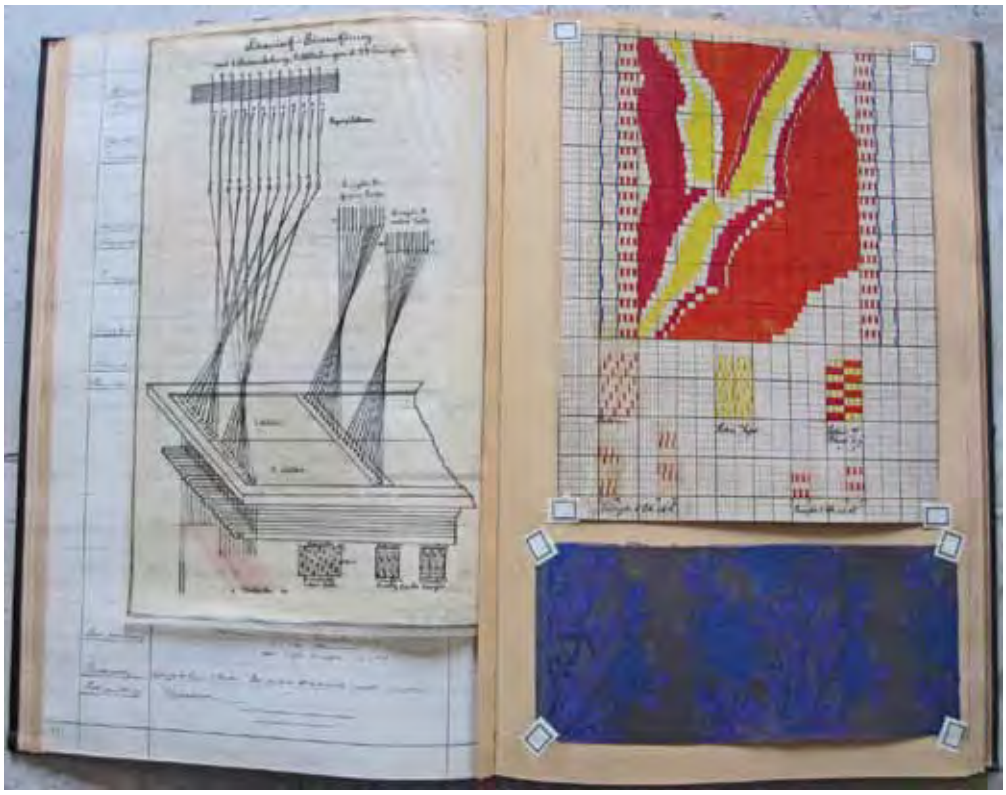


Fig. 48. Erik Brattberg's silk-weaving manual 1922-1924, SKAASoM (Photo: Martin Ciszuk).

3.3.4 Erik Brattberg's textbook

Erik Brattberg directed Aktiebolaget ('limited liability company') K.A. Almgren Sidenväveri from 1945-1974, but delegated the practical management of the mill to foreman Claesson, whose textbooks have not been preserved. Brattberg's textbook in five volumes, labelled E. Brattberg 1922-24, are found in the collections of SKAASoM: "Schaftgewebe" ('Dobby-weaving'), "Jaquardgewebe" ('Jacquard weaving'), "Samt" ('Velvet'), "Färberei" ('Dyeing') and "Theorie" ('Theory'). (Fig. 48.) They are written in German and contain 117 dispositions with fabric samples ordered from tabby to Jacquard patterned fabrics, gauze weave and velvet. The majority of the fabrics are silks, but there are wool and cotton fabrics as well. At least four of the Jacquard woven silk samples are furnishing silks from the production of K.A. Almgren Sidenväveri which Brattberg obviously brought to Germany.

The books bear similarities to Holmberg's thirty years older textbook, but are more extensive. It is probably also from the Preussische Höhere Webschule in Krefeld where another Brattberg is mentioned in the city archives as a volunteer.[159]

3.3.5 Summary of textbooks in silk-weaving

The textbooks provide direct information on the kind of technical knowledge the pattern constructors or the foreman were expected to possess and which silk qualities were produced at silk-weaving centres in Europe. Technical names and weaving terms are in French and German. The technical descriptions and the terminology are very exact and adequate, unlike the product names in the factory reports and those of some fabric sample collections. It does not, however, become clear which of the techniques were used at the silk mills in Sweden, what they were called in Swedish and how much of the instruction could be used at the Swedish weaving mills. The content of the textbooks and the technical names may be compiled to display changes in the subject matter taught at weaving schools during the 19th century. This may be compared to information in factory books and other Swedish sources.

Textbooks in silk-weaving contain methodical descriptions of the production processes and the equipment of the looms, important sources as they are contemporary with the textile material. They provide an understanding for the terminology and create a context when combined with the preserved machines and tools and the sporadic technical notes from the Swedish weaving mills. In addition, the textbooks are one source which may provide an understanding of how knowledge transfer transpired in silk-weaving, positioned between handicraft and industry, and also how technical educations in the 19th century replaced the apprenticeship system in professional educations under the influence of mechanization and industrialization.

159 Krefeld city archives, Melderegister 1922.

3.4 WRITTEN SOURCES

Earlier, written sources have been used primarily in economic-historical research regarding silk-weaving in Sweden. In this study, they form a framework and a complementary source material to the textile objects.

3.4.1.1 Factory reports

The annual information in the factory reports constitutes a rich and useful source of information for research.[160] From 1740 to 1847, all manufactories and factories in Stockholm reported to Stockholms Stads Hallrätt, which compiled the factory reports in tabular form and added an introductory text.[161] All domestically manufactured products also had to go through a quality review and were stamped at the hall. Information from "hallrätter" all over Sweden was then compiled by Kommerskollegium.[162] In the factory reports, there are silk-weaving mills, ribbon-weaving mills, and silk throwing mills with information on the name of the owner, the number of looms and machines, the number of workers, the number of ells or pieces of various kinds of silk fabrics and kerchiefs (called "dukar") and the total value of the production. The basic data, the statements submitted by the manufacturer, are collected in the archives of Hallrätten.[163] After Hallrätten was abolished in 1847, the reports for 1848 were submitted to "Stockholms Stads Politiembete och byggnings Collegium" ('the Stockholm City Political Office and Housing Board') and between 1849 and 1862 to "Stockholms Stads Handels och Ekonomi Collegium" ('the Stockholm Trade and Financial Board'); the information from the Boards was also compiled by Kommerskollegium. After 1863, the manufacturers appear to have reported directly to Kommerskollegium.[164] With this change, the written introductions soon disappear and the detailed information on production is reduced to a simple division between fabrics and kerchiefs. Between 1891 and 1895, information from the mills is compiled in table form by the statistical division of Kommerskollegium.[165]

The factory reports compiled by Kommerskollegium have been excerpted for each

160 Lars O. Berg Hall och Manufakturrätten i Stockholm. *Berättelse över Arkivnämndens förvaltning och verksamhet under år 1967* p.45-72.
161 SSA. Hall och Manufakturrättens arkiv, B III Fabriksberättelser 1740-1846.
162 RA, Kommerskollegium, Årsberättelser fabriker, Serie 1: 1740-1815, Serie 2: 1816-1846, Serie 3: 1847-1862.
163 SSA Hall och Manufakturrättens arkiv, E IV Förteckningar över arbetare 1773-1847.
164 RA, Kommerskollegium, Årsberättelser fabriker, Serie 4: 1863-1890.
165 RA Kommerskollegium, Statistiska avdelningen, Fabriksberättelser H1b:1.

year between 1800 and 1895 and the information has then been compiled into tables and diagrams. The parts of the introductory texts dealing with silk-weaving have been transcribed. The most lucid way of presenting the data of this large material is to make diagrams, which may shed light on different aspects of silk-weaving and lead to further discussions on conditions and causes behind changes. The diagrams are created to illustrate my research questions, which will influence the design and selection of information. The results from the investigation of the factory reports will not prove to be entirely exact, because procedures regarding how the statements were drawn up and the compilation of them have varied during the period. They are also complicated by the fact that the products have been reported in part according to various shapes, sometimes in lengths, in numbers of pieces, or, between 1877 and 1879, in weight. During the course of the century, there are also reforms in both in the system of measurement and the currency system. Despite the great zeal and care of the bureaucrats of the 19th century, miscalculations and misreadings obviously exist in the originals of the factory reports. It is also very likely that errors have crept into my transcription, as the handwriting is often difficult to read and the spelling of names varies for the manufacturers and products. In the transition periods between old and new systems of currency and measurement it was only natural for both manufacturers and bureaucrats mixed up units and numbers; this may be suspected by any reader only by looking at the diagrams, especially regarding the value of the products.

On the whole, factory reports from the 19th century may be considered an objective and reliable source, due to the fact that Hallrätten, in principle, was independent of the branch organisations and Sidenfabrikssocieteten.[166] There is no reason to believe that the manufacturers withheld information from Hallrätten or Kommerskollegium or overstated their production in the 19th century, which was probably the case in the 18th century when the silk industry received large subsidies from the state based on its production.[167] On the other hand, the exactitude of the statements and the compilations may have varied over the century.

166 Lars O. Berg Hall och Manufakturrätten i Stockholm. *Berättelse över Arkivnämndens förvaltning och verksamhet under år 1967* p.54.
167 Stavenow-Hidemark, Elisabet, *Nya källor till 1700-talets svenska textilmanufaktur*. p.85.

The design of the factory reports themselves were influenced by the changes in the economy during the 19th century. During the 18th century, the compiled reports were begun with Silk-weaving mills on page 1, but from 1808 and onwards, all entries were instead ordered alphabetically. Until the late 1820's, the written introductions to the factory reports were very brief and used the same wording year after year. During the 1830's and 1840's, they were more detailed as the industry expanded, but at the end of this period they were once again stated briefly and became even briefer with time. This obviously reflects the great importance of the textile production among the manufactories during the 18th century and the increased interest in silk-weaving of the authorities in the 1830's. This was followed by a decreasing interest for the industry, especially after the introduction of freedom of trade in 1846 and the abolishment of the regulation requiring stamping of goods in 1862. Thus, it appears the level of detail in the factory reports varies more with the interest of the authorities and less with the changes in the economic conditions of the silk industry.

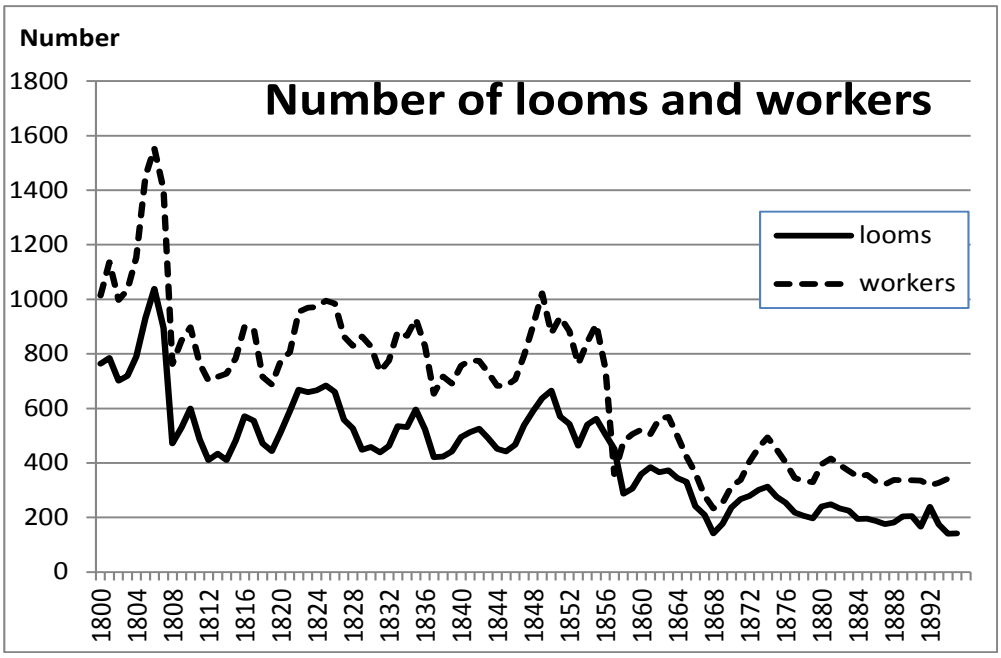


Diagram 1. The number of silk looms and ribbon looms compared with the number of workers in silk-weaving, ribbon-weaving and silk throwing, 1800-1895.

3.4.1.2 Factories, looms and workers

The information in the factory reports regarding the number of looms and workers at the silk-weaving mills provides a concordant picture of the development of silk-weaving in the 19th century. The numbers of looms and workers fluctuate drastically and varying economic cycles can easily be traced in Diagram 1.[168] The crisis in 1809 was followed by a period of recovery in the 1820's and 1830's and good times in the late 1840's, until the years of depression in 1857 and 1866. This information more reliably reflects the development of silk-weaving than information on production values. There are information in the factory reports on the types of looms: "släta stolar" ('treadle looms'), dobby looms, Jacquard looms, power looms, single ribbon looms, and "möhlstolar" (multi ribbon mechanical looms). There are also information on other machines: "slängmöhl" or "tvinnmöhl" at the silk throwing mills, "skärmöhl", "vindmöhl" and "spolmöhl" for the preparation of the warp and the weft, card punching machines ("lisagemaskin"') and re-recording machines ("repiccagemaskin") and a press for punching cards, finishing machines and also gas turbines and steam engines for the running of certain mills. This information is, however, not stated and entered with such care and consistency as to make it possible to use it to compile diagrams or comparisons between different mills. Although it is evident that the lack of information about a specific kind of machine cannot be used as an argument to state it was not used, factory reports provide important information on which machines were employed and what they were called.

The silk industry is presented under Silk-weaving mills ("Sidenväverier"), Ribbon-weaving mills ("Bandväverier"), and Silk throwing mills ("Silkerederier"). The silk-weaving mills wove plain and patterned fabrics and kerchiefs in silk and half-silk (silk warp with weft of cotton and sometimes flax or wool). The ribbon-weaving mills primarily produced silk ribbons, but also ribbons in cotton, wool and flax. The silk throwing mills report a production of sewing silk, silk and, after 1868, dyed silk. Part of the silk may have been intended for embroidery and dressmaking, but it is likely that they were mostly involved in doubling and plying silk for the ribbon and silk-weaving mills. The categories the mills have been assigned to are partly a bureaucratic construction. Several operations with the same owner were often organized within the same business, likely also under the same roof, but were stated

168 Regarding the varying economic cycles of the Swedish economy and the silk industry, see Svennilson-Colleste, p.4-10.

as separate mills. In K.A. Almgren's letters patent from 1833 it is stated that he was granted the right to manufacture "Silk and Madras-weaves (half-silks) and silk ribbons and sewing silk".[169] Despite the fact that work assignments were clearly separated, so that each worker was specialized in a single task at a machine or the weaving of a single product at a loom, the situation was probably a lot more flexible in reality than the factory reports indicate, particularly so for the smaller mills.

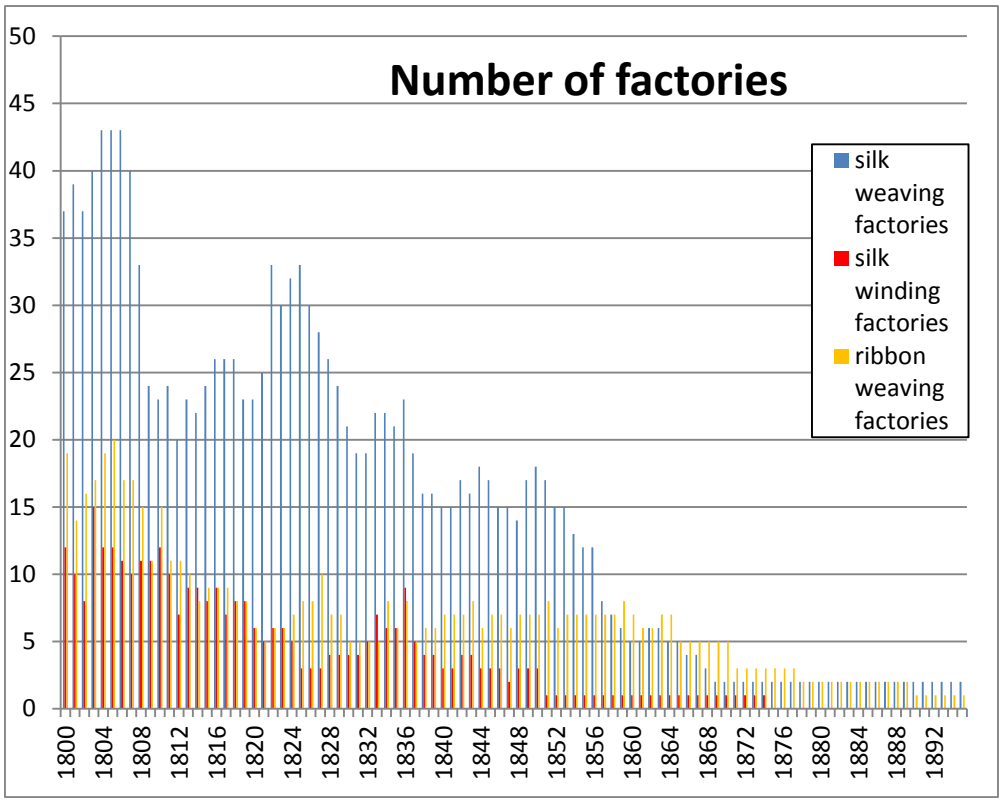


Diagram 2. The number of silk-weaving mills, ribbon-weaving mills, and silk throwing mills per year, 1801-1895.

The information about the silk industry in the factory reports have been adjusted for Diagram 2 in order to show the number of separate mills. The calculation is based on the assumption that weaving was the primary business operation and ribbon-weaving a second priority, with silk throwing mainly subcontracting to the other two. This assumption is supported by the

169 SSA Hall- och Manufakturrättens arkiv, Privilegier 1833, RA Almgrens Familjearkiv.

low number of silk throwers (Diagram 4) and the low production value of the silk throwing mills (Diagram 10). Only ribbon-weaving mills not run by silk-weaving mills have been entered separately and the same goes for silk throwing mills sharing an owner with any of the silk-weaving mills or ribbon-weaving mills. There were also instances where hosieries ran silk throwing mills. The finishing took place both within the businesses and at separate mills. To some extent, the diagram reflects the varying economic cycles, but it is also influenced by the change in size of the weaving mills (Diagram 3).

All businesses are called factories in the factory reports, despite the fact that many of them

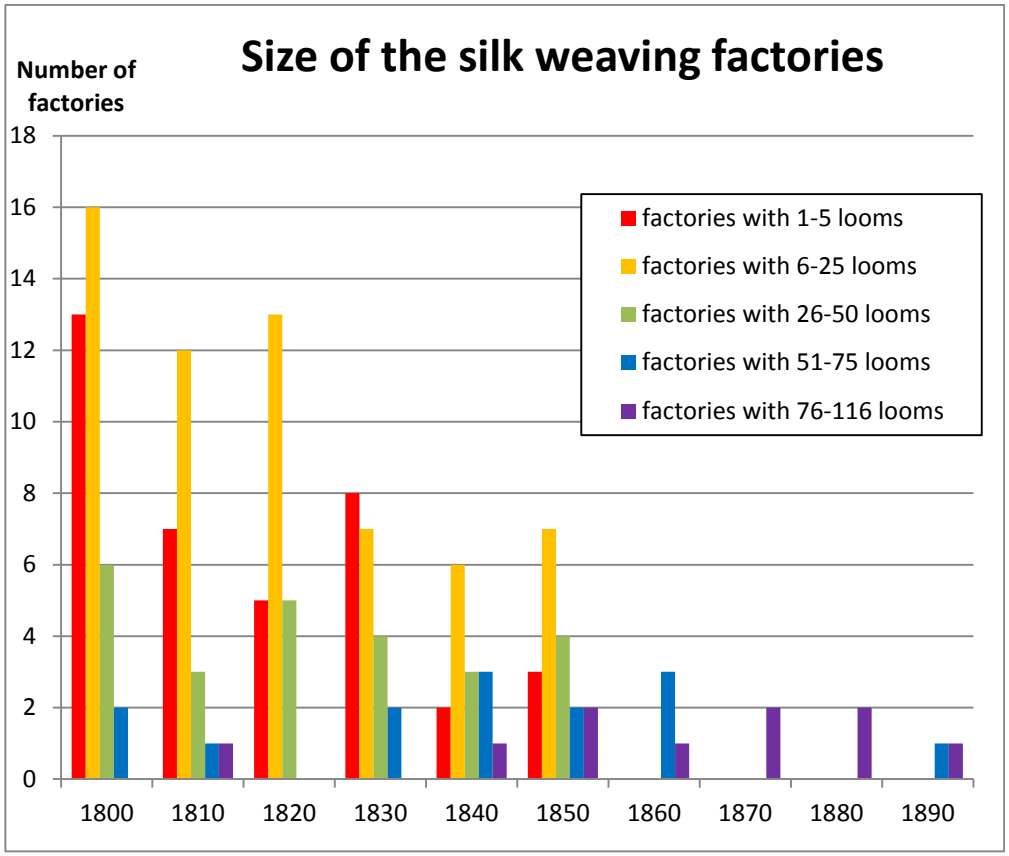


Diagram 3. The size of silk-weaving mills, 1800-1890.

were small family businesses which are difficult to compare to factories in the modern sense of the word. There are 119 names of manufacturers registered in the factory reports for the 19th century. Some are uncertain, as spelling varied and especially the initials of the first names may be difficult to decipher. The names of the manufacturers and their active periods have been compiled and show that several mills were long-lived, some running for over 50 years, while others lasted only a year or two. In some cases it is possible to follow a workshop as it is passed to a widow or a son. Until 1890, there is no information on the whereabouts of the mills, why it is often difficult to determine whether a mill that has changed owner or a new mill has been established. It is not stated in the factory reports if all looms in a mill were assembled in one hall or if weavers worked through a putting-out system, i.e. on their own looms at home. Also, it is not possible to determine from the factory reports to what extent looms and members of the workforce from closed down mills were transferred to competing or newly formed businesses. The changes in size of the mills do not reveal any direct correlation with variations in the economic cycles. Instead, it quite obviously reflects an independent trend in the silk industry.

The composition of the workforce is presented in various ways. Up until 1828, it is divided into masters, foremen (“verksgesäller”), journeymen, apprentices and unskilled workers (the latter were primarily women, but how many of the unskilled workers were women is not stated). From 1829 to 1847, the only distinctions made are between workers with or without a registered address and children under the age of 15. From 1848 onwards, owners and masters have separate columns. It is not always clear whether or not the owner was active in the business; this was probably true for the smaller weaving mills, while at the larger mills, the actual work was directed by masters and foremen. This uncertainty is a possible source of error in calculating the number of workers, although here it may be dismissed, as under the circumstances it is considered to be of negligible importance to the results. (Diagram 4) From 1863 onwards, the workers’ registered addresses, their sex and if they are under 18 years of age are stated. It is thus difficult to compile an overview of the changes in the composition of the workforce during the 19th century from the information in the factory reports. Neither does this issue fall within the scope of this investigation.

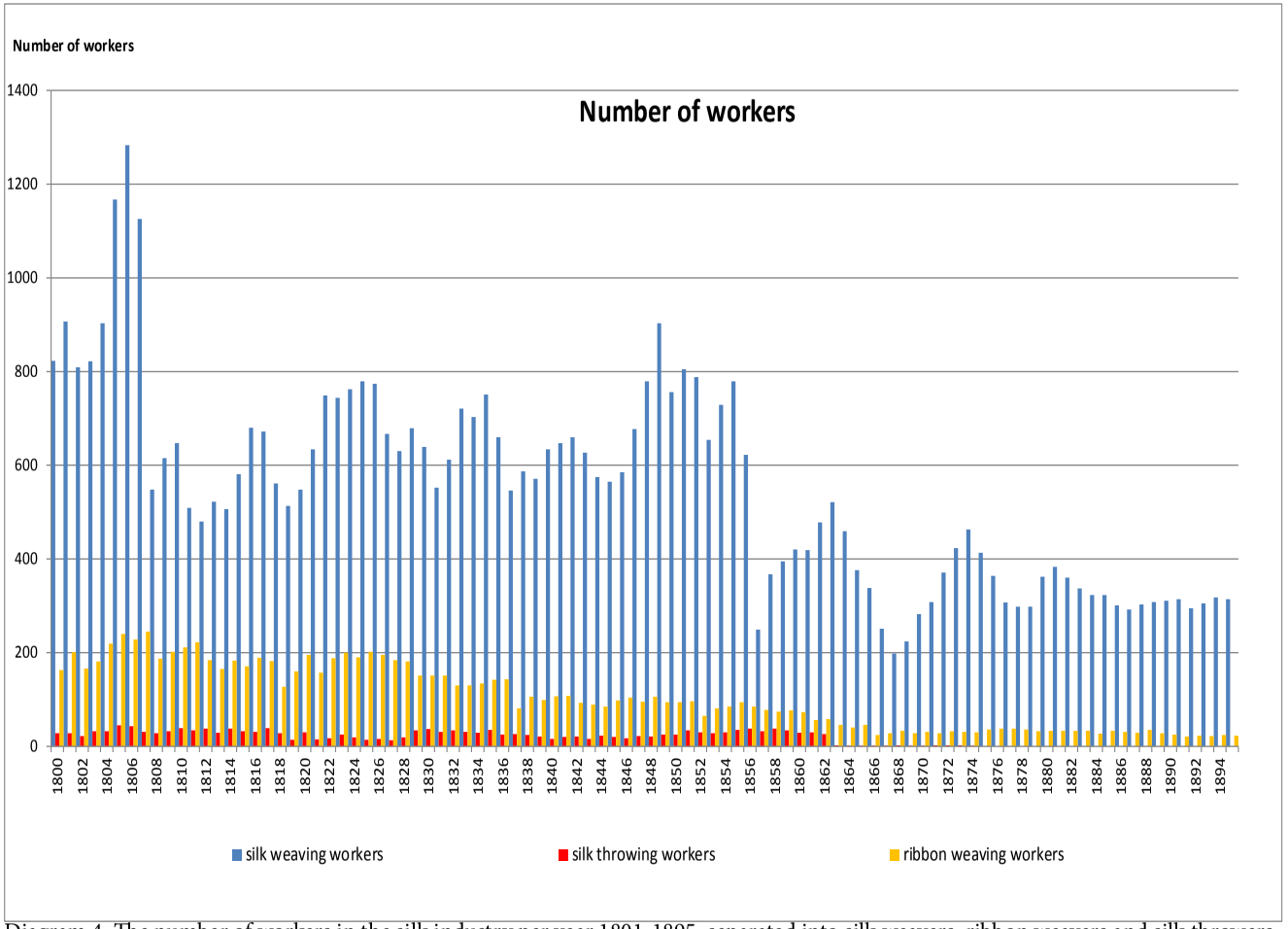
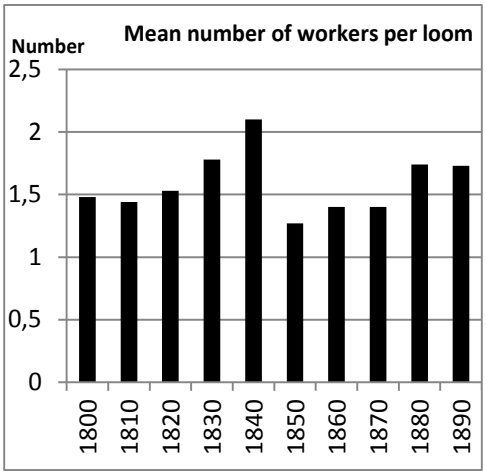


Diagram 4. The number of workers in the silk industry per year 1801-1895, separated into silk weavers, ribbon weavers and silk throwers.



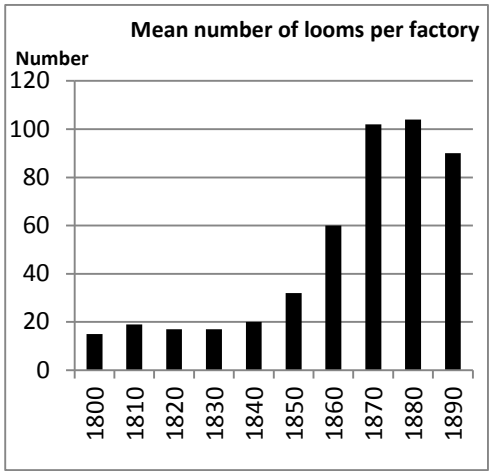


Diagram 5. Changes in the silk mills, 1800-1890.
A. The number of workers per loom. B. The number of looms per factory.

The factory reports have earlier been used as material to discuss the rationalization of the textile industry.[170] By dividing the total number of silk-weaving looms with the number of silk mills, the total number of workers at the silk-weaving mills with the total number of looms and the total number of ells and kerchiefs with the number of looms, the changes in the mills can be illustrated effectively (Diagram 5a-c).

Diagram 5b shows, as do Diagram 3, a change in the size of the weaving mills after 1860. Any clearly indicated rationalization can, however, not be traced in Diagram 5a. A distinct rationalization and mechanization would be expected to show up in the form of fewer workers per loom, which is not the case. Statements about rationalization based on the number of looms and workers ought to be made with caution. It is fairly certain that the number of looms reported is the number of looms in active service during the year, but apparently the rate of productivity varied. Each loom was adapted to a certain quality or product and the workers were specialized and responsible for a loom or a task in the preparations. From this information, one may draw the conclusion that looms involved in the manufacturing of products which were large in terms of volume were used more efficiently than looms used for products manufactured in smaller volumes. It is not evident from the

170 Nyberg, Klas, *Köpes: ull, säljes: kläde: yllemanufakturens företagsformer i 1780-talets Stockholm*. Heckscher, Eli F., *Sveriges ekonomiska historia från Gustav Vasa. Del II 1- 2, Det moderna Sveriges grundläggning*. Nyström, Per, *Stadsindustriens arbetare före 1800-talet*. Krantz, O. *Production and Labour in the Swedish Manufactories During the 18th Century*. Kjellberg, Sven T., *Ull och ylle: bidrag till den svenska yllemanufakturens historia*.

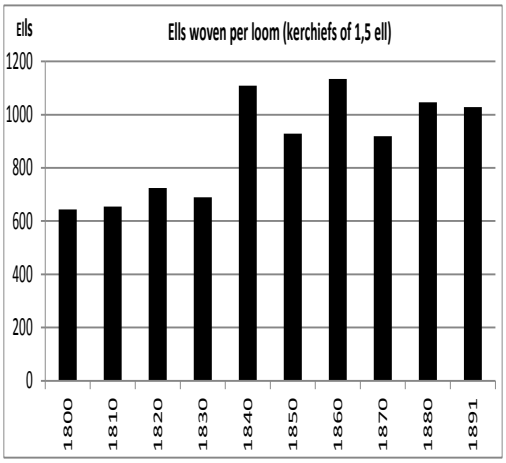


Diagram 5C. Changes in the silk factories 1800-1890: The number of ells woven per loom.

factory reports if all employees worked full-time or if changes in working hours occurred during the course of the 19th century. It is also probable that some tasks, e.g. the knotting of fringes on kerchiefs and also simple weaving, throwing and winding were performed by women working from home. In notes from Edvard Liné's mill in 1853, there is mention of a woman thrower who works from home and a woman silk thrower who has her own silk throwing equipment.[171] It is not certain these were included as employees in the factory reports. In Diagram 5c, it seems one is able to discern a change in productivity per loom after 1840. However, the calculation is somewhat problematic. A kerchief is estimated to correspond to 1.5 ells of fabric (around 90 centimetres). In reality, kerchiefs varied in size, which is not evident from the factory reports. Due to changes in the relative proportion of kerchiefs to the entire production, this calculation is of great importance. The diagrams do not indicate any significant influence by the varying economic cycles.

171 Nordiska museet NM 116 294. "September 1852: Felldin, miss 20 inches Satin. obs. Felldin had a loom at home." "vinderskan Widmark (har egen möhl) [Woman winder Widmark (has her own silk throwing mill)] Maria Quarngränd No. 7 Noted in July 1853".

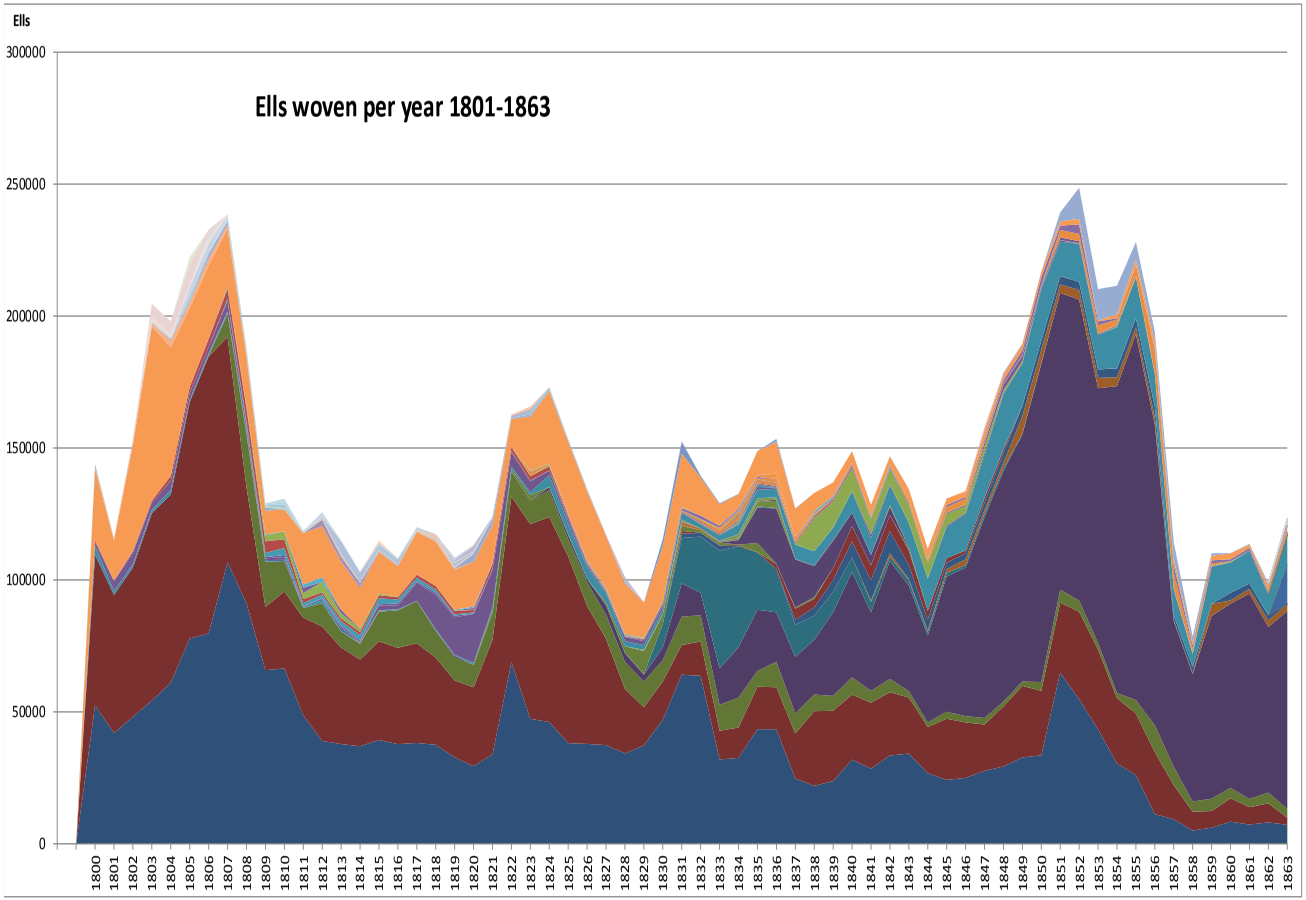


Diagram 6. Annual production of silk fabrics manufactured by the ell (excluding silk kerchiefs, bonnet silks, waistcoat silks, ribbons and silk yarns), measured in ells (after 1859, recalculated from feet), 1801-1863. Blue= Taft ('taffeta'), brown= Satin, green= Levantin, violet= Gros de Naples, orange= Flor ('gauze'), light blue= Sarge de soie.

3.4.1.3 Composition and volume of the production

Specific qualities of fabrics were reported until 1863: afterwards, production was only specified as fabrics and kerchiefs ("dukar"). Around 75 silk products with different names have been documented. The Swedish ell was 0.593 808 metres and was used in the reports until 1858. After that, volumes were reported in feet (2 feet = 1 ell) and from 1889 in metres. In 1877-79, production was reported in weight, pounds (1 pound = 425 grams). The production volume of fabrics cannot be compared in the same diagram as that of kerchiefs, apron fabrics, waistcoat fabrics and bonnet fabrics, as the latter were reported only in pieces.

The production volume graph in Diagram 6 follows the economic cycles (compare the first part of Diagram 1). Many products were produced merely for a short time and only in small quantities. The diagram cannot show all the smaller products, but the change in the composition of the production is clear. Three periods can be discerned: Before 1830, a few large products dominated. Between 1829 and 1845 there seems to be a more varied production comprising several products. After 1845, one product dominated the production. The three periods probably represents different specializations of the production under the influence of technological changes and market development.

Diagram 7 shows, as do Diagram 6, a change in the breadth of the production. The 1830's, when the silk industry expanded and the Jacquard machine was introduced, comes through as

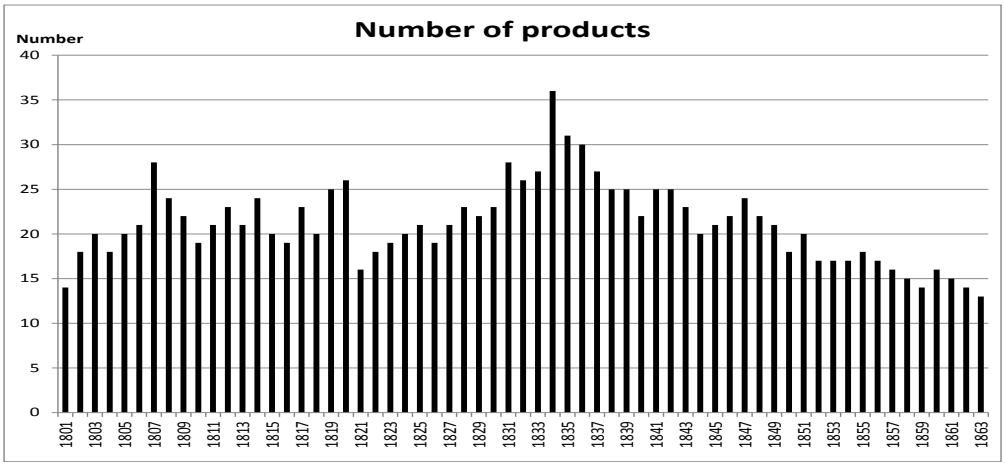


Diagram 7. The number of different silk products (ribbons and silk yarns excluded) per year, 1801-1863.

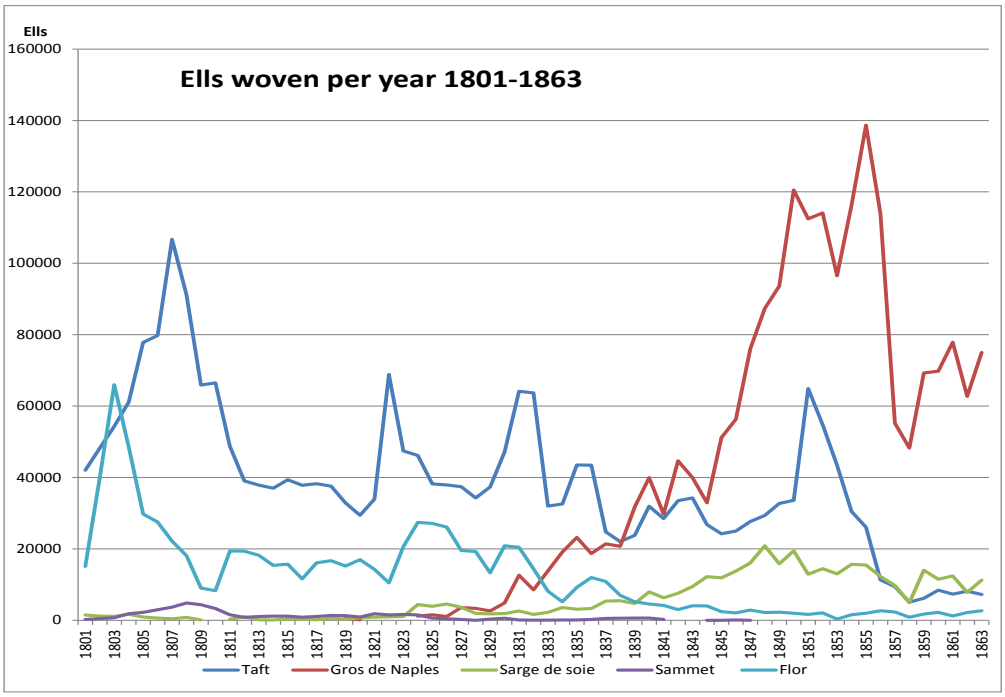


Diagram 8. Examples of changes in the production volume for some large and significant types of silks, measured in ells per year, 1801-1863.

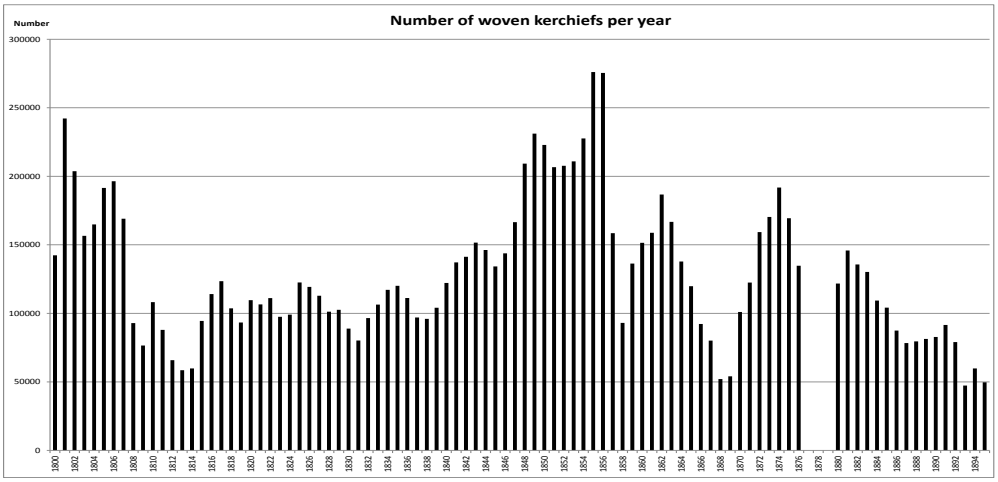


Diagram 9. The number of woven silk kerchiefs per year, 1801-1895.

a period with a broader production, whereas the 1850's and 1860's brought about a decrease in the number of products. It is possible, however, that the great variety at the middle of the diagram is in fact an effect of the factory reports having been kept with great care and detail during this period. Varying economic cycles are not reflected in this diagram and appear not to have any effect on the number of products.

Diagram 8 shows changes in the production volumes of the largest products. Except for variations in the economic cycles, it shows how some products increase and some decrease in volume during the period. These changes depend mainly on the variations in fashion and in the Swedish market for silk fabrics.

Silk kerchiefs were reported in pieces. (Diagram 9) During the first years of the 19th century, different types of kerchiefs are specified, e.g. gauze kerchiefs, Sarge kerchiefs and Damask kerchiefs. From 1809, all kerchiefs are categorized as "dukar", despite the fact that kerchiefs is a product group consisting of several different products and sizes with different values. The production of kerchiefs was largest during the 1840's and 1850's. Despite a decreasing number of mills, the production volume increased during this period. The variations of the economic cycles are clearly indicated by the graph. The breaks in the graph are years when the production of silk was reported in weight.

The reporting of products does, however, come with some questions looming. In 1847-55, manufacturers who had been granted a letters patent for silk-weaving are mentioned whether they reported any production or not. Sometimes a mill did not submit any statement on production for a few years. It is unclear whether this depended on there being no production or whether it was due to negligence in submitting the report - a complaint sometimes voiced in the introductory texts. On the other hand, at times there are reports of mills, which were considered to have closed down, stamping goods long after they were supposed to be out of business. This may possibly be explained by owners selling off old stocks, another possible explanation being that a new owner selling the stocks of a closed down mill.

The designations and names for the products are many. The spelling varies and sometimes confuses the reader. It is possible that some product designations changed its meaning or that fabrics changed names during the period. The product designations in the factory reports appear to have followed some form of template drawn up by the bureaucrats at

Kommerskollegium. Preserved fabric samples with product designations from the Barnängen mill and Liné's mill do not correlate entirely with the terminology of the factory reports.[172] This means that e.g. the fabric designated "Parasoletyg" by the silk weaver Liné probably have been placed under the heading "Taft" ('Taffeta') in the factory report. Patterned silks of Swedish manufacturing are mentioned in newspaper articles and accounts from industrial exhibitions, although they are not specified in the factory reports.[173] They are likely put under the headings "Taft", "Satin" or "Gros de Naples" in the factory reports because they are called "Façonerad Taft" ('Patterned taffeta') and "Façonerat Gros de Naples" ('Patterned Gros de Naples') in the other sources. Thus, from the factory reports, it is not possible to determine with any certainty how much of the production was made up by plain or patterned fabrics.

3.4.1.4 Value of the production

By compiling the production value, changes in the volume and composition of the production can be compared throughout the 19th century. In 1855, a currency reform was carried out and shows up in the factory reports in 1858, when there was a transition from "Riksdaler banco" to "Riksdaler riksmynt" when calculating product values. One "Riksdaler riksmynt" equalled 2/3 "Riksdaler banco". In 1873, there was a transition into "kronor" which, however, took place without any change to the rate.

The currency reform of 1858 is the reason for splitting Diagram 10 in two. The graph reflects the revaluation of the production in 1814 and, thus, does not correspond to a real production increase for this year. It has not been able to trace any other revaluations (compare Diagram 12). The breaks in the curve reflect lapses of reporting and the years where the entire production has been represented in a single figure. The figures for the silk yarn production are uncertain after 1858 as they sometimes appear to refer also to the dyeing of silk yarn. In the calculation of the value of the ribbons, it has not been possible to separate silk ribbons from ribbons of other materials. However, the value of the latter was so low compared to that of the silk ribbons that they do not influence the figures to any great extent. The production value follows the variations of the economic cycles, the depression years of 1809, 1858 and 1867 are clearly discernible in the graph.

172 Samples from the Barnängen mill in the Eneberg collection, Inv. No. 11.183-11 Textilmuseet, Borås. Linés book, Nordiska museet NM 116 294

173 E.g. "Expositionen af svenska slöjdalster Stockholm 1840", *Post och inrikes Tidningar* 1840-08-01.

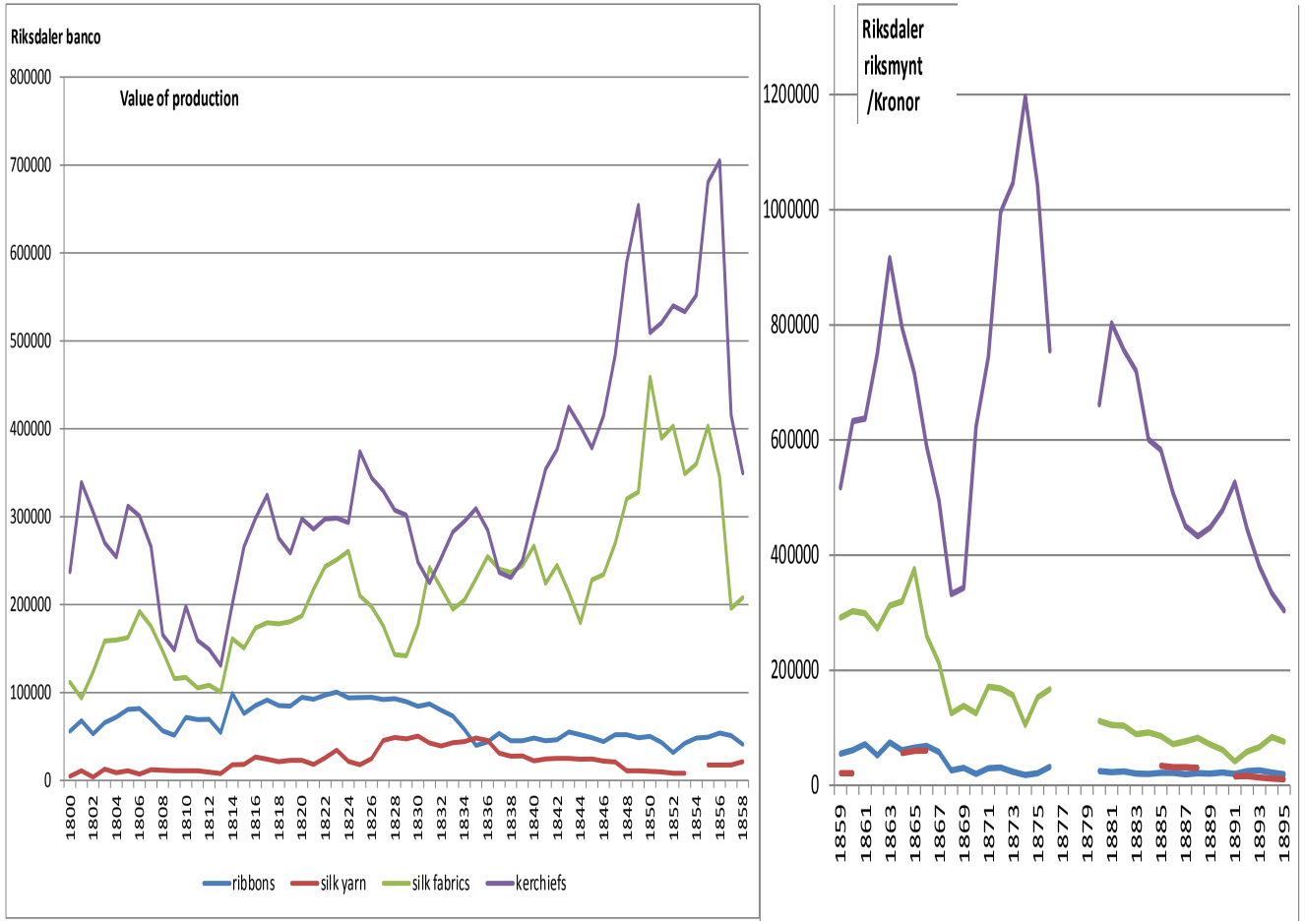


Diagram 10. The production value of silk kerchiefs, silk fabrics, silk ribbons and silk yarns, 1801-1895.

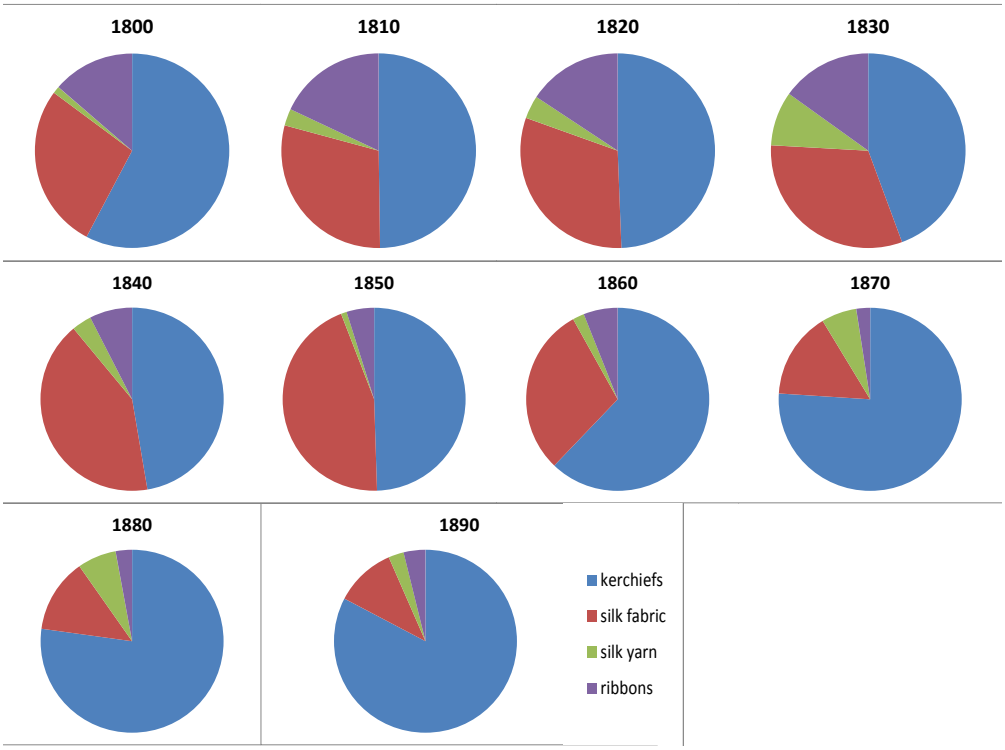


Diagram 11. The distribution of the total production value between silk kerchiefs, silk fabrics, silk ribbons and silk yarns, 1801-1895.

By comparing the distribution of the value between the main product groups of the silk industry, an overview of the change taking place in the industry is provided. (Diagram 11) This does not show any clear correlation to variations in the economic cycles.

By dividing the number of ells with the value per product and year, the value per ell can be calculated up until 1863. The compilation in Diagram 12 shows the different values of some silks in correlation to one another and also changes in price during the period. The value after 1858 has been recalculated from Riksdaler banco to Riksdaler riksmynt. Small changes likely stem from rounding errors. The great leaps may be due to calculation errors. In 1814, the value was recalculated. This brought with it an increase in value for most of the fabrics, although not all of them. In 1859, in connection with the transition from riksdaler banco to riksdaler riksmynt and from ells to feet, it seems the calculation of the value has

caused confusion among both the manufacturers and the bureaucrats. Any general increase in the value does not show up in the diagram until possibly after 1859. However, the value of "Satin" changed compared to that of other fabrics, which may be interpreted as a change in quality (i.e. thicker satin qualities were more common in the mid-19th century compared to the beginning of the century).

The values stated for the fabrics in the factory reports are only estimates. It cannot be determined whether it was the manufacturers or the bureaucrats who estimated the value of the production. The mills ought to have had their own accounting for their sales, independent from the factory reports. Wholesale and retail prices were different and can be found on receipts and samples in fabric sample collections. Also, the stated values of the products are made up by different values, different sorts of the same quality, e.g. thinner and thicker

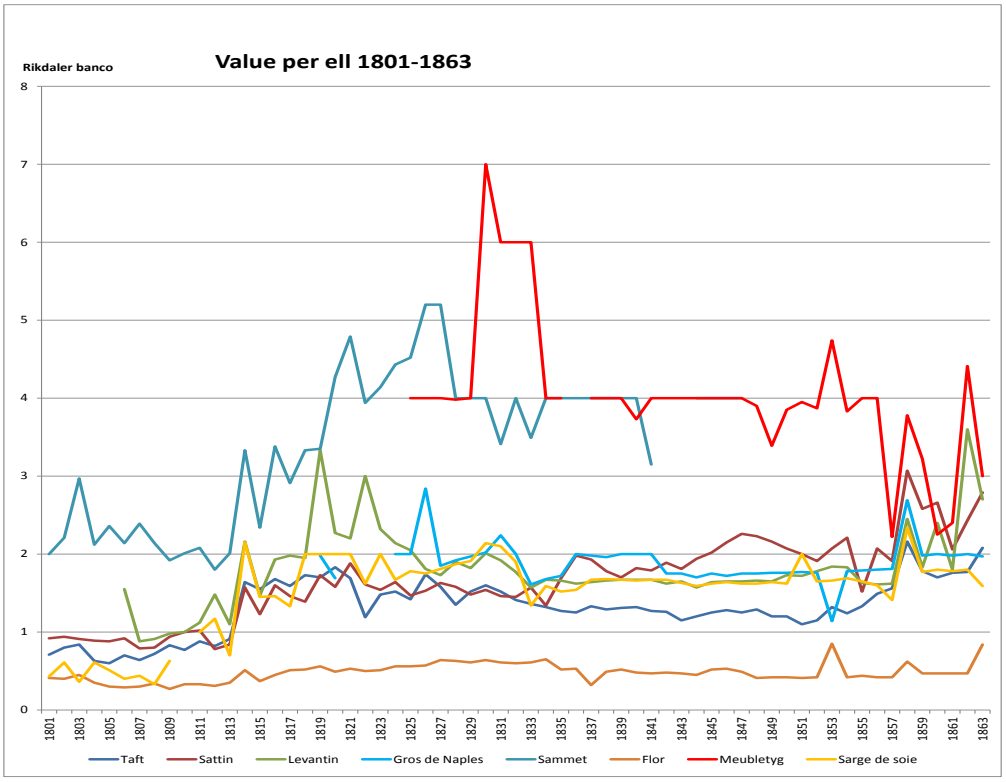


Diagram 12. Calculated value per ell, 1801-1863.

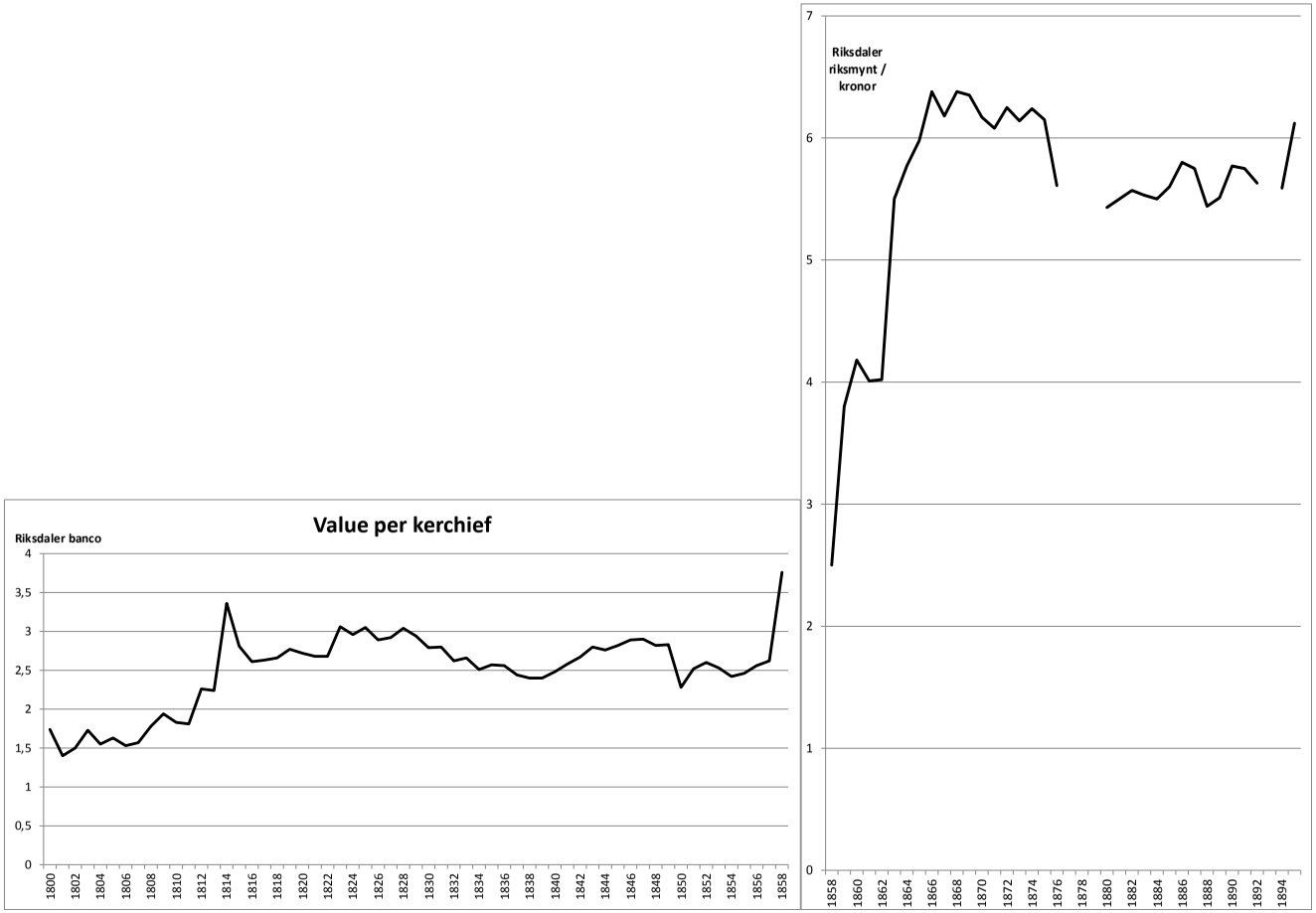


Diagram 13. Calculated value per piece of silk kerchiefs, 1800-1895. The diagram is divided and adjusted so that 1 Riksdaler banco equals 2/3 Riksdaler riksmynt.2/3 Rilsdaler riksmynt.

taffeta of different widths. This may be one reason why the standard price varies for the same quality. Only once, in 1814, a revaluation is mentioned in the text of the factory reports. This revaluation is visible in the diagram as well. The factory reports do not appear to provide any information of value on the price changes for silk products which ought to have occurred during the 19th century. The diagram is useful mostly because it shows the different values of the fabrics in relation to one another.

It is possible to follow the value of kerchiefs throughout the 19th century. Diagram 13 shows that the value undergoes major changes. However, as was mentioned above, several kinds of kerchiefs with different values have already been combined in the reports of the mills. Thus, the factory reports do not provide any information on whether a change in the production of kerchiefs occurred. The one change the diagram does indicate is just as likely to be a general increase in the price of kerchiefs as it is a result of the kerchiefs manufactured at the end of the century being larger and thicker. For example, a greater portion of large and thick kerchiefs in the production would change the diagram without reflecting a real change in prices. It is also possible that the change in 1858-66 depends on changes in the way the value was calculated, as the increased value in 1814 did. These doubts will also affect the interpretation of the total production value in Diagram 10. The information in the factory reports regarding value should be used with great care in the drawing of conclusions regarding the prices of products and the profitability of the industry.

3.4.1.5 Summary of factory reports

When compiled, the factory reports provide a good overview of the development of the silk-weaving in Sweden during the 19th century. The factory reports shed light on economic cycles and economics, but also on changes in the composition of the workforce and the production. Some aspects are clearly affected by varying economic cycles, such as the number of workers and looms and the production value, while others, such as the size of the mills and the composition of the production, reflect changes in the silk industry that are not directly affected by varying economic cycles. The overall picture inspires confidence, but detailed information such as product designations, the value of the products and the equipment of the mills cannot be used without support from other sources.

3.4.2 Other archive material

3.4.2.1 The archives of Hall och Manufakturrätten

In addition to the factory reports, the archives of Hall och Manufakturrätten contain reports of the proceedings, registers of workers, documents regarding privileges, and registers from the period 1740-1846.

Although the reports of the proceedings of Hallrätten are very extensive, they are very difficult to read. They contain files and verdicts for cases where silk weavers were involved and in these it is possible to find details on technological development, products, factory buildings, and the organisation of the production. Finding these, however, requires reading of a vast amount of text, most of which is irrelevant to the research questions. The reports are entered in a diary ordered by the names of the disputants, but not by the cause of the case. The only investigation method applied for this material has been sampling, which did not yield any results.

In the registers of workers ("Förteckningar över arbetare"), which were submitted by the factories as basic data for the factory reports drafted by Hallrätten, there is often address information regarding the owner of the mill. They do not always state, however, if it is the address of the owner's residence, office or of the mill itself or if these were located on the same premises (which was common, although not a rule). It is particularly interesting that the registers hold the names and tasks of the workers. Among those, the silk manufacturers are often stated as masters, foremen or journeymen either before they started their own business or after closing it down to take up employment at another mill. Sometimes there is more detailed information about looms and tools in the statements than what was included the factory reports, such as which techniques were woven on particular looms and the widths and numbering of the looms. Until freedom of trade was introduced in 1846, all looms used by the manufactories were given consecutive numbers which were to be woven into the end markings of all fabrics together with the initials of the manufacturer.[174] Unfortunately, the records that probably existed over the looms and their numbers have not been found.

The documents regarding privileges provide information on the name of the manufacturer and the products covered by the letters patent. This information is of less value to the

174 *1700-tals textil*, p.254.

investigation, because the factory reports show that all who were granted letters patent did not use them to their full extent. In the register, which is connected to the letters patent, the uncertainty of the localization of the mills depends on the letters patent often being granted prior to the start-up of the business (e.g. it is stated that K.A. Almgren lived in Stadsgården, whereas the first mill was started in Svartensgatan on the same year). However, the registers sometimes also state the landlord of the holder of the letters patent, which may provide clues for the location of the mill.

3.4.2.2 The archives of Kommerskollegium

The archives of Kommerskollegium contain minutes, correspondence and central directives that applied to the manufactories and thus also the production of silk in the 19th century. In addition, there are documents regarding customs and trade restrictions where different silk products are mentioned and fabric samples sometimes have been preserved. The minutes of the Kommerskollegium are entered in a diary sorted by subject and are thus easy to survey. Although the material has only been investigated through sampling, it has yielded interesting results, e.g. about the design of the hall marks, which may be interesting to the dating of stamped silk kerchiefs.

3.4.2.3 Address directories

Printed address directories for Stockholm are available from 1855 and onwards. They provide information on the addresses of the companies, often to their offices, sometimes to the shop where the products were sold, but not to the mill itself if it was on another address.

3.4.2.4 Land register

If the manufacturer owned the lot where the business was situated, his name is in the land register (“Fastighetsregister”). If he instead rented the premises, there are no traces in this register. The register is based on lot numbers and not on the name of the owner, which means the starting point for the search has to be founded on information from another source.
In some cases, the mill sites found through the land register can be traced forward and backward in time, giving information about ownership changes through selling or inheritance of property.

3.4.2.5 Census papers and census records

All who are registered at an address for census purposes are recorded in the census records ("Mantalslängd"). Many of the workers in the silk-weaving mill were registered at their mills. This is why there are often notes in the census records and, most importantly, in the census papers ("Mantalsuppgifter"), i.e. the statement submitted by the owner of the property regarding the employers, tenants and sometimes businesses on the premises. The census records are bulky volumes and the archive has been weeded so that prior to 1862, only the records from certain years remain.[175] The census papers have been preserved only from 1835 and onwards. The records for some of the years have been photographed and are digitally searchable through the databases of the Stockholms stadsarkiv.[176] In the census papers for 1835 regarding master carpenter Blom of the Häcklefjäll district, it is e.g. noted that silk manufacturer Almgren was his tenant and that "At the next property: No. 22, old No. 5, there are silk mill halls but no living space".[177]

3.4.2.6 Applications for building permits

Several silk mills are found in applications for building permits ("Byggnadslovshandlingar"). There are drawings of both the façade and the floor plan of buildings for silk mills which sometimes have been altered or torn down since then. (Fig. 49.) It is, however, not always clear if the house was built according to the plan. Parts of this material have been photographed and are digitally searchable at the Stockholms stadsarkiv. The building permit documents have been organized after property, but the digital database allows searches for the name of the builder. However, this material is not comprehensive, because all the buildings are not registered and far from all silk production was carried out in buildings built especially for this purpose.

3.4.2.7 Fire insurance inspections

There is a lot more information to gain regarding the premises of the silk-weaving mills through the inspections performed in connection to the taking out of a fire insurance policy. The archives of Brandkontoret ('the Fire office') contain documents from 1746 until the

175 1800, 1810, 1820, 1830, 1835, 1840, 1845, 1850, 1855 and 1860.
176 Mantalslängd: 1810, Mantalsuppgifter: 1835, 1845, 1860, 1870. http://www.ssa.stockholm.se/Anvand-arkiv-en/Folkbokforing-och-mantalsskrivning/Register-till-mantalsbocker/ (viewed 2012-09-07).
177 SSA Mantalsuppgifter 1835, Katarina norra, nr. 1347.

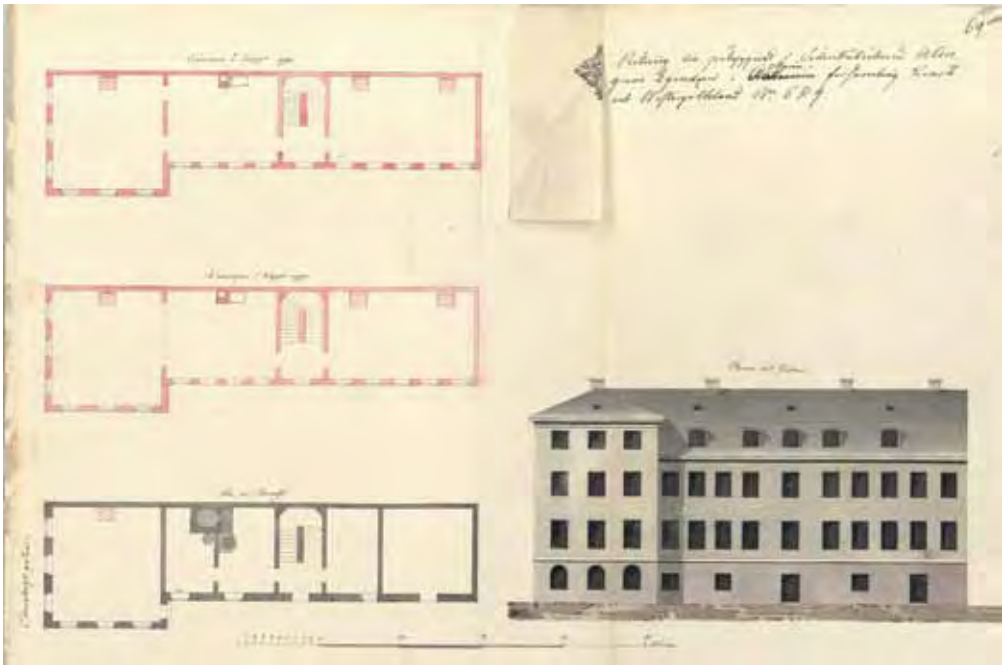


Fig. 49. Almgren's first mill at Repslagargatan, application for building permit 1846:69, SSA

1950's and most documents in the archives have been scanned and are digitally searchable.[178] The inspection inventory reports drawn up when the insurance was taken out and updated at fire inspections are sometimes very detailed. The reports state the building materials and the sizes of the houses, sometimes the functions of the rooms such as "work room" or "factory hall" and in some instances ceiling height and the number of windows. Often the coverings of the ceiling, roof and walls both inside and outside are described. Inventories such as machines are only entered in the reports by way of exception. Despite this, it cannot be determined with certainty what kind of business operated on the premises, even though it is possible to differentiate between rooms serving as living spaces, having wallpapers and stoves, and factory halls. The insurance is connected to the property and thus care has not always been taken to note the name of the owner and the names of the tenants are never registered. All properties did not hold fire insurance, but the material covers most of the silk manufacturers.

178 http://www.brandkontoret.se/SV/63/historiska-arkivet (viewed 2012-09-07).

3.4.2.8 Bankruptcy documents

Bankruptcy documents (“konkursakter”) regarding silk manufacturers in the archives of Rådhusrätten are sometimes very detailed. In addition to information on the financial network of the manufacturer and personal belongings, they also contain inventoried assets, where stocks, tools and looms sometimes are carefully specified and written down, as well as tenancy agreements and bills for materials and services rendered. Bankruptcies from 1767 to 1846 are searchable in a database created by Stockholms stadsarkiv.[179] Out of these, around twenty hold documents regarding manufacturers of silk or silk ribbons. The material provides detailed insights into the equipment and organisation of the silk-weaving mills and contains Swedish words and terms connected to silk-weaving. The tenancy agreements may provide information on the location of the mills. The furnishing and equipment of the mills may be described through bills for services rendered and purchases of tools and inventory. Inventoried stocks, sales on commission and bills for the purchase of raw materials and products contain information on prices and product designations for silks and also terms and estimated values of machines and looms. There are examples of purchased ”façoner”, i.e. designs for kerchiefs. It is, however, uncertain whether the businesses going into bankruptcy were typical of the industry and, obviously, K.A. Almgren Sidenväveri is not in this material as it never went bankrupt. The archives are not comprehensive for the silk industry, although at certain points they provide very detailed information that cannot be found in other sources.

3.4.2.9 Estate inventories

When a person deceased, an estate inventory (“Bouppteckning”) was drawn up prior to the distribution of the estate.[180] Most of the silk mills were family businesses and were thus registered as assets in the estate inventories. Estate inventories from the first half of the 19th century may, as with the bankruptcy documents, contain detailed inventories of real estate, factory halls, machines, tools and stocks of products and raw materials and also reflect on the financial network of the manufacturers through debts and claims. Stockholms stadsarkiv has created a register where estate inventories are searchable through names and date of death, which may be compared to the names of the manufacturers and the active years of the mills in the factory reports. Random sampling has shown that silk manufacturers who had ceased reporting their business activities to the authorities sometimes still owned tools and stocks.

179 http://www.tidigmodernakonkurser.se/index.php (viewed 2012-09-07).
180 Estate inventories from 19th century Stockholm are registered and available at the SSA.

However, in some estate inventories the inventories of the mill are not recorded in detail. In the estate inventories of K.A. Almgren and Oscar Mauritz Almgren from 1884 and 1910, the mill is recorded only by an estimated value. The material is far from comprehensive, but may provide detailed information on the equipment and production of the silk mills.

3.4.2.10 Almgrenska släktarkivet

In the part of Almgrenska släktarkivet (the Almgren family archives) kept at Riksarkivet there are sporadic documents from the period between the 1820's and 1870's. [181] It contains the letters patent for the mill from 1833, one part of K.A. Almgren's textbooks from Lyon 1829, several travel diaries, a large number of private and official letters, and Almgren's own "biographie" in the form of a list of keywords. A number of letters from L.G. Horngren, the pattern constructor of Sidenfabrikssocieteten, vividly relate the Paris exhibition in 1855, where K.A. Almgren Sidenväveri exhibited the woven portrait of King Oscar I. The material provides detailed information on K.A. Almgren and his silk-weaving mill and may function as a complement to other information sources.

3.4.2.11 Receipts in the palace archives

The palace archives ("Slottsarkivet") contain receipts for fabrics for interior decoration and fabrics commissioned for coronations and other official ceremonies. Kerstin Wölling has compiled the receipts for silks in the archives at Stockholms slott (Stockholm Palace), but there are separate archives for all the palaces and the royal family also made private purchases for which the receipts have not always been preserved. Several researchers have made use of this material.[182] The receipts sometimes provide information on the name, price and use of the fabric, information that may be compared to and used to fill out the information from the factory reports and to identify preserved fabrics and furnishings. It is difficult, however, to paint a complete picture of the royal consumption of silks due to the material being spread out, not all of it having been preserved and insufficient systematization.

181 RA, Person- släkt- och gårdsarkiv nr 79, transferred to Riksarkivet in 1977 by Erik Almgren.
182 Among others: Christan Laine (red.), *Rosendals slott* p.76, 221. Rangström, Lena, *En brud för kung och fosterland: kungliga svenska bröllop från Gustav Vasa till Carl XVI Gustaf.* Ekstrand, Gudrun, *Kröningsdräkter i Sverige*.

3.4.2.12 The archives of Sidenfabrikssocieteten

The archives of Sidenfabrikssocieteten only consist of a few volumes and capsules.[183] They have been used by Lindgren-Fridell and Bergström.[184] The minutes cover the years 1828-1905, but are most substantial up until the 1850's, during the period when the silk-weaving industry was at its largest and the members convened twice every year. The accounts from 1820-67 mainly mentions membership fees and costs for the finishing mill run by the society. The minutes contain letters of complaint and negotiations on pensions, information on the pattern constructors and sporadic information on production and the organisation of the silk industry. The material is closely connected to the silk production and may complement other sources regarding some details.

3.4.2.13 Catalogues and accounts from the industrial exhibitions

The Swedish silk-weaving mills participated in several handicraft and industrial exhibitions which were held in Stockholm between 1823 and 1865 and also in the 1897 Stockholm World's Fair, the 1909 art and industrial fair in Stockholm, and the 1914 Baltic Exhibition in Malmö. They were represented at the World's Fairs held in e.g. London in 1851, Paris in 1855 and 1900, and in Chicago in 1893. At the printed letterhead and receipts of K.A. Almgren Sidenväveri, medals won at the exhibitions are depicted. Catalogues and accounts from the industrial exhibitions contain information about the silk products and the new technology exhibited. It is not certain whether the items displayed at these exhibitions are typical of the production in general. The selection is more likely to reflect the most advanced technical capacity of the silk-weaving mills and ideas regarding the industry and production of the 19th century. This will be interesting when the material is compared to other textile sources and written sources which speak more of the production in general.

3.4.2.14 Notes and archives at SKAASoM

Very little of the archives of K.A. Almgren Sidenväveri prior to 1880 have been preserved and no accounting at all. Apparently, the main part of the archives was not kept at Repslagargatan and has been lost. There is a small possibility that the Almgren family still has this kind of material among their private possessions. The things that have been

183 The archive is located among Skråhandlingar, Nordiska museets folkminnesarkiv.
184 Lindgren-Fridell, p.107-144. Bergström, 2007.

preserved mainly belong to the production activities of the mill. Except for fabric samples, factory books and disposition books, technical drafts and design drafts, which have been described above, there are instructions, calculations and sketches of different tasks such as warping, threading, tying of warp, and finishing. Most of these notes were probably made by foreman Erik Holmberg, active between 1890 and 1948. The material is not systematised and can thus only provide glimpses of the knowledge of the working processes documented. Despite the fact that the notes most likely were written during the 20th century, they may shed light on the production during the 19th century because silk-weaving in Sweden was very tradition-bound.[185] They may be compared to the textbooks in silk-weaving above and provide detailed information about silk qualities, technology and terminology.

3.4.2.15 Factory books 1896-1974 for K.A. Almgren Sidenväveri

The factory books ("fabriksböcker") provide detailed information about the composition and volume of the production, the colours, materials and designations of the products, which looms were used for different products and who among the women weavers were involved in the production of what products, when warps were set up and cut down, etc. The information regarding running metres have been excerpted by Kerstin Wölling and have been inserted into a database (information on kerchiefs is pending).[186] Unfortunately, the factory books only depict the period of decline for the silk industry, but contain information on techniques and production that can be used in discussions on earlier conditions.

3.4.3 Summary of written sources

By compiling and comparing address information from the registers of workers, registers and letters patent from Hallrätten with information from address directories, land registers, census papers and fire insurance inspection reports, it is possible to locate most of the 119 names on the list of silk manufacturers who were registered in the factory reports during the 19th century. Using older maps, it is possible to indicate where the silk-weaving mills and ribbon-weaving mills were located in Stockholm by marking the locations on a modern map. Where lot boundaries, streets and the numbering of houses have been changed, it may sometimes be difficult to find the exact property with only an address to go from, but the approximate location may be indicated. It is thus possible to follow factory premises as

185 Nyberg (red.), 2012 in print, p.125-126.
186 Sjösten Wölling 2008 och 2010.

they were taken over by new manufacturers, which is not evident from the factory reports. The fire insurance inspection reports and the documents regarding building permits provide an opportunity to calculate the size of the factory halls. The ceiling heights of the halls are interesting because the Jacquard looms were higher than the treadle looms and the draw looms.

All written sources provide knowledge on contemporary terminology regarding textiles and tools. Several of the written sources provide only random images which are very detailed but are meaningful primarily when put into a context and combined with more comprehensive source material, such as the factory reports. On a lucky day, bankruptcy documents and estate inventories may provide information on the inventories and machines of the mills to complement the later dated notes of Holmberg in the archives of K.A. Almgren Sidenväveri. The factory books provide much more detailed information on the production than the factory reports do and are complemented by the fabric sample collections, which were described above. Receipts in the palace archive provide the clients' and silk consumers' perspective, while the industrial exhibitions and the letters in Almgrenska släktarkivet demonstrate how the silk industry in Sweden presented itself and how it was received by its contemporaries. The archives of Sidenfabrikssocieteten, the reports of the proceedings of Hallrätten and the archives of Kommerskollegium represent the authorities' involvement in the silk production in the 19th century.

4. SUMMARY AND DISCUSSION

4.1 THE EMPIRICAL MATERIAL

4.1.1 Textiles and Texts - possibilities and problems with the different kinds of materials

4.1.1.1 Textiles, tools and other objects

Artefacts are concrete expressions of history. They can be ordered, described and analysed to provide knowledge on materials, technological development, changes in fashion, consumption and market and show the industrialization process in Sweden from higher-level perspective. The technical analyses of textiles lay the foundation for processing this material. These analyses require practical and theoretical knowledge from the field of silk manufacturing and the use of a specialized terminology. This will possibly make the presentation difficult for researchers who do not come from a textile background, but in the comprehensive analysis, which will be presented in the PhD thesis, the technical details will not be an objective in themselves but constitute arguments in the discussion.

The material from K.A. Almgren Sidenväveri is rich and is composed of a number of different types of sources. However, it primarily represents the last part of the 19th century and the beginning of the 20th century, when silk-weaving was in decline. It is uncertain how much of the material is older, because it contains few objects which can be dated with certainty to the 1830's and 1840's. Not until 1896 can the material be considered even somewhat complete. The corresponding material is, however, missing entirely for any of the other Swedish silk-weaving mills, why the material from K.A. Almgren Sidenväveri is very valuable. It also apparent that silk-weaving in Sweden during the second half of the 19th century was a very conservative industry. Thus, the material largely sheds light on older conditions and illustrates, nuances and makes concrete the information in the written material. The specific combination of different types of sources, ranging from design drafts to machines and textiles, makes it possible to follow the entire production chain. It is problematic that parts of the collections at SKAASoM still have not been catalogued and thus are difficult to refer to in an exact manner.

The rest of the textile material is spread over the 19th century, but is not comprehensive. Plain fabrics are found primarily in the fabric sample collections. They are important

because they provide reliably attributed examples of this significant part of silk production in Sweden, which otherwise would appear to be anonymous due to the fact that plain fabrics rarely can be identified as Swedish once sewn into clothing. The plain fabrics primarily represent a textile consumption of the bourgeoisie class of the cities, which so far has not been explored to any great extent. Fabric sample collections also provide concrete connections between textiles and terminology, which nuance the written material. The sometimes contradictory terminology in fabric sample collections, textbooks in silk-weaving, technical notes, factory reports, and other written sources and printed product dictionaries illustrate the problem of the same fabric being referred to in different ways by manufacturers, retailers and users. The technical analyses of preserved silk fabrics may in many cases provide an exact definition of a product name and constitute an argument in a critical analysis of the information in the written material.

Silk kerchiefs were the most important product of the silk industry in Sweden. They constitute a voluminous material spanning the entire century. They may be dated through the use of technique, style, colour, hems, fringes and through their stamps and thus reflect development in both technology and fashion. The preserved kerchiefs appear to be more varied in comparison to what the information in the written sources suggests and also shed light on consumption, market and distribution of the products of the silk industry in Sweden. The older, colourful kerchiefs dominate in several museum collections due to their connection to the folk costumes, while the younger, black kerchiefs dominate in private collections. This is partly due to the black kerchiefs being manufactured later during the 19th century, but also because they belong to the bourgeoisie costume and the so-called folk-fashion (clothes without regional characteristics worn on the countryside), which for a long time did not attract much attention from the museums.

When the patterned clothing silks were sewn into clothes, they very rarely retained markings showing that they were made in Sweden and the same goes for the plain fabrics. It is most often a coincidence when one is able to recognize a pattern from the samples in a preserved garment. Except for the Damasse fabrics and the necktie fabrics at SKAASoM, which are from the end of the 19th century, there are few examples of patterned clothing silks made in Sweden. However, the preserved examples show that such fabrics were produced although they cannot be traced in the factory reports. The textile material thus points to a flaw in the value of the factory reports as sources, but due to the limited extent of this material it cannot

answer the question of how important this product was to silk-weaving in Sweden on the whole.

Samples of Swedish silk ribbons are scarcely found in the fabric sample collections. Although the existing ones cannot be safely said to represent the entire production in Sweden, they provide important information on appearance, designations, techniques and finishing which cannot be found in the written sources.

The woven images, together with the waistcoats with woven text and the political devices, constitute marginal products of the silk industry in Sweden which, however, is very interesting to study. The objects have been preserved mostly due to their connections with historic figures and events. Already in their own time, they obviously represented manifestations of advanced technology and came to be used for both political and commercial purposes.

4.1.1.2 Textbooks in silk-weaving

Textbooks in silk-weaving constitute a series that reflects education during the 19th century. They contain both text and textiles. They provide an ideal image of the knowledge of the silk weavers, but do not say much in the way of production and terminology in Sweden. They are, however, an extraordinary reference to international terminology because they are very exact and are written by silk weavers, unlike the factory reports and Swedish product dictionaries.

4.1.1.3 Written sources

The factory reports cover the entire period and they provide a good overview of changes in the production, the number of workers, the number of mills and the economic development. The great advantage of this material is that it is continuous, easy to survey and that it contains information which may be compiled into diagrams. The factory reports form a framework with names of manufacturers and products, against which other written and textile material may be contrasted, act as complements, and provide in-depth perspectives.

The factory reports have, however, been kept with varying degrees of exactitude, partly due to the different political directives governing the bureaucracy in the 19th century and thus

their value as sources vary. They must be seen as bureaucratic products rather than exact sources of information. Until 1863, all the different qualities and products were registered, whereas after 1863 the only distinction made is between silk fabrics and “dukar”, i.e. silk kerchiefs. In the factory reports from 1800-63, there are 75 different names for silk products registered. Several names of fabrics are only mentioned a few times, others may refer to the same products but are given new names to appear more modern, still others may represent different fabrics which were combined under one heading. This information will thus have to be examined in connection with the textile material. Colour information is entirely absent in the factory reports and variations in quality and designation were obviously greater than what has been stated in the reports. One major issue regarding source criticism is the value of different products. The values stated in the factory reports are only estimates and are not to be considered real prices. The mills did their own financial accounting regarding prices and sales, nothing of which have been preserved, not even at K.A. Almgren Sidenväveri. From the factory reports, any discussion on prices can only become a comparison between different fabrics to show which fabrics were expensive and which were cheap. In order to approach an answer, comparisons can be made with the estimated value of stocks in estate inventories and real price information found attached to some of the fabric samples, receipts for furnishing silks, and notes on labour costs in the Eduard Liné book. Although the numbers of workers and looms are stated in the factory reports, it is precarious to discuss rationalizations based only on this information because the factory reports do not say if all the workers were full-time employees and to what extent some parts of the production were carried out through putting-out work. Information from the Eduard Liné book indicates these phenomena and the factory reports are complemented in part by the “registers of workers” which is the basic data submitted by the mills. They contain e.g. address information, but are only kept until 1846. From the names in the factory reports, the manufacturers can be found in the fire insurance archives, with detailed information on the location, layout and size of the premises. Census records and census registers, land registers and the fire insurance archives cover the whole of the 19th century and the majority of the silk-weaving mills, although sometimes it is difficult to find all the information due to the fact that ownership has not been registered in the factory reports.

Although the other written sources are fragments, they are at times very detailed. In some cases, bankruptcy documents and estate inventories provide information on tools and stocks. Receipts sometimes give information on terminology, colour, price and the use of silks. The technical notes from K.A. Almgren Sidenväveri are sometimes very detailed but belong to the final days of the silk industry.

4.2 THEORY AND METHOD

4.2.1 Objects as sources

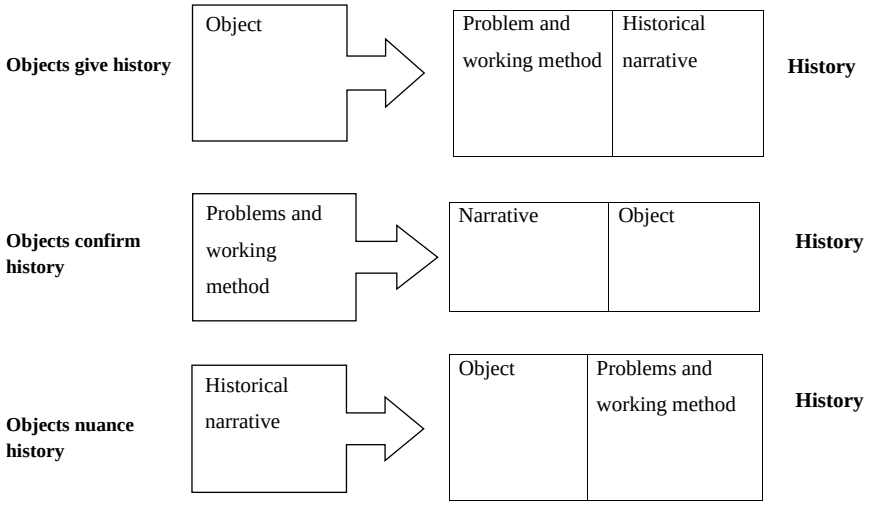
A substantial part of my research project consists of examinations and analyses of objects. If the examination only becomes descriptive and focuses on examining the object in itself and all its details, without ever arriving at the whole picture, i.e. the historical narrative, my research will be difficult to defend. The historical narrative is the larger context that sheds light on the relationship between man, material, technology and society. As an object-oriented researcher it is easy to lose oneself in the description of the objects. How do I avoid this situation? Distance and reflection are needed in order to reach reasonable results. Objects have something to tell, but they will not do so without interpretation. They must be analysed both in regard to technical details, form and function, but also interpreted against their societal context. Only in this way can they become part of the narrative about Sweden in the 19th century.

"Material culture" is a concept used primarily by historians about a field of research where the study of objects replaces or complements written sources, which normally constitute the primary research material of the historian.[187] In his article "Things that shape history: Material culture and historic narratives", Giorgio Riello analyses three examples of how objects may be used in different ways to ask new questions, challenge established truths, and formulate new interpretations in historical research.[188] He summarizes his analyses in a table with three approaches to object studies: "history from things", "history of things" and "history and things". The table is not a template for how to conduct research, but rather a reflection on different ways in which object-based research may contribute to the knowledge of history. He concludes that research bears fruit when object, methodology and the historical narrative are allowed to interplay.

187 Auslander. Leora, *Beyond words.* Grassby, Richard, *Material Culture and Cultural History*.
188 In: Harvey, Karen (ed.), *History and material culture: a student's guide to approaching alternative sources.*

Inspired by Riello's table, I have created a model (Model 1) showing three different approaches to how objects are used in my research. The model is meant to function as an analytical instrument for my research problems and contains three perspectives:

- Objects give history - where an object causes questions to be asked and is put into a context through examination in which different methodologies are used and comparisons to other sources are made.
- Objects confirm history - when an object is examined using different methodologies to confirm and illustrate the historical narrative.
- Objects nuance history - when the established historical narrative is tried against an object and the study of the object sheds light on history in a new way.



Model 1. Model showing three approaches to how objects are used in my research.

The discussion on “Material culture” may be used for all kinds of objects, but my knowledge in textiles and handicrafts is special for this investigation. The point of using the term “material culture” is to view, from this perspective, objects as the primary research material to provide, confirm or nuance history. Through this, new perspectives are created that avoid an exclusively descriptive treatment of the material, instead focusing on the objects’ dialogue with the narrative.

I want to try out ways of analysing my textile material from K.A. Almgren Sidenväveri using this model. The model is dynamic, which means the analysis of the objects will take place simultaneously in the different perspectives. The understanding relies on an interplay between different focuses where every partial analysis generates new historical narratives, questions, and perspectives on objects which can then be re-entered into the model.

Objects refer to the physical artefacts that are examined: the silk fabrics, designs, looms and machines, technical notes, factory buildings and textbooks.

Problems and working methods here refer to the questions I ask the objects and the way in which they are analysed:

- Textile technical analysis - How were they manufactured?
- Cataloguing and comparisons with preserved garments - What was the silk used for?
- Who were the clients? What did the market look like? How was distribution carried out?
- Summary of archive material and statistics - In what way did production change?
- Comparisons with letters, diaries, drawings and newspaper articles - What did their contemporaries think?
- Aesthetic perspectives and art historical stylistic analyses - What did the fabrics look like? How were the designs created? What was considered modern?

The narrative refers to the big picture and questions on e.g. mass consumption and production of luxury goods, modernity, changes in society, formal and informal structures - how both legislation and individual choices shape history.

4.2.2 Experience-based knowledge in textile research

Experience-based knowledge has an important function in my investigation, as one of several dimensions of scientific analysis. By tradition, practical knowledge has been put in opposition and has been depreciated in relation to theoretical knowledge, particularly in academic research. Plato's distinction between a higher, ideal realm and a lower, material realm in Ancient Greece may be seen as the foundation for a conception of the superiority of thought over action. This conception achieved a break-through in the development of modern science during the Enlightenment, where art, handicraft and morals where separated from reason. The development culminated in logical positivism, where scientifically verifiable methods were seen as the ideal form of science and vocational training was moved out from the universities. During the second half of the 20th century, however, many researchers have questioned this distinction.[189]

The discussion on the role of experience-based knowledge in academic research may be brought together with the epistemological discussion where concepts such as the difference between "knowing how and knowing that" (Gilbert Ryle), "tacit knowledge" (Michael Polanyi), and "knowledge in action" ('kunskap i handling', Bengt Molander) prove the general scope of the problem and its relevance to modern research. Lise Bender Jørgensen has summarized the connections between these theories and textile archaeology in her article on "The epistemology of craftsmanship".[190]

Gilbert Ryle explains in "The concept of mind" that there is a difference between "knowing that and knowing how".[191] "Knowing that" is knowledge about facts and states of things, whereas the part of the knowledge dealing with "know[ing] how" is connected to the carrying out of actions. Except for the carrying out itself, this knowledge also contains the understanding of the action, a cognitive consciousness about the activity in itself. Ryle describes this in terms of that this skill also implies that the person is able to reason about the action carried out and that understanding is reached in the carrying out of the action itself. The ability to reflect and the ability to act are thus considered intimately connected.

189 Gustavsson, Bernt (red.), *Kunskap i det praktiska*. p.5-16.
190 In: Bender Jørgensen, Lise, Banck-Burgess, Johanna & Rast-Eicher, Antoinette (red.), *Textilien aus Archäologie und Geschichte: Festschrift für Klaus Tidow*.
191 Ryle, Gilbert, *The concept of mind*.

Michael Polanyi uses the concepts “silent knowledge” and “personal knowledge”.[192] He regards knowledge as personal and located in the body, consisting of activity and possessing a silent dimension. In addition to the notion of the action being located in the body, the personal aspect also includes the notion that the action is considered to be integrated into the personality. This personal integrity may consist of theories, methods, tricks, feelings, values and skills. It is recognized by the fact that it is used during the carrying out of an action. In connection to this, no distinction is thus made by Polanyi between “knowing that and knowing how”. This silent dimension may, however, be made explicit through reflection: “reflection raises the silent knowledge from its function as a tool”. Knowing is thus placed at the focus and can be articulated with the help of language.

Bengt Molander uses the concept “knowledge in action”.[193] He distinguishes between two different forms of knowledge: prerequisite knowledge and orientation knowledge. Prerequisite knowledge consists of the knowledge that forms the prerequisite for and enables the carrying out of an action. In turn, orientation knowledge comprises the knowledge essential for the action to be carried out in a correct way, in a given situation. In Molander’s opinion, these two forms of knowledge are interdependent. Knowledge exists simultaneously in the action, the body and the culture. Knowledge formation is connected to attention. It is by practicing attention man may evolve. Molander considers the reflecting practitioner to be the attentive and learning practitioner.

Another way of approaching experience-based knowledge has been developed in research on professional skills. Under Professor Bo Göranzon at the Department of Skills and Technology, KTH (the Royal Institute of Technology), methods were developed in which art, music, writing and dialogue were used as means to be able to describe aspects of professional skills that will not be measured with conventional methods. The goal is to articulate the silent dimensions of the action-borne knowledge. Examples of the method is Lotta Victor Tillberg’s licentiate thesis on eldercare, “Vård som konst” (‘Care as art’) and Gunnel Andersson Gustavsson’s thesis on hairdressers, “Den inre teatern i lärandet” (‘The inner theatre of learning’), where the titles in themselves hint to how the silent dimensions of professions and actions are interpreted through metaphors and are caught through reflections on aesthetic

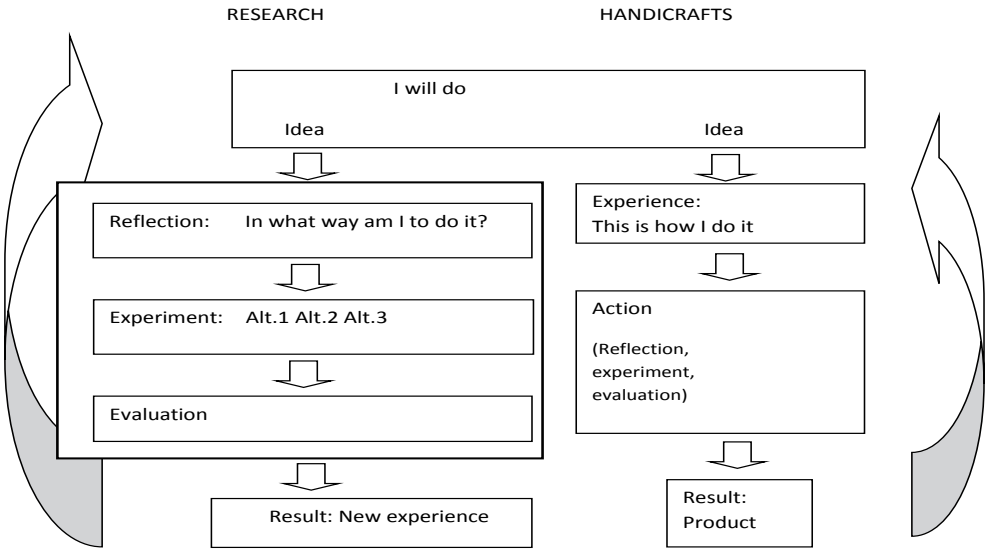
192 Polanyi, Michael, *Personal knowledge: towards a post-critical philosophy*. Polanyi, Michael, *The tacit dimension*. Rolf, Bertil, *Profession, tradition och tyst kunskap: en studie i Michael Polanyis teori om den professionella kunskapens tysta dimension*.

193 Molander, Bengt, *Kunskap i handling*.

expressions.[194]

The epistemological discussions reinforce the value of silent and experience-based knowledge, which is one of the reasons why I use this approach in my studies of objects.

In recent years, many handicraft educations in Sweden have been connected to universities and university colleges, for political and financial reasons. These educations work within different faculties to develop methods for academic research in which there is room for knowledge in handicraft. The development is positive as it increases the status of practical knowledge, but it has proven to be difficult to transform the handicraft educations to fit into the forms of higher education. Earlier handicraft educations were often much longer and required large amounts of practice in combination with production - something which is difficult to perform in a scheduled educational environment. They also contained less experimenting, reflection and personal development than what is expected of a modern academic or artistic education.



Model 2. Model displaying the differences in the creation of knowledge between research and handicrafts.

194 Victor Tillberg, Lotta, *Vård som konst: om yrkeskunnande i vård och omsorgsarbete*. Andersson Gustafsson, Gunilla, *Den inre teatern i lärandet: en studie om kunskapsväxandet inom hantverk*.

In Model 2 I have demonstrated the differences between the creation of knowledge in handicrafts and academic research. Despite the fact that the model shows a general dichotomy, a created distinction which is partly an illusion, it depicts the relationship between theoretical and practical creation of knowledge.

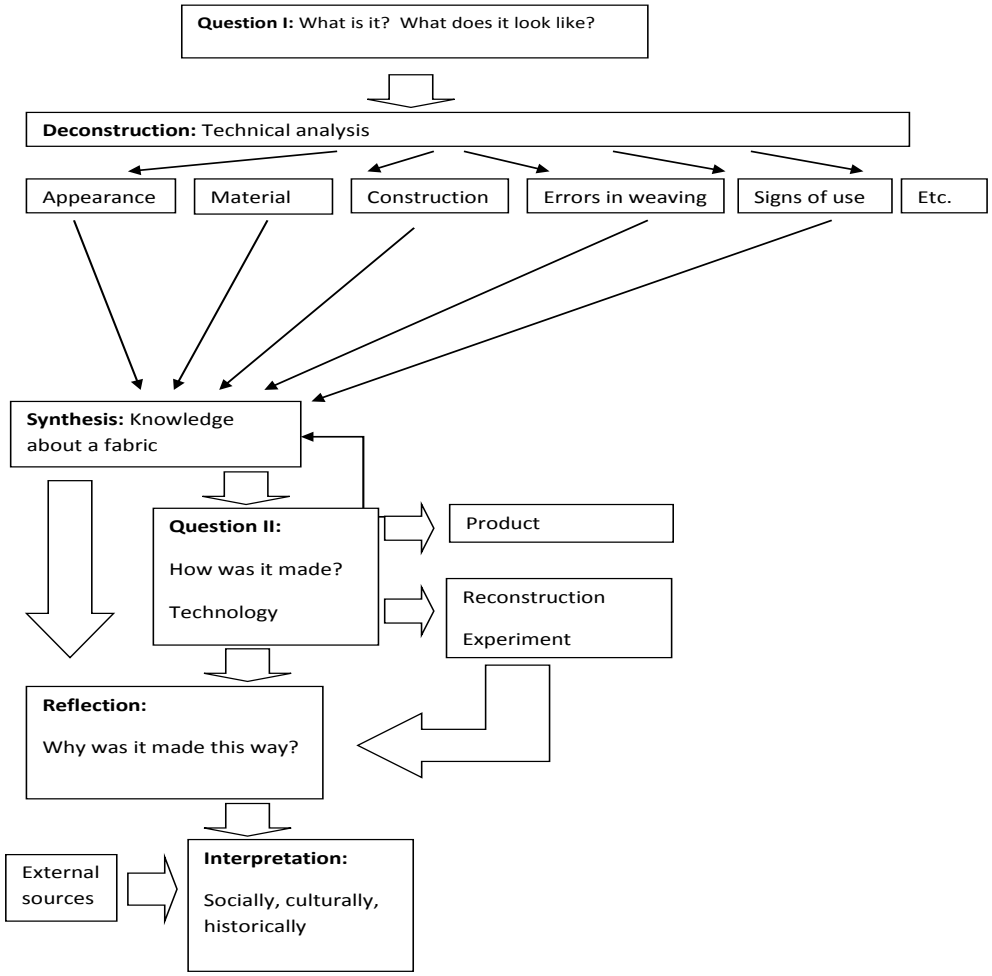
Both research and handicrafts start with an idea which is the processed. The primary difference between traditional handicrafts and academic research is that reflection is not verbalized in the handicraft. In theoretical thinking, reflection is constantly articulated in speech and writing. The research results are new experiences and knowledge which are then reintroduced and create new ideas and questions. Focus lies on describing the thoughts and the argumentation behind an experiment or a research question. It is a form of knowledge that, in principle, may be transferred entirely through written text. In the handicraft tradition, the transfer of practical knowledge takes place through action, by doing what the tradition and the master say, without arguing or verbalizing reflections. Knowledge is transferred in connection to production. However, this does not mean practical knowledge and handicraft would constitute a lower form of knowledge compared to the theoretical. As Molander and several other epistemologists have shown above, reflection, experimentation and evaluation take place within the action. The craftsman's knowledge of the material, his well-founded choices and solutions to the problems that arise, generate new experiences through the action which are then combined to form deeper knowledge of the subject. It should be noted, however, that handicrafts focus on the making of a product. Verbalization of the process is unnecessary as long as the result, the product, is satisfactory. Most of the practical knowledge is, however, possible to verbalize, if needed. It may be added that there are parts of the transference of knowledge also in theoretical research that actually are not verbalized, primarily the cultural and social aspects of education and research.

In my investigation, I wish to elucidate how experience-based knowledge is one part of my method for studying objects. When I e.g. analyse a silk fabric, all my practical experience of the handicraft, my preunderstanding, is activated: knowledge of the material, of all the details of the manufacturing process, of the equipment and tools needed, of the organisation of labour, time consumption, etc. In addition, this is combined with the experience I have gained through my earlier examinations of textiles and technology: the experience of recognizing and analysing older tools and textiles. This kind of knowledge, which is founded in a familiarity with objects, has been described as “connoisseurship” or “the antiquarian eye”.[195]

For the analysis of objects to be successful, preunderstanding in combination with reflection is required. Experience-based knowledge shapes the practical layout of the examination and, at the same time, is the very prerequisite to be able to perform the examination. It comprises the preunderstanding of the material and makes the researcher see the objects in a specific way - as the result of a crafting process. Thus, details that would have escaped a researcher with a different background may be discovered and interpreted. The practical knowledge of handicrafts means a reference library on technological possibilities and varying solutions, to which the technical details of an object may be compared. [196] This previous knowledge in handicraft also helps the researcher pose relevant questions to the objects and to avoid problematizing that which is given by e.g. the technology or the material. Knowledge about the textile materials and their properties is important to the analysis work and is gained mostly through the handling of textiles. Experience in handicrafts also provides access to a terminology and a notation system (e.g. weave diagrams) that adequately describe the textile materials, the objects and the technology. Despite the existence of several, sometimes contradictory, terminology systems in textile handicrafts, the use of established terms is preferable to constructing a new terminology. A uniform terminology is important to make research results available both to other textile researchers and to craftsmen with an interest in technology and history.

195 Knutsson, Johan, *Experiment, konnässörskap och kulturhistorisk kontext*. Flygare, Iréne, *Det antikvariska ögat, eller åsynen av ett mycket gammalt golv.*
196 Cecilia Aneer describes this in *Tailored criticism*. p.110-112

In Model 3 below, I describe the process of conducting object analysis founded on experience-based knowledge. The analysis process consists of a deconstruction of textiles from a crafting perspective.



Model 3. Model of the process for performing object analysis founded on experience-based knowledge.

In the technical analysis, the textile is deconstructed into a number of pieces of information on details connected to its production and function. These technical facts are then combined within the synthesis which, together with the preunderstanding, comprises the foundation for the knowledge and understanding of the object. Familiarizing oneself with the objects down to the very last detail provides the tools to relate their narrative.

The technical analysis may then proceed to the question: How was the fabric made? The answer to this question provides further in-depth understanding of the textile. Understanding the different steps of the production of a fabric through experience is important to interpret details, such as e.g. errors in weaving, and to understand older descriptions and notes from the mills. Experience of the entire life cycle of textiles from fibre to yarn preparation, weaving, finishing, sewing, care, and wear to repairing, reuse and destruction also provides references to understand and interpret appearances and technical details. In handicrafts, knowledge gained from older objects is often used to develop new products. As the goal is a product, the question posed is: How can the fabric be produced today? In textile research, however, there is an opportunity to use the handicraft knowledge in practice through experiments and reconstruction projects. By combining analysis and reconstruction, it becomes possible to gain even deeper knowledge and understanding of technical details and the production process. In the practical examples, situations arise and perspectives are created based on details of the object which can never be fully replaced by the experience-based analyses.

The most important part of the process when performing an object analysis founded on experience-based knowledge is the question: Why was it made this way? This is where the analysis is carried forward by bringing reflection together with object descriptions. This all comes down to an interpretation: The textiles, their production and their uses are put in relation to other sources and brought into a social, historical and cultural context. It is important to relate to the organisation of the production and the factors which, except for materials and technology, may have influenced the design and appearance of the objects.

The difficulty in using experience-based knowledge in research is that reflection and evaluation are located in the action and may be unspoken. The experience-based skills are parts of the handicraft tradition and have been shaped by the social and historical

environment where the production or the handicraft training took place. My training as a craftsman of today has left its impression on me, whereas the material I study and interpret is over a hundred years old. My interpretation is coloured by my personal knowledge because it is based on my present-day textile experiences. This means I cannot go about interpreting a historical material through experience-based knowledge just like that.[197] Reflection and a critical approach, also to my own experience-based knowledge, are thus central to its usefulness. When the results of an object analysis do not correspond to the notions I have been taught regarding how to go about producing the object in the best and simplest way, it is very easy from a handicraft perspective to go on to dismiss these anomalies as results of the work of craftsmen who are unintelligent, primitive or technically under-developed. The interpretation of these differences may instead shed light on the decisions made by the craftsmen at the manufacturing of the product and find explanations as to what circumstances influenced them to take these decisions. This may be both material conditions, such as development of and access to material and technology, but also the cultural and social context, where ideas of how and why the textiles were produced are essential. With a reflective perspective, the anomalies may themselves become the very details that generate fruitful questions on the development of society. This reflection brings about a synthesis of experience-based knowledge and academic research.

197 This discussion is dealt with in my essay in Textilvetenskap from 2002, *Den akademiske hantverkaren.* published as Ciszuk, Martin, *The Academic craftsman.*

Fig. 50. Waistcoat, 1830ies (Photo: Martin Ciszuk, by courtesy of Östergötlands museum).

4.2.3 A textile example: Technology, aesthetics and politics in silk waistcoats

Although patterned waistcoats were a part of men's fashion in the 19th century, a group of silk waistcoats in Sweden and Norway with text woven into their fabrics stand out as very odd. (Fig. 50.) It is true there were checked and striped, patterned waistcoats, but the motifs were normally small floral patterns. Instead, four Swedish waistcoats have the same design in horizontal borders with two lions holding the coats of arms of the Union between Sweden-Norway crested with a crown and the text CARL XIV JOHAN in a cloud-shaped cartouche.[198] (Fig. 51.) The textile technical details of the waistcoats have been documented. All the waistcoats are woven on the same brown-black warp, but with different colours for the wefts: gold/brown, cerise/green, and red/yellow. The waistcoat silk was woven on

198 Värmlands Museum inv. No. 24.600 , Nordiska museet NM 149 387, Livrustkammaren No. LRK 5 787:98 NNR 20 822 and Östergötlands Museum inv.No A1908.

a loom without ground harness, equipped with a Jacquard machine with 600 hooks. The pattern repeat is 5.3 centimetres wide and 4.8 centimetres high and has been carried out with 200 punched cards. The person who constructed the design was obviously very technically skilled and wanted to make a show of it. As many weaves, surfaces and structures as possible have been used for different parts of the motif. One example is the three small crowns in the Swedish coat of arms, where the shadow under the crown was made in close tabby so that the long weft floats in the ring of the crown bend to create an almost three-dimensional effect. (Fig. 52.) However, all these finesses are not visible to spectators until they come very close to the waistcoat fabric. At a distance, the details of the design and the larger pattern shapes make the waistcoat look very discordant and strange. Here, technology has certainly won over aesthetics. The silk has been woven primarily to show the possibilities of technology, as a manifestation of a technological imperative. Everything must be tried, if only for the reason that it can be done, regardless of whether it is practical, beautiful or economically sound. A comparison may be made to a modern mobile phone, in which there is an abundance of functions that are never used.

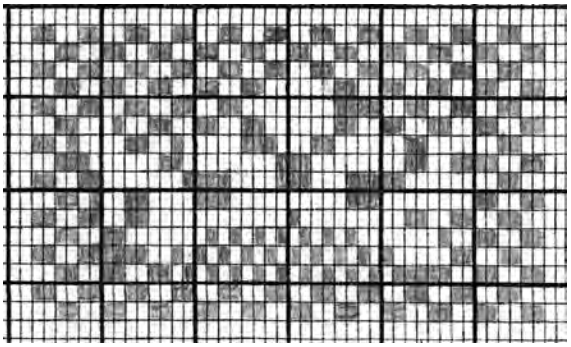


Fig. 52. Detail draft of the woven design of the waistcoat.

The silk has no markings woven into the fabric that would identify it as being made in Sweden. However, with the special design in mind it is likely that this is the case. Woven markings were placed at the beginning and the end of the woven piece and thus it is not surprising that they have not been included in the waistcoats. Two similar fabrics with the text “XVII MAI” (Norw. ‘syttende mai’, Eng. ‘17th May’: the Norwegian Constitution Day) and “CONSTITUTION” have been used in seven waistcoats in Norway.[199] (Fig. 53.) The silk in the “syttende mai” waistcoat has been analysed and displays the same thread density, 73 warp threads and 40 wefts per centimetre, the same satin weave in the ground sections,

199 Bugge, Astrid, *Constitutionsfeiring og 17. Mai-vester.*

Fig. 51. Detail of waistcoat in jacquard woven silk (Photo: Martin Ciszuk, by courtesy of Livrustkammaren, Stockholm).

Fig. 53. Detail of silk in waistcoat NF.1897-0530 (Photo: Martin Ciszuk, by courtesy of Norsk Folkemuseum, Oslo).

and the same width of the pattern repeat as the Swedish waistcoat silks do. [200] The equipment of the loom has obviously been the same for both fabrics and it is thus possible that all the waistcoat silks were woven in Stockholm at the same weaving mill. The silk cannot have been woven in Norway or Denmark, as neither country had any silk-weaving mills in the 19th century.

The waistcoats, which can be dated to the 1830's judging from the cutting, do not belong to any uniform or composed dress but have instead been sewn by different tailors, which is apparent from the variations in sizes, sewing details, cutting details and the materials used for the lining. The back piece is, as for most waistcoats from this period, made from a simpler fabric of linen or cotton. A certain shortage of material can be traced as collars and facings have been put together from irregular pieces. At the front edge, the selvage is visible for both the front pieces, which reconstructs the width to 55 centimetres. The silk has apparently been sold as cut-off coupons of around one ell and the tailors have made the best possible use of the fabric to make it last to all parts of the waistcoat.

If the King Charles XIV John waistcoat is woven in Sweden, this must have been done after the Jacquard loom was introduced by K.A. Almgren in 1829 and prior to the passing of the king in 1844. It is possible that the Swedish waistcoats were created as an answer to the "syttende mai" or the "constitution" waistcoats worn in Norway in the 1830's. These waistcoats with woven political motifs were worn by nationalist Norwegians who opposed being subjected to Swedish rule through the union. They were mentioned in the newspapers and were banned by the king. In the factory reports, the company Mazer & Co. is found to be the indisputably largest producer of waistcoat fabrics in the 1830's. The factory reports do not state if these waistcoat fabrics were patterned, they may have been checked and striped, or if they were manufactured on Jacquard looms. However, it was on the behalf of this very company that K.A. Almgren smuggled in the first Jacquard looms. It is possible that they were used for patterned waistcoat fabrics in addition to the silk kerchiefs that were mentioned in the introductory texts of the factory reports dated 1831, which also happens to be the year when Mazer & Co. reports production of waistcoat fabrics for the first time.

The waistcoat fabrics with woven text are fascinating examples of how new technology was

200 Norsk Folkemuseum NF 1897-0530.

used to spread political messages. Although the waistcoat fabrics may appear, to the modern eye, poorly designed from an aesthetic perspective, one where the interest in technology has ruled out all practical and aesthetic functions, they were probably perceived by their day as exciting pieces of evidence of how new technology could be used to create patterns that previously had been impossible to produce at a reasonable cost. The Swedish waistcoats have a somewhat uncertain provenance, but appears to have been used both by people in the countryside and by men of the higher classes. The users of the Norwegian waistcoats appear to have belonged to bourgeoisie circles. The Jacquard woven silk fabric was likely a relatively cheap one, particularly in comparison with the patterned silks that had earlier been made on draw looms.

4.3 CONCLUSION

4.3.1 Summary of the empirical material

The research material is extensive and is composed by different types of sources. The textiles are in focus for the investigation because they represent a source material which earlier has not been used for research regarding silk-weaving in Sweden to any great extent. My special textile competence means that my research, focusing on objects, is expected both to provide new results and to develop methods around object-based studies, using experience-based knowledge of handicraft in academic research. The textiles are thus placed at the front end of the presentation of the material.

To create a cultural-historical context and complement the textile material, a number of other sources have been utilized. The sources range from purely historical archive material, i.e. various forms of texts, to several kinds of objects, such as images, machines and buildings. They are, so to say, sources for which the degrees of text and artefact vary, where archive materials are at the one end and objects are at the other. Some sources, such as the fabric sample collections and the textbooks in silk-weaving, contain both texts and textiles. They may, depending on how they are treated, be seen either as texts or artefacts, or both. This combination of detailed object studies and the use of text sources is the essence of my research methodology. The objects become sources through the technical analyses and may be compared to, complemented by, and set against the written material. This generates new perspectives on technological development, industrialisation and knowledge transfer, taking silk-weaving in Sweden in the 19th century as an example.

4.3.1.1 The context and value of the objects and texts as sources

Textiles, other objects and tools have high values as sources because they are direct manifestations of the silk production, its organisation and knowledge. The problem is that they must be interpreted in order to be used in a written narrative. My knowledge in handicrafts provides a good foundation to achieve this, but a consequence is that the analysis may be seen as partly subjective, simply because it is founded on my experience-based knowledge. Also, artefacts have only been preserved to a small extent and the role they play in interpretations depends on what has been preserved and identified as made in Sweden. Much of this is guided entirely by chance, while other cases are guided by the

collection policies of the museums and the individual motives of the Almgren family and K.A. Almgren Sidenväveri when it comes to which objects have been preserved and which have been thrown out. Objects are also more difficult to describe and quantify in text. Despite their fragmented form, textiles and tools are important because they are concrete artefacts providing distinct nuances to the image of the silk industry in Sweden as it has been presented and interpreted through the written sources.

The information in the factory reports will have to be considered reliable. There is no reason to believe the mills consciously tried to withhold information from the bureaucracy. On the other hand, it must be taken into account that the reports were designed by bureaucrats and differed from the accounting of the mills primarily regarding terminology, which may be observed through comparisons between the factory reports and the Eduard Liné book and the sample chart from the Barnängen mill. The remaining written source material is often more detailed and was created closer to the production than the factory reports were. Thus, the value of these sources is higher in terms of credibility compared to the factory reports, but through their sporadic and irregular existence, they are difficult to use in a narrative on silk-weaving in Sweden. They primarily function as ways of nuancing the over-all information from the factory reports.

4.3.1.2 Comparisons between the different types of source materials

The combination of object studies and text studies creates possibilities, but also generates problems. The research material becomes complex and has a tendency to become impossible to overview. The various types of sources demand various analysis methods, generate different research questions and provide different kinds of answers. The results will thus also have to take on different forms. The figures from the factory reports can be compiled simply enough into easily overviewed diagrams, while the other written sources can only be presented in the form of quotations and reviews. They become images, “frozen moments” in time, rich in detail and carrying strong illustrative powers. The textile technical analyses can rarely be quantified, but are presented as weave diagrams, analysis forms, and tables holding information on ends per centimetre and technical details. The analyses of the technical drafts, the looms and compacted mountings may be presented as schematic drafts or as tables made from compilations of technical information, notes, markings, datings and relationships to other objects. Patterned fabrics, technical drafts, design drafts, and sketches

are best presented as photographs, while the locations of the mills are presented through markings on a map. The research material in this thesis may appear asymmetrical, dispersed and fragmented, but the presentation is a necessary preparation for the cultural-historical analysis which will follow in the PhD thesis. There, the subject will be treated thematically and the result of the various kinds of source studies performed will be used as arguments to point to the development, change and context of silk-weaving in Sweden in particular and industrialization processes in general.

The textiles, tools and textbooks in silk-weaving contain the traces of knowledge transfer. Textbooks and technical notes represent a handed-down theoretical knowledge. It has its origins and probably has been shaped by the example collections containing samples with descriptions which were collected by journeymen in a time where their instruction was carried out within the organisation of the guild or the manufacturing system. They reflect the theoretical knowledge deemed necessary for the profession at the place and time of the instruction.

Textiles, on the other hand, represent *exposed* knowledge. They are the result of the combined theoretical and practical knowledge of the craftsmen, shaped by the Swedish handicraft culture and the market where the products were intended to be sold. The difference between the examples in the textbooks and the textiles may point to when and to what extent the international technology development broke through and what knowledge was applicable to production in Sweden.

In the same way, the tools, machines and factory halls that were used reflect international knowledge transfer, but through their use they also characterize the silk industry in Sweden, sometimes in contrast to their French and German models.

Handicraft culture, organisation, status, procedures and grips are implicitly manifested in the textiles, the tools and the textbooks. However, only a part of the knowledge and culture of the silk weavers will allow itself to be caught and analysed. Entire professional cultures cannot be caught, but parts of them can be interpreted through the combined study of objects and texts from an experience-based handicraft perspective.

Neither textiles, nor other objects, nor texts are alone sufficient to make up the material of the cultural-historical analysis. They are all subject to issues related to source criticism which must be taken into consideration. The comparison between the different sources often sheds light on their value as sources and proves the importance of combining studies of differing material groups in the investigation. One aspect is chronological differences, i.e. that the sources cover the time period to varying extents and with varying depth. This in turn is connected to the collection and preservation of the material, which have been done in many different ways and for many different reasons depending on the type of material and time period. Some source types, such as the factory reports, are able to perform the role of a framework for the information from the textile sources, which are less continuous. The other written sources primarily function as complements and in-depth information regarding details. They may appear somewhat marginal to the purpose of the thesis, but contribute through their singular nature, in detail and in quality, to complement the overall picture of the two main dimensions, the silk production and the industrialisation.

4.3.2 The song of the fabrics

Objects can be interpreted and given voices. By being studied from my experience-based handicraft perspective, the Swedish silk fabrics may be given voices to sing in the choir of the many-voiced source material relating the narrative of the industrialisation and the society of the 19th century. The song of the fabrics is sometimes faint, sometimes dissonant and sometimes harmonious with the voices of the other sources, but during certain parts of the music it rises to perform a brilliant solo. Then, the song of the fabrics rings with details and conditions, creating new harmonies in the historical symphony. The song of the fabrics develops, deepens and, in a quite unique way, changes the theme of the music of cultural-historical research.

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Damasse register
Disposition books
Drömmar
”Jacquardmönstrens nummer”
Technical drafts, design drafts, chains of punched cards
Unattached fabric samples
File of fabric samples
Looms, tools, machinery

SOURCES AND LITTERATURE

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