DUTCH DENIM
Differentiation Through Innovation

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I, Ruud van Esch, declare that this thesis is an original study based on my own work. All the sources used have been quoted and indicated correctly.

Ruud van Esch
Foreword

This thesis is a part of the project of my graduation, the end of my study Fashion and Management at AMFI (the Amsterdam Fashion Institute).

The reason for me to write this thesis with this subject is twofold. It started with an obstacle I came across during one of the brainstorm sessions, regarding a project that never happened. Ideas flew around the room, possible solutions for the woven denim product too. But no place for development in the Netherlands. Like I said, the project never took place but the lack of a nearby development centre stayed in my mind.

It was Daan Roosegaarde that triggered me to start with this project and see what happens. In the Dutch ‘slow-television’ show Zomergasten he was the last guest of this summer, and blew my mind away with his future forwarded vision and enthusiasm. I like to highlight the few sentences that made me think of that project again and at the same time decide to just do it.

- “Every Dutch company is looking for added value, for innovation, for renewing. Every company is in decline; China is able to produce much cheaper. Help! That is the interesting part of the current crisis… … It appeals to a new kind of creativity.”

- Just use that knowledge, that energy and creativity that is available in our beautiful but kindly strange Holland.” (ROOSEGAARDE, Daan, 2013)

This period was a roller coaster but I guess that counts for every intense project. Never the less it was as is amazing as it was rough. I really like to thank my coach, Sean Chiles, for the ‘reality’ checks, which created the overview and motivation to keep going. Second I want to thank Joop Smith for his notes and advice. The last I like to thank everyone who was able to make time for me in his or her tight schedules, to give me a better insight on the subject. Enjoy!

Ruud van Esch
Amsterdam, January 2013
Executive Summary

The research on the current environment of the Netherlands shows interesting opportunities and complicated issues to conquer, for a revival of the Dutch textile industry with a focus on denim. This thesis is the foundation for possible further research.

The characteristics of this revival should not be found in mass industry and low prices, simply because the Netherlands can’t compete with the current minimum-wage countries and established mills on that factor. A Dutch denim mill should focus on small-scale production with a high level of flexibility and innovation. Use the current knowledge economy within the Netherlands to its maximum capacity.

Co-creation with the academic institutes and developing research centres within the Netherlands is the best option to achieve a high level of innovation. The best option is to provide a ‘innovation pool’ and consult the companies and institutes within this database on specific issues.

The market strategy that suits best with these characteristics is a combination of knowledge flows between the market, the ‘innovation pool’ and the development centre itself. This approach is described best as a combination of the ‘product leadership’ and ‘customer intimacy’ strategies of Tracy & Wiersema. In line with the size of the development centre and the approach of the market, a process driven structure of the internal framework suits the institute best. This in combination with a open system culture to increase the free flow on information and the individual qualities of the employees.

For an exact financial statement more research is needed. The capital intensity of the business is very high, for the needed investment a couple of million Euros are needed. Options for funding are EU/government, work with another mill or private investments, these option might be combined. In all cases counts the independency of the development centre needs to be secured, and the investor should be able to think long term.

Still a lot of the financial plan is a hypothesis and the actual risks and investment will reveal itself after further research.

Recommendations for further research:
- Competitors
- Operational plan crystalized
- Innovation plan & partners
- Financial investments including machinery maintenance, labour cost, location, supplies and office.
- Sales forecast
- Financial investors
- EU Findings
"There exist limitless opportunities in every industry. Where there is an open mind, there will always be a frontier." - Charles F. Kettering
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Chapter 1
1.1 Relevance

April 2013 I had a few meetings about a denim project that never took place. This sounds not so interesting, but within those meetings the subject for my thesis formed itself. Within this brainstorm session we had some ideas we wanted to develop on small scale, and the solutions for this where most likely found within the fabric itself. There was one problem; within the Netherlands there was no such place to develop your beloved denim fabrics. This captures my interest, so what is more appealing then find out myself if a place for this could be possible within the Netherlands?

Furthermore, while I hear more negativity around me in the fashion industry, in terms of employment and turnover. The Dutch denim market becomes bigger every year. Especially round the area of Amsterdam. (LAMPE, Bregje, 2012) Combine this fact with the rising costs in the minimum-wage countries and the way that these countries have been in the news for the last couple of years. Countries like China, Bangladesh and also the North-Africa countries like Turkey and Tunis are due different aspects slowly becoming less interesting as a country for production. The idea that someday the Dutch textile industry might has its revival is for me an interesting one. And in my opinion the denim industry could get much more interesting and future forward then it is today. What happens when we combine our rich Dutch historic knowledge of weaving with today’s frontiers of the technology and design institutes?
1.2 Main research question & Sub questions

How to form the revival of the Dutch textile industry 2.0, specified to denim?

Decades ago the Netherlands was well known for their textile industry, is some of it left and can we restructure it in a way that suits today’s market? Amsterdam brand itself as ‘denim’ city, is this specific enough to define what is really happening in the Dutch denim market. During the years a lot of the industry has changed but also the Netherlands a country changed from a trade driven society to a knowledge based society. What is the best approach toward the future market?

Sub questions

Can we combine the knowledge of the historic textile industry and todays Dutch innovative institutes/companies?
To create a solid base for a development centre in the Netherlands we must first find out if we can learn from the past. To see what the Dutch textile industry looked like and if there was a connection with today’s denim industry. Also the future evolution of the fabric itself is important to see which role the Netherlands could play in that future.

How do Amsterdam-based denim brands have benefit from a development centre in their own country?
Amsterdam has a big variety of denim brands, which operate in very different markets. It depends on the development itself in which market it could be successful. It is important to explore the fields of innovation and see which market within the denim industry is most suitable for the specific type of innovation. How to be relevant?

What will be the best set up and structure for an institute of development and innovation within the denim market?
For organisational structure there are a lot of options to set up an institute, we must find out which type will be the most logical. Also in terms of market approach and the definition of what role to play within the denim industry. Is there a way to learn from other industries or to work with current trends like open source innovation strategies in the ‘closed-box’ fashion world?
1.3 Research methodology

This research report is built on quantitative and qualitative research methods. The quantitative research contains a lot of academic articles, books about the history of the Dutch textile industry, newspapers and websites. The most important was for the first chapter to gain a historical overview and the reasons behind sudden movements in the past. To create a reliable idea for the future, books and articles and interviews gain me a lot of insight.

All the information from the qualitative research is drawn from interviews and conversations with professionals from the denim industry. In addition, interviews have been done with people outside of the denim market to see how an interdisciplinary collaboration should form. In absence of a case study; this gab is filled with an in depth interview on a similar project the ‘House of Denim’.

1.4 Framework

This research report is written with a focus on professionals from the Dutch denim industry. To get some grip on this five months project I will frame the subject with some boundaries. This will increase the focus and will improve the quality of the research.

The city of Amsterdam is working on their ‘denim’ image in the fashion industry. Because this is the city I live in and my direct working area, I will mainly focus on the Dutch textile market. In some cases it will be inevitable to bring in the broader picture for a reliable conclusion.

The history of the Dutch textile industry is enormous. To specify the field of research I will explore the history of the cotton industry and focus the research on woven textiles. Furthermore the denim industry knows many aspects and levels of creation. This report will focus primarily on the woven fabric itself and the people that work with it.
1.5 Structure of the report

To make the thesis relevant and understandable for a broader audience I will first define the woven product denim through the eyes of this industry. Then within this frame I’ll try to search for possible overlaps within the history of the Dutch textile industry, to see if today’s denim industry can learn from the ‘old master’. To have an idea of what we can expect from the fabric in the future I will figure out what is happening in the field of denim. Also what the opinion of the industry is on innovation and development of their beloved product. And how they see the future of possible implementation into jeans or denim. The results of this first stage in combination with extra information will give a clear view on what to expect from the Netherlands as a base for a denim mill.

From this point on the thesis will concentrate on the operational part of the project in progress. Via several resources I’ll draw strategic options for a market approach and describe from my point of view the one that is most likely to succeed. After the external strategic options, the internal framework will be explored. The end of the 3th chapter gives an overview on the financial risks, and provides ideas for possible investments. This part needs more research, to create reliable business plan but that will take years to find out. (VEENHOF, James. Personal interview, 2013) The last chapter contain the conclusions, which will define outcome, recommendations and the possibilities for further research.
Chapter 2

2.1 Denim, according to the industry

The term denim is used in very different ways. The one person is using it to talk about the fabric as a component of a pair of jeans, others use it to define the jeans itself. To make sure that even people outside of the apparel industry can understand this thesis, I’ll define the term denim through the eyes of the industry itself. This assures me that you will not only understand the technical term but also see the poetic value of it according to the people who work with it everyday.

Rawrdenim.com explains the term denim the following in their denim dictionary: “Denim is a durable cotton twill material primarily associated with jeans. It is unique in that while it is naturally beige or off-white, it is associated with only one color – blue (due to its long history with indigo dye). Many believe that the term denim comes from the French phrase “serge de Nimes”, a fabric of silk and wool that originated in Nimes, France during the Middle Ages. In 1873, Levi Strauss and Jacob Davis began making riveted “waist overalls” for workers out of denim and cotton duck, with the denim eventually completely supplanting the duck because of its comfort and durability. Despite its humble origins, denim is now a staple in nearly everyone’s wardrobe, usually in the form of jeans. It is almost always indigo-dyed and has a diagonal ribbing easily seen on the reverse side of the fabric. While traditionally made solely of cotton, denim is now frequently blended with other fibres such as Lycra or spandex to give some stretch to the material.” – (RAWRDENIM.COM)

As for me this is the well-explained technical side of the fabric, it doesn’t really cover the beauty of it. The poetic part lies in the characteristics of the fabric. The crispy feel when the fabric is untreated, the rainbow of indigo shades after wearing and the literal footprint in the product of the person who lived it as his or hers second skin. There are many sides and opinions on the fabric denim and it is interesting to point out a few of them.

Quite simply, according to Miles Johnson, design director at Levi’s XX, it is a fabric that contains 2 different colours; warp and weft. If you have the same colour warp as weft, it is twill. He like to keep the term this open, this broad, to make sure it doesn’t limit his field of work. (JOHNSON, Miles. Personal interview, 2013)

Tony Tonnaer, CEO Kings of Indigo(K.O.I.) mentions the same, that the simpler technical explanation of denim is a woven twill construction with a blue and white thread. In which the blue thread started as a natural indigo dyed yarn
that later on evolved in a chemical extract. The indigo makes the characteristic fabric ‘alive’. On a personal level, Tony says, denim is always in motion; the many variation, the rich history of the fabric and also the bright future of this product. The fabric constantly evolves in ways of construction, compositions of fibres and new ways of laundering. (TONNAER, Tony. Personal interview, 2013)

For Liam Maher, head design for Denham the jeanmaker, the cultural meaning of denim that comes with it passionate him the most. This comes mainly because Liam describes himself more as a work wear inspired designer than a pure denim specialist. (MAHER, Liam. Personal interview, 2013)

Lennaert Nijgh, founder of the one-man brand Benzak Denim Developers (BDD) and developer at K.O.I., states denim is a woven fabric, originated from a functional and durable aspect. Worn by every layer in the society, with a lot of historical symbolic. That is also a beauty of the fabric, and the aspect Lennaert has in common with Menno van Meurs, Co-founder of denim inspired boutique Tenue de Nîmes.

For Lennaert it is especially that the fabric has the beautiful characteristic, like leather, to ‘live’. It brings personality to a product, by the shadings of the indigo after wearing. Collection wise, fabric is very important for him. Because the fabric is his starting point, he builds the products based on aspects of the chosen fabric. All denim fabrics are based on indigo, but all colours differ. Within a range of fabrics and even within one fabric you get this amazing colour scheme. (NIJGH, Lennaert. Personal interview, 2013)

Beauty, most times, comes with a down side and this is not an exception. The main ingredients of this fabric are cotton and indigo. Rene Strolenberg, Co-founder of Tenue de Nîmes, says about denim that it doesn’t matter how the world at the moment looks at denim, it must and will change dramatically in the coming 10 years. If today Greenpeace put their minds on destroying the denim industry, the branch doesn’t stand a chance because of the enormous polluting character of the industry. (STROLENBERG, Rene, 2013)

I think he’s right. Those earlier explained beautiful characteristics are also the most polluting ones. The cotton, indigo but also the worn-out demands of the market, make this industry a danger to the environment. This has to chance dramatically. The whole industry is aware of this and small steps are made from time to time. The question here is, can the Netherlands be a part of the solution within the fabric stage of the process?
2.2 Textile from the Netherlands

To define if there is possibility for the Dutch textile industry to revive itself and in what form we should search for such a revival, we must first find out how the industry originated and how the branch evolved over the years. Many sections of the textile industry within the Netherlands originated, moved and disappeared throughout the years. This chapter focus on the industry of cotton and the woven fabric.

The history of Dutch textile started to be a manufacturing industry in the 17th century, with a small-scale linen and flax production in the western of the Netherlands. At that time the production was only individually. Before this period it was mostly a trade business. The spinning and weaving off clothes happened at people’s homes. Within a few years it got more and more industrial, this was the reason for the first shifting. The labour intensity of flax production was the reason that had moved to the east side of the Netherlands and the province of Brabant because of the lower labour costs. Another reason was that these areas were a better situated on the trade routes of the Westfalen(DE) and Luik(BE). (BREITBARTH, Peggy, 1994)

Round the year 1800 in Western Europe originated a trade in second-hand clothing. This circumstance as well as the preproduction of clothing for sailors and the Marines, whose time on land was to short to create a tailor-made suit, gained the revolution of the Dutch confection Industry. This is accompanied with invention of the sewing machine. (BREITBARTH, Peggy, 1994) During the 18th century cotton fibre replaced flax little by little. First as a combination of linen and cotton. Cotton was used for the weft and linen for the warp of the cloth, the Dutch name for this particular cloth was ‘Bombazijn’. There were several reasons for the growth of the cotton industry in Holland. Round the year 1830 the first steam-automated spinner started in the city of Almelo, as an example they used the model of Gent(Belgium). (BREITBARTH, Peggy, 1994) The industrialisation due the use of steam and the improved rail and road network got an enormous boost between 1840 and 1870. This was also the time that the Netherlands followed the British liberal path. (DE BEUKELAER, Hans, 2003)

In the year 1836 they established Nijverdal in the east of the Netherlands. First it was set up as a fortress of warehouses. That later on became a spinning mill for flax, a starching place for threads and weaving mill. This happens under the supervision of ‘De Nederlandsche Handel-Maatschappij(NHM)’ (the Dutch trade company), which was set up by king Willem I in 1824 to stimulated the Dutch economy. (BREITBARTH, Peggy, 1994)
This trading company acted as a state bank and an overseas trade and transport company. They decided to export ‘katoentjes’ (cotton) to the Dutch colonies of India, to stimulate the Dutch textile industry. This made the Twentse (East of Holland) textile industry the first official industrial sector. At first the NHM tried to setup the reformed textile sector in the surroundings of the cities Haarlem and Leiden, but it ended up in the eastern side of Holland. Due the fact that the city like people couldn’t handle the technical aspect of this renewed industry. The steps of the NHM was not only stimulating the Twentse textile branch, also the cotton and wool industry the North-Brabant region in the south of Holland had benefit from it. (WIKIPEDIA®, 2013)

Due this growth of the Dutch textile sector the migration of from the Western parts of the Netherlands towards the East was huge. All ‘job seekers’, of which mostly young women. A lot of those people ended up in the booming confection business. This happened at the end of 1800 and beginning of 1900. Within the textile and confection sector more and more start-ups took their shot, also stimulated due the First World War in which the production of the surrounding countries choked. (BREITBARTH, Peggy, 1994)

1923; just after the unions had an agreement for the employees to start working less, 6 x 8 hours in a week, the big textile barons wanted to decrease the wages or increase the hours. Under the pretext that the companies couldn’t survive otherwise. This led to one of the biggest ‘work related wars’ in the Dutch history. In the end a devastating strike of 5 months left big scars organizational wise. It took years to rebuild the glorious textile industry of East-Netherland. Almost 60 years later, in 1994, after reopening the archives it showed that the companies were doing great at the time. No need for pushing the employees.

(STICHTING VAN DE HISTORIE VAN DE VAKBEWEGING)

After the years of rebuilding, the sector got his structure and strength back. In the mean time the world surrounding is collapsing bit by bit, the great worldwide depression of the 1930 hit the market. Despite the suffering market, a lot of new initiatives found their way into the Dutch textile market. This blooming of the market initiated by the Dutch government. Who set up import restrictions and encouraged the people within the Netherlands to buy only products of the Dutch market with the slogan; ‘Koop Nederlandsche waar’. This didn’t help the rest of the Dutch economy. (BREITBARTH, Peggy, 1994)
The Second World War started to dominate the industry in the late 1930’s. Warned by the problems of the First World War, the Dutch government took measures to create economic security. As the war lasted, the measures couldn’t keep up. Almost every company within the Dutch textile industry had to choose; close the factory or manufacture for the enemy and keep up the employment. A lot of companies shut down, the people got unemployed and ended up in the German weapon industry. Especially in the eastern part of Holland.

When the war finally came to an end, the industry recovered fast by investments in supplies, machinery and energy flow funded by ‘the Marshall Plan’. (DE VYDER, G., 1995) Directly after the war the ‘competition for the girl’ started, due the lack of employees. Confection companies in Amsterdam tried to get the girls from the eastern textile industry to work for them, and visa versa. Also companies in the neighbourhood competed for their workers with secondary working conditions. They promised the girl’s free shoes, fabric for sewing or a raincoat. A lot of these girls chose for the textile industry, for the higher salaries.

1957 is the year the European Economic Community(EEC) came to life, which made international trade a lot easier. Also free movement of employees from countries like Spain and Italy towards the Dutch industries got less restricted. The shortages in employees within the Dutch factories were mainly caused by the great economic recovery after the World War II. Also the Dutch people got to highly educated and a lot of Dutch people emigrated towards the USA, Canada and New-Zealand during the 1950’s. (WIKIPEDIA®, 2013) Between 1960 and 1967 thousands of immigrant workers were brought to the Netherlands. First from countries like Spain and Italy, but fast after that they sourced their workers in the North-African countries. (SLE, 2010)

However, this migration couldn’t help that the textile industry moved to the South and East sides of Europe and to the North-African countries. The first so called ‘low wage countries’. This was a direct result of the ‘wage-explosion’ in 1964/65. This ‘explosion’ increased the salaries with 15%. (HESSELINK, Hendrik Jan, 2010) The ‘wage-explosion was actually only the start the industry translocations, which continued till the mid 80’s. The confection industry moved mostly towards Eastern-Europe(Yugoslavia), the South of Europe(mostly Italy) and the North-African countries slowly took over the Dutch cotton and textile industry. (VAN DIJK, Meine Pieter, 2005)

There are many more reasons that influenced the shifting of the industry along that period. The General Agreement on Trade’s and Tariff’s(GATT) was
probably the biggest influence. This agreement was set up to brake down trade barriers with the developing countries, and decreased tariffs. Due the earlier rebuilding strategy of the textile industry in the 1950’s, which contained the specialisation in cheaper mass production, it became clear in the 1960’s that this was the wrong move. The developing countries got way stronger on the field of mass production and the government decided that the Netherlands didn’t need the textile industry to compete with other countries during the prosperity in Europe during the 60’s. So the Dutch government decided not to support the sector and set in a planned reduction of the branch. (DE VYLDER, G., 1995)

Only from 1974, government coalition Den Uyl, they started with an actual policy regarding the textile branch. Although, even this policy was a contradictive stimulation, between the textile industry and the third world countries. What ended in a focus on the Dutch textile industry as a well-known trade sector, rather than an industry for production. The policy of the government even stimulated tax-free investments, what resulted in investments of the South European and North African textile industry. The confection warehouses like C&A and Peek & Kloppenburg got bigger during this time and they invested in production facilities in India and other Newly Industrializing Countries (NIC’s) (DE VYLDEN, G., 1995)

During the period of the GATT, after 2005 known as the World Trade Organisation (WTO), also the GATT’s Multi Fibre Agreement (MFA) was effective. This agreement protected the cotton industry by maintaining quota’s, so the trade was not completely barrier free. After the 1980’s the Dutch government positioned itself as an ally of the NIC’s and a stimulated the spirit of free trade. Which was the complete shutdown of the Dutch textile industry. During the 90’s Belgium, France and the south of Europe had still a pretty strong textile industry, while in the Netherlands this industry was completely gone. (DE VYLDEN, G., 1995) However, the MFA lasted till 2005, a lot changed in the last 15 years of the agreement.
The figure above shows the decline of the textile industry from the end of the 1990’s. Eastern Europe got expensive for production what created movement of confection to China. Later on also weaving mills moved to China. The wages in China started to rise; this made China outsource their production to countries as Vietnam and Myanmar. Assumed is that the future production moves to African countries like Ethiopia. For large amounts (basics, production) in low wage countries will always be interesting, due the fact that the total costs (including quota costs, shipment etc.) will be lower than the total cost of production in nearby countries. (VAN DIJK, Meine Pieter, 2005)

The relocation of the mass production is only one of the two changes that are happening at the moment. With the other movement we see companies and brands producing smaller orders in factories nearby. Companies launch more and more collections per year, what makes each collection smaller. These smaller orders are rejected in factories in countries like China but the biggest reason is that the closer the factories are, the faster the latest decisions and trends will hit the market.

This last situation is the most interesting for the denim brands that are situated in the Netherlands. For the future we look at three scenarios drawn by Kurt Vogler-Ludwig & Ana Claudia Valente, May 28, 2009;

“Scenario 1 called “Globalisation limited” sees considerable effects from climate change. Rising environmental costs will change the system of global trade and set new priorities for consumers, governments and producers. TCL industries will become more European or even regional under these conditions.

Scenario 2 called “Asian dominance – European excellence” assumes that emerging countries will improve their specialisation in industrial manufacturing
and the EU will strengthen its technological lead. Production activities will largely disappear from European TCL industries but a great need for technical specialists and natural scientists will emerge. Scenario 3 called “Advanced New Member States” describes how the European Union and lowcost countries among the Member States are going to defend the industrial basis in Europe. Facing the strongly negative effects of globalisation on manufacturing employment (and TCL employment in particular), a comprehensive policy programme aims to revive industrial jobs.” (VOGLER-LUDWIG & VALENTE, Kurt Vogler-Ludwig & Ana Claudia Valente, 2009)

In both the first as the second scenario the Netherlands has to play knowledge based role in my opinion, based on the current industrial environment. The authors Vogler-Ludwig & Valente state the following recommendations on the previous scenarios:

“• Developing the knowledge base: Facing the situation of an eroding training system, it is recommended to apply a strongly selective HR policy concentrated on the regional centres of TCL production in Europe.
• Fostering innovation strategies: Innovation will be a precondition for the survival of European TCL industries, particularly in the areas of specialty textiles, machinery production, and logistic systems. An interdisciplinary approach should be promoted rather than segmented specialisation.
• Strengthening regional policies: TCL industries in Europe need a strategy to defend the share in mass consumption markets. The New Member States are those, which would be best positioned to compete with the Asian competitors. The development of regional TCL clusters – as was undertaken by China – might, therefore, help to improve the competitiveness of European mass producers. This requires a low-cost strategy supported by trade unions and workers, a human capital strategy developing regional labour markets, an efficient organisation of the business environment, and a marketing strategy expanding the sales networks worldwide.” (VOGLER-LUDWIG & VALENTE, Kurt Vogler-Ludwig & Ana Claudia Valente, 2009)

To conclude it is save to say that the current economical environment of the Netherlands is no platform for a revival of the mass industry they ones had, not for the textile industry as for confection. The current Dutch economical statement is not build to compete with the low wage countries on mass production. Besides the economical climate the Netherlands has a lack on denim related knowledge in the process of production. During the 1960 when denim became a product for the mass (HARRIS, Alice. text by Morris, Bob, 2002), the textile industry in the Netherlands set in his decline.
In the meantime the Netherlands has transformed from a trade and industry driven economy towards a knowledge based economy. To start a textile development centre in Holland the approach should make use of the current innovation driven economy. The knowledge of denim production never hit the Netherlands and the knowhow of the textile industry has decreased dramatically, but the Netherlands is build on their knowledge for innovation. This could proceed as another approach for a denim mill. Out of the interviews I had with several denim brands in the area of Amsterdam, I can conclude that there are demands for a small-scale mill focused on development and flexibility. Not directly said that this is the solution, but a definitive drive for me to further investigate.

“I always liked denim, I will always like authentic denim. But it doesn’t excite me anymore. Even if you bring it back to the original story; cultural the product was something to contest the power, but now it became the norm. Hopefully some people can bring revolution back to denim, it is the time to do that.” – Walid Zaazaa, 2013

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1 See appendix for all interviews.
2 You can find the content of these interviews in the appendix.
2.3 Denim future

Now we’ve seen that the revival of the Dutch textile industry 2.0 mainly has to focus on innovation and development, it is interesting to know what the future might look like. What are today’s possibilities and how will this evolve. What is happening within the denim industry and is denim the way to go? Mostly we see innovation trickle down from fields like the defence, medical or aerospace. For that it is interesting to give a short brief of some developments outside of the denim world. Beside a sneak-peak into the future it is important to see if and how the denim world sees itself as an instrument for innovation.

Clothing does a lot for the human species. It protects and covers the body when needed and cultural functionality. We wear clothes every day, so it is only a logical step to see how we can use this medium to the fullest. Could it not only protect our body from the outside, but also makes us aware of what’s happening on the inside? How can our everyday clothes be an extension of the technology around us? Then there is also the downside of all the clothing we were every day, it has a massive impact on the environment. And denim is the number one suspect in this case. The used raw material, the industrial process for the fabric and the end product are all on the most wanted list. So food for thought, and room enough for development.

2.3.1 The short list of Launch (an initiative to stimulate innovation on global challenges set up by parties like NIKE and the NASA) for 2013 teaches us about some real interesting developments to impact the system of creating fabrics. A lot of these developments contain a different view on the raw materials that are used, for example milk, mushrooms, bacteria, recycled PET or Silk from honey bees. For the denim industry the most interesting initiative is CRAiLAR Flax fibers. Who created, in collaboration with parties like Cone Mills (USA), a modified flax fiber due the use of a technical process, which is almost undistinguishable from cotton. CRAiLAR flax uses less pesticides, 99% less water and grows up to almost four times effective as cotton. (LAUNCH.ORG, 2013) From a sustainable point of view this is an amazing achievement and opportunity.

A present example of denim fabric development is from Levi’s, who collaborated with DSM in the Netherlands to develop a jeans from a fabric that is 25% stronger then an average jeans. Without increasing the thickness of the cloth. DSM started working in the 1970’s on a ultra-high molecular weight fibre of Polyethelene, today known as Dyneema®. This worlds strongest fibre is 15 times stronger then steel. The denim development of Levi’s and DSM
contains only 4% of Dyneema® fibre. Both companies think about reducing their ecological footprint, and created this denim from a long-lasting-product point of view. (DSM, 2013)

Giovanni Hensen, application manager at DSM Dyneema®, explains about the collaboration that the concept and first development of the fabric-combination of cotton and Dyneema- came from DSM. After they developed and licensed the idea, they got in contact with Levi’s. DSM developed the first draft of the fabric at IFTH, an independent textile lab in France. This institute for developing and testing fabrics, originated round the year 2000 from the ‘bankruptcy’ of the French textile industry. (HENSSEN, Giovanni. Telephone interview, 2013; VAN DEN ACKER, Pieter. Telephone interview, 2013)

According to Miles Johson, design director at Levi’s XX, this is only one of the many projects Levi’s is working on at the moment. “The collaboration with DSM is initiated by the US department. Levi’s has a complete R&D department in San Francisco, which is dedicated to innovation in to basic platforms like denim. So they always look in to new and interesting ways to spin it or twist it, and there are projects on-going with all the mills that we work with. Considering the size of the brand, it is important for us that we do that. If Levi’s wants to be the number one jeans brand, than it has to keep putting innovation into the product.” (JOHNSON, Miles. Personal interview, 2013)

“Sustainability is no longer a ‘niche market’; it becomes a substantial part of today’s society. Unbranded, it will be the standard within every aspect of future products. The whole world will slowly change this way, look at coffee, food, gasoline and cars. Clothing is no exception, there is no way back.” – Tony Tonnaer

Another beautiful innovative project is the Catalytic Clothing partnership of Helen Storey of the London College of Fashion and the chemist Tony Ryan. They prototyped a purifying jeans, in which the woven denim contains nanoparticles. This addition cleans the urban air around you while you walk.

For the next step they hooked up with detergent brand Ecover, to develop a washing powder with this same additive. For the additive to work it requires sun or daylight, and works best with thousands people using it. It works on a lot
of materials like cement and glass, but the researchers see clothing, as the medium with the largest effect. (COOKSON, Clive, 2012)

These developments are just to name a few of the recent projects within the denim industry. Although these projects seem quite future forward, the denim scene has a conservative reputation. Most of the recent denim developments within the last years are eco-friendly driven properties like recycled and biological cotton on the material end. And laser techniques and Ozone treatments for the laundry part of the process. Sustainability is the main factor for innovation within the denim world at the moment. (GALIJASEVIC, Adriana, 2010) For me personally these innovations are needed, logical and really clever, but in my opinion denim is one of the biggest platforms fabric wise. Worn be so many people within every society. So maybe there is more to achieve besides the decrease of environmental issues.

2.3.2 As Walid Zaazaa, the senior design manager of Calvin Klein, stated in an interview I had with him; if you only know denim you know nothing, this is applicable for everything. I couldn’t agree more. For me it is important to look further then the field you work in, I always liked combining and collaborating multiple fields of interest. To create a more reliable view on the possible future of denim, we have to create a view on the future of all textiles.

Professor Hein Daanen describes that the outside world and technologic equipment will further integrate into current and new textiles. The future development he thinks is going to be a major ‘game-changer’ are sensors in textiles and clothing, which creates a platform to extend the signals of the body to better monitor and understand what is going on. But also signals from mobile devises that connect through textile with your body. (PROF. IR.) DAANEN, Hein. Personal interview, 2013) Most of these inventions make use of smart textiles. This is a term for a new generation of textiles, which connect with their surrounding. There are many differentiations within smart textiles, to name a few; textiles with sensors, digital ‘wires’ or Nano-components. These textiles can be used for various fields of applications such as environmental issues, medical issues and technological properties. (BRESK, Erik, 2008)

Marina Toeters, part of Saxion’s smart textile courses, explains the developments within the field of smart textiles and public apparel the following; “After quite a few projects and commercialized products are introduced into the army, work wear, medical and sport applications there must come a moment where smart fabrics enter the world of commercialized fashion. I can’t imagine it takes too long anymore as developments become prettier, mass-
producible and robust. Now is the time for brands and fashion designers to incorporate the available innovations into their ready-to-wear collections.” (SMARTFABRICSCONFERENCE.COM, 2013)

This is the case with most innovations, first they are created for defence, aerospace of the medical field and then they trickle down to the consumer market. I find these types of innovations amazing and love this future forward approach. But is denim the platform for these kinds of innovations? Most hard-core denim people are not a fan of these developments within the denim industry. As for example Mr Tonnaer of K.O.I. believes in more technological innovations in other fabrics but states that denim isn’t the right platform for it from a K.O.I. point of view. (TONNAER, Tony. Personal interview, 2013) I have to admit that for me it is also a tough development to adopt, but if the earlier bespoke characteristics of the fabric remain the same, I can’t wait.
Due the current Dutch tax climate a lot of brands within the denim industry have their head office round the area of Amsterdam. This shift started around 15 years ago and from the big brands some individuals started their own brand also within the area of Amsterdam. These headquarters and studios create the collections and develop the denim products. For this reason it would be interesting to have the fabric development as close as possible to the people who actual have to work with it. (SAHIN, Fatih, 2013) On the other hand, the actual mills that create the denim for production are located in countries like Turkey, USA, Italy, Japan, China and India. When the development is done near the companies in Amsterdam it would create a gap between the development and production. (CANDIANI, Alberto. personal interview, 2013) So what would be the pros and cons of a mill in the Netherlands?

To find out I have subtracted an analyses based on the earlier research and on the interviews with people from the industry. It creates more insight in the current situation, the background and the possibilities but also the needs of the industry. From this analyses conclusions can be made for future possibilities and it shows the obstacles to conquer.

**Opportunities for innovative weaving of denim in the Netherlands**

- Close to the market by a wide range and variety of denim brands around the area of Amsterdam
- The denim industry has a constant need for eco-friendly developments
- Increasing demand for specialty textiles (VOGLER-LUDWIG & VALENTE, Kurt Vogler-Ludwig & Ana Claudia Valente, 2009)
- Denim as a platform for innovation is a broad supported product amongst society
- Many innovation driven companies and research institutes are located within the Netherlands, Interdisciplinary research
- Stimulation by the EU for innovation, note that the rules are really strict
- Smaller denim brands struggle with the flexibility of the current mills around the world
- Strong worldwide position on chemical and material based institutes (HCSS & TNO, 2012)

**Threads**

- No historical knowledge on weaving denim
- The Netherlands is no environment to compete on the mass market
- There are many denim mills around the globe (CANDIANI, Alberto. personal interview, 2013)
- The experience of the established mills
- Asian-countries like Korea have a really strong R&D policy ((PROF. IR.) DAANEN, Hein. Personal interview, 2013)
- The denim industry is mostly traditional minded
- Dutch regional climate for innovation not optimal (HCSS & TNO, 2012)
- No academic R&D culture within denim branch (VEENHOF, James. Personal interview, 2013)
- It is really capital intensive, which need a big en long term investment
This analyse shows clear characteristics of the possible revival of the Dutch textile industry, and which form is needed to succeed. Like James Veenhof stated in an interview, “important USP’s for the denim industry within the Netherlands, are small-scale, high quality and explorative.” (VEENHOF, James. Personal interview, 2013) The prospect denim mill should show a high-level innovation and flexibility to compete with the established mills. This flexibility is in line with the needs of the smaller denim brands.

As Vogler and Valente stated in their report on the TCL businesses in Europe; “They can profit from their strong market position in specialty textiles and high-quality products. Moreover, their attendance to environmental aspects appears as an opportunity. However, these markets only provide limited volumes and their position will not remain unchallenged by the (Asian) competitors.” (VOGLER-LUDWIG & VALENTE, Kurt Vogler-Ludwig & Ana Claudia Valente, 2009)

Besides that the analysis shows possibilities for co-creation on an academic level within the Netherlands. This ‘multi-collaboration’ of knowledge should be used to its maximum capacity. Furthermore the largest issue to conquer is the financial investment. Within the next chapter these issues and opportunities will be explored more in depth.
Chapter 3
3.1 Combine knowledge to everyone’s interest

Now we have seen what key features a mill within the Netherlands need, to stand a chance against the established competition. We need to figure out what is the best way to approach the market, which in this case are the denim brands that are interested in high quality Dutch Denim with an innovative character. This fits in the ‘Product development’ approach according to the model of Anshoff. (MUILWIJK, Edwin)

In an interview I had with professor H. Daanen in an early stage of my thesis, he stated that most institutes and companies based on an innovation approach work from the market up. On request and problems supplied by the market itself. The following figure shows a sketch on the bottom-up market approach as professor Daanen explained it, drawn from the mill’s ideal market situation.

![Figure 3.1 Market strategy for Dutch Denim by Ruud van Esch, 2013](image-url)
The mill with his think tank and the market in the figure above are self-explaining, the innovation pool is functioning like a platform of innovative companies and research institutes as discussed in the text box below. The market strategy in figure 3.1 feels to me most like a pull strategy, but instead of products it is the ideas that the mill pull from the market. From these ideas (requests), the mill starts developing the possible solution. After success the mill sell the market-ready product to the brand that came with the request. This sounds to me as a workable strategy but it maybe has its limits.

The ‘innovation pool’ is a collection of committed collaborating companies and institutes that could be consulted on questions regarding a specific innovation request. This could be a case from the mill/think tank itself or a question from one of the denim brands. The interviews with the market and other professionals pointed out that all this knowledge combined the mill can achieve much more then on its own.

These Dutch institutes and companies came across during the interviews and research (the sequence is random):
- University of Wageningen, research on natural materials
- DSM, knowledge on chemicals, founder of Dyneema® and working with developments in defence and aerospace
- Saxion, material innovation on several levels
- University of Twente, nano tech & chemicals
- KICI and Texperium, innovation for recycled fibres
- Hempflax, hemp fibre development
- Artofil, knowledge on spinning and threads
- AMFI/Jeans school, textile design
- Ministry of defence - Defence material organisation, R&D department.
- Rubia, specialist on natural colouring

This list of companies should be further researched; the way of collaborating, legal issues, contracts on patents and money are a few issues that need to be solved before the advise on the innovation pool can be count as reliable.

These limits unveiled themselves during several interviews\(^2\) I had with people from the market itself. Several interviewees, among whom Miles Johnsson of Levi’s and Tony Tonnaer of K.O.I., pointed out that the denim industry is best served top-down qua innovation. In most cases the brands are not fully aware on all possibilities. This creates a strategy that, on a product level, looks more like a push-approach towards the market.

\(^2\) You can find the content of these interviews in the appendix.
Innovation and knowledge wise it is a combination of pull and push. The think-tank co-create with the most suitable partner(s) out of the innovation pool and then ‘push’ the development towards the market. This strategy suits best as the ‘Product leadership’ model of Tracy & Wiersema(T&W), this strategy is based on a company has a flexible nature and drives on innovation and results, where the first model follows the ‘Customer intimacy’ structure. The third model within the Added value strategies of T&W is called ‘Operational excellence’. According to his founders it is best for a company to manage all three models within your business but excel in one to conquer your competitors. (STRATEGISCHMARKETINGPLAN.COM)
To me, combining the best of both ‘Product leadership’ and ‘Customer intimacy’ suits best as a market strategy for a Dutch mill focused on high quality woven fabric. It combines the innovative input on a product level, and the flexibility and contact with the market that is necessary to fulfil the needs of the brands. The following strategy is a combination of the strategies above plus all information drawn from the interviews.

![Figure 3.4 Market strategy for Dutch Denim 3 by Ruud van Esch, 2013](image)

This market strategy generates a trifold stream of concepts and ideas towards the denim brands. The first (green) flow shows the pitch of complete developed products towards the brands, the second (blue) is pitching concept ideas to the brands. When a brand is interested, develop it exclusive for the brand. (NIJGH, Lennaert. Personal interview, 2013) The third (red) covers the requests from the brands.
In my opinion this way everybody wins, and it uses all knowledge to its fullest potential. It also generates the flexibility that is requested by the smaller denim brands. (TONNAER, Tony. Personal interview, 2013) But notice that in both the first 2 approaches, the mill has to work with strict contracts with the brands where they pitch the concept. This is something that might be overlooked, but all brands are in for the money. In the interview I had with Miles Johnson he advised me to keep in mind that the brands have to sign a confidentiality agreement before the presentation. So they can’t ditch the idea and use it behind your back. (JOHNSON, Miles. Personal interview, 2013)

3.2 The inner framework
The approach of and co-creation with the market was a more complicated part to figure out properly. This doesn’t mean that it is thé key factor; it is one of the many factors to succeed. The set up of the internal part of the institute is as important as the external ones. There are many ways to structure the core of a company. A normal mill is built out of the steps of the pad, which the raw material has to follow to become a commercial ready fabric.

This last part is very important, commercial ready. This makes that there are more step to it, then the ‘naked eye’ can see at first. The cotton has to go to the spinning department, into the dyeing process before it ends on the actual loom. And there are many steps within these departments that the product has to follow before it is ready for the next stage. After the woven product comes of the loom, it is so called ‘loomstate’. (TRYNKA, Paul) It then needs a lot of extra steps in the finishing department to get it market ready for the brands to give it to their factory.

If we now transfer this process of a big mill to a development mill, nothing changes in terms of the diversity of the equipment. At first my thought was to skip the first steps and source ready made yarns and warp beams, then only weave the fabric in the Netherlands. But that doesn’t make sense, because the largest platforms for innovation within this process are everything besides the weaving part. (CANDIANI, Alberto. personal interview, 2013)
The entrepreneurial structure of the company has a flat organisation, which makes each single part within the process equal. Besides that the short lines of communication between the individual parts of the process and the ‘management/think tank’ keeps the process easy to control.

This looks like a simpler version of Henry Mintzberg’s ‘fly’ for organisational structure, (STAPPER, Chris, 2012) which I find to complex for a company with this calibre. In the case of this development centre the organisational structure that suits best in my opinion is the ‘process driven structure’. (ROBBINS, Stephen P. and Coulter, Mary, 2003) The organic and flexible character provides a free flow of information and stimulates participation amongst the employees. This small organisation functions without any bureaucratic features. This keeps the focus on the product and the innovation within every facet of the company. To provide this workflow best, the company should be provided an open system culture focused on flexibility and the qualities of each individual. In words of Robert E. Quinn and Kim S. Cameron, an innovation culture or ‘adhocracy culture’’. (NIEUWENHUIS, M.A, 2010)

These are the outlines of the organisational structure. For future reference, in case the actual business plan should be written, every department should be crystalized and work out. For a complete overview all staff and employment places should be identified.
3.3 Always the money

From the start of this project it became clear to me that the biggest issue to start this development mill is the capital intensity of it. Much less run it for a couple of years. This is also the part that needs much more research to give a clear insight of the financial risks. I simply have not enough information yet to go to an investor and show what is needed for the coming 5-10 years, and what the prognoses of income will be. I like to give you an insight in what could be the beginning of the financial plan. And researched a few suggestion for the possible solutions.

The machinery itself is the biggest invest to start with. Within the production process, which I explained in the previous paragraph, all machinery for every part is needed to be relevant. Within these parts of the process there is a lot of machinery\(^3\) needed to control the production and make the fabric commercially interesting. All this equipment, when bought in a young but second hand state, will cost between the 2.5 and 3 million euros. (VAN DEN ACKER, Pieter. Telephone interview, 2013) This is only for the purchase, for a reliable cost factor of your machinery you also have to calculate the costs of the maintenance and repair.

This equipment to provide the smallest possible fully vertical denim mill, need about 1500 square meters to work correctly. (CANDIANI, Alberto. personal interview, 2013) A quick research on the Internet learns that the rental costs alone for this space in the area of Amsterdam will be between the 75.000 and 100.000 euro a year. These numbers are hard to rely on for the following reason; the needed space has a lot of requirements on electricity and supplying possibilities. For this it would be wise to identify the exact needs and demands of a mill this size, by creating blueprints. And then search for a place with this outcome in mind.

\[^3\] For an example of the complete list see the interview with Mr. van den Acker in the appendix.
As for every company, it is very interesting to see what the costs are. But maybe more important what the output is. In the conversation I had with Pieter van den Acker, he calculated what a mill with this calibre could produce. In his calculation he worked with the factors of 1 shift of 8 hours a day, running the factory for 5 days a week. With this kind of mill the output of fabric a year will be around the 100,000 meters. (VAN DEN ACKER, Pieter. Telephone interview, 2013) It is hard to calculate the exact market value of this, because that depends on quality, the level of innovation and agreements with the customer on exclusivity.

To be exact on the financial input for the first years more research need to be done, but we can conclude that capital intensity of this business is high. For financing this institute there are a few options in my opinion. Below I will highlight the options and give my opinion on the pros and cons of each option based on insights of my own and knowledge gathered by the provided interviews.

A) Funding by the EU.
This might be a good solution with a lot of independency for innovation. The need for commercializing the product is small and the focus on development is high. The downside is that the rules for funding by the EU on innovation and research-based matters are really strict and the agenda for innovations must be crystal clear. ([PROF. IR.] DAANEN, Hein. Personal interview, 2013) This means that the issues for innovation should contain a sustainable, social or medical character. And for most of these funding possibilities counts that the company has to be idealistic and non profitable. (EUROPESE COMMISSIE, 2012) To make this work a lot of research needs to be done. In the case of the House of Denim project I interviewed James Veenhof about, they make use of funding for reordering of public areas. James states the effort put in to it is still huge, but probably slightly easier then the funding for innovation purposes. (VEENHOF, James. Personal interview, 2013)

B) Funding by another mill.
This would work the following, the mill in the Netherlands works as a research and innovation lab for the bigger international mill. To provide solutions and come up with products they couldn’t create on their own. For example the Dutch mill would be a dependant of a Japanese mill that wants a higher level of innovation to compete with other mills. (NIJGH, Lennaert. Personal interview, 2013) This option comes with strings attached, less independency and maybe limited to agreements this mill already has with certain brands. But this is not the biggest problem with this construction. The problem lies in the reproducing
the innovations in the large mill that have been developed in the small one. According to Alberto Candiani it is already really difficult within his own company under the same roof. (CANDIANI, Alberto. personal interview, 2013)

This option could probably only work as the Dutch mill will only produces their own small runs, so no high commercializing afterwards. The positive side of this construction is that the development centre can use the years of knowledge provided by the funding mill.

C) Funding by private investor
This option gives the mill less independency than option A and more than option B. The note on this option is that the agreements with the investor must be really clear, and the innovative & research facet of the company should always stay in tact. The investor must support the project to the fullest and have patience with a possible return on investment. (TONNAER, Tony. Personal interview, 2013)

It could also be that a company, or several companies are willing to invest in such a place. Like a part of the House of Denim project is financed. The important characteristic here to keep in mind is the independency if the institute. (VEENHOF, James. Personal interview, 2013)

Like I stated before, the capital intensity of this development centre is high. The further research will show what option suits best, or combination of options, and can provide the needed financial resources. The hypothetical factor of this financial plan can’t be overlooked. In the end it might be to risky, or even not profitable at all. But does that mean that the project has to stop completely?

As the research shows, half a mill is no mill. So it is fully vertical equipped or nothing. That doesn’t mean that the earlier bespoke knowledge factor within the Netherlands should be used anyway. In the interview with James Veenhof of the House of Denim, it became clear that the institute and the centre he is developing (a development centre for laundry, workplace and library/museum) could be very useful for the mill. House of denim creates in their centre a sort of own ‘innovation pool’ were they connect all people from the denim industry. (VEENHOF, James. Personal interview, 2013)

This could also work the other way around. If the mill never sees the light, the created ‘innovation pool’ could be managed to a program within the House of Denim. In this case the knowledge of the Dutch institutional landscape contributes to the denim industry, but the developments for woven fabric has to be created in mills outside of the Netherlands. This initiative is very low cost, because all the facilities are already there.
Chapter 4
4.1 Conclusion

The main research question will be answered by defining the characteristic outlines for a revival of the Dutch textile industry.

How to form the revival of the Dutch textile industry 2.0, specified to denim?

From the research we can draw the characteristics of what a Dutch development centre for denim should contain to succeed. It characterizes itself by small-scale production with a lot of flexibility towards the market.

By analysing the history of the Netherlands as a country for production of woven products, we can conclude that this rich industry has almost completely disappeared. And with that also almost all technical knowledge what a weaving mill needs. Besides this decline, the Dutch never had any experience with weaving denim. Also the price for the product will be higher then in the lesser developed low wages countries. This shows that the Netherlands is no environment for mass production, on that factor no competition with the already established countries.

Several reports show that opportunities for countries in Western Europe could be found in focus on small-scale production with a high quality level. With a focus on innovation, on a scientific and academic level.

The earlier mentioned flexibility aspect of the mill is drawn from several interviews with the market, in which stated that there is a need for a mill which can provide requests of this market on small runs. Especially the smaller brands benefit from such a mill. On the other hand if the centre can provide a high-level of innovation on sustainability and more future features, for health and technical issues, the added value towards the larger brands will increase.

To provide this level of innovation, co-creation is needed. The ‘innovation pool’ can achieve this, what functions as a database for consulting these companies and institutes on certain issues.

For the operational part the foundation of the development centre is created. As a market strategy the mill benefits most from a combination of the ‘product leadership’ and ‘customer intimacy’ strategies of Tracy & Wiersema. This in combination with the knowledge flow between the development centre, the ‘innovation pool’ and the market creates a solid and original approach to the
market. The use of academic input is new for the denim market on a product level.

The internal part of the company based on a process driven structure with an open system cultural approach. This flat and flexible approach creates an organisation that is easy to control, a free flow of knowledge and stimulates the individual to excel. Robert E. Quinn and Kim S. Cameron define this culture as an innovation or adhocracy culture.

Within all interviews I’ve done with professionals the largest thread to conquer came always across. The financial intensity of a mill is huge. Although I’ve could only manage to investigate a tip of the iceberg on this particular part, it shows that needed capital investment is between the three and four million Euros. Still a lot of this is hypothetically speaking but it shows the risks that with this industry come along.

There are three options provided to manage the financial investments, funding by EU/Government, become a research dependant of an international mill or find private investors. All three options have their pros and cons, and in the end it might be the best option to combine. The importance for the strategy and innovation drive to stay independent and find investors that support the project complete.

Like I stated before, this research created the foundation for a possible revival of the textile industry within the Netherlands. It shows what it should look like, but also the enormous risks. Further research is needed to find out if this project can actually achieve its goals or its better to avoid the financial hazard. In the next paragraph you’ll find the recommended next steps for further research.

A recognisable signature is very important. Capture the essence of Dutch innovation and denim, Liam Maher advises, and then combine this to provide the signature. This, in combination with the research, will be the starting point of my end product; the visualisation of the concept for a Dutch weaving mill for denim with the focus on innovation.
4.2 Recommendations

The groundwork on research for a denim mill in the Netherlands is done, but to actually succeed a lot more is needed. The timeframe I had was simply not enough to clarify every detail. And as you’ve seen, the capital intensity of a weaving mill, how relatively small it may be, is enormous. Entrepreneurship is taking risks, but it would be wise to limit and map the risks as much as possible. With the progress I made this past four months, I think it is save to say that it would be possible to have all research finalized within two years from the moment that the research will be continued. In the end the possibility exists that the risks are just to high, but for now these are the recommendations to clarify the uncertainties.

To start with denim and innovations, it would be best to create prognoses on what to achieve, an innovation agenda. Create a document with issues to conquer and goals, supported by clear research questions. Try to put these goals in to a timeframe, so it gives you a clear view on the level of output. Based on this information it is possible to get an insight of your sales forecast. Note that this is probably the hardest part and nothing within this area of research is a certain factor. It would be built on hypothesis, but it declines the level of ‘guessing’.

Next to the innovation agenda, I recommend to investigate the innovation pool in person. I’ve managed to talk to a few, but nothing concrete. Create the actual pool, with a database of institutes and companies with all the information needed.

While the ground research is done for the operational part of the mill, to complete the operational part every task need to be sourced out and an organogram with each needed person should be defined. This also provides a more refined view on the size of the company.

The outlines for the financial part of a business plan is made, but to provide a solid forecast of what the costs will be for the coming five years every gap need to be covered. For future research the list below shows what to research furthermore, it is important to do this for each stage of the process. Furthermore research is needed, to structure the exact management/think tank part of the mill. To calculate the financial plan these factors should be kept in mind; every piece of machinery on its own, maintenance of the machines (cleaning and repair), Labour costs for complete company, location (Rent, fixed charges,
maintenance & cleaning), supplies (Raw material, dye stuff, finishing material etc.) and office supplies. During the further research extra factors might come across.

These recommendations create a clearer view on what to expect if future research might be done. At this point it is hard to provide every factor within the prognoses, for example the cost of a financial loan depends on the way the project will be financed. As James Veenhof stated after almost three years of research and negotiating with several parties on a development centre for laundering jeans; still nothing is curtain, but there is a time to just do it and see what happens. (VEENHOF, James. Personal interview, 2013) To sum up; this thesis provides the groundwork and the characteristic out lines of a denim mill with the focus on innovation in the Netherlands, for the actual risks and needed investment a lot more research needs to be done.
Appendix

5.1. Abbreviations

BDD = Benzak Denim Development, Dutch denim brand in 2009
CMT = Cut, Make and Trim. Used term for confection industry.
DSM = Dutch worldwide chemical company
K.O.I. = Kings of Indigo, Dutch denim brand established in 2008
NHM = Nederlandsche Handel Maatschappij (Dutch trading society), Dutch trading company established in 1824 by King Willem I of the Netherlands to promote and develop trade, shipping and agriculture. (WIKIPEDIA®, 2013)
Oz = Ounces, the weight factor for denim. Ounce/square yard.
TCL = Textile, Clothing & Leather. TCL is the acronym for the NACE (code by European union for economical activity) sectors 17 to 19: manufacture of textiles, wearing apparel, leather, leather products and footwear.
TNO = Largest research institute in the Netherlands, with the target to apply scientific knowledge in to real life applications.
VU = Vrije Universiteit Amsterdam (Independent University Amsterdam)

5.2 Terminology (TENUE DE NÎMES, 2013)

These are the most important terms for this thesis, to freshen up the memory or learn a thing or two about denim. It makes sure that it is more easily to understand this thesis, also for people for an entirely different industry. Extracted from The Denim Dictionary, created by Tenue de Nîmes. For full dictionary see tenuedenimes.com/denim-dictionary

3x1 Weave
This refers to the number of weft threads per warp thread. Traditional denim is woven in this 3 to 1 weave, contrary to lighter weight denim (under 10.5 oz. a yard, like chambray) woven with a 2x1 weave. The 3x1 weave is woven with a pattern like: over, over, over, under, over, over, over, under and so forts.

Abrasion
The distressed section on a pair of denim, where the fabric shows results of heavy wear. Often created with use of the washing technique with pumice stones on pre-washed jeans.

Canvas
A heavy-duty and durable fabric with a plain-weave. Normally used to fabricate sails, tents, backpacks and sturdy fabrics. Woven from cotton or linen yarns, although historically made from hemp. Levi Strauss used hemp canvas on his first pairs of ‘waist overalls’, before he found out about the cotton twilled ‘denim’.

Cast
This refers to any extra color tones that might be present in denim fabric that is sometimes added by way of an additional dyeing process. Indigo denim can have a black, brown, gray, green, red or yellow caste to it.

Cotton
A vegetable fibre collected from the cotton plant. It has been used to make cloth for over 7000 years. It withstands high temperatures and can therefore be boiled and hot pressed. Abrasion resistant and gains 10% in strength when wet. The most valuable varieties are Egyptian, Sea Island and Prima. Cotton accounts for more than 40% of the total world fibre production.

Denim
A cotton twill fabric, composed of indigo-dyed yarn for the warp and natural yarn for the weft. Known as a work wear fabric since the late 18th century, it is now most commonly associated with jeans. Supposedly the name stems from the French ‘serge de Nîmes’ a silk and wool fabric that originated in Nîmes, in the south of France. The fabric is nearly always indigo-dyed and has diagonal ribbing that can be seen on the reverse side of the fabric.

Dyeing
Tinting procedure of the denim cloth, in which the natural cotton warp yarn is dipped into a number of indigo dye baths. After each bath, the denim is hung out to allow the indigo to oxidize, which eventually turns the color from yellow to green to blue. As a last step, the yarn is rinsed to remove excess dye.

Finishing
a) Finishing processes are used to age denim garments or create other effects by various means such as the enzyme wash or the stone wash.
b) It may also refer to the very last step in denim production, which consists of three phases: running the denim through rolls to remove excess lint or fibers; hauling it through a gas flame to burn off these fibers. Lastly, the cloth is dipped
in a vat of a finishing liquid and run through ringers to remove any remaining liquid.

Hemp
Is a low-cost and extreme versatile seed plant. It is cultivated in China from as far back as 4000 BC. It is one of the strongest plant fibers and creates a durable fabric similar in texture to linen.

Indigo
Known as the living color, as it does not bond strongly to the fiber it is applied to. Its first use can be traced back 4000 years and was obtained from the leaves of the Indigofera plant. China and India are the natural homes of this plant. Exports of it rose dramatically in the 15th century when the sea route to India was discovered. Around 400 years later, German scientist Adolf von Baeyer perfected a formula for synthetic indigo, which soon overtook the demand for the traditional production of the dye. It is to this day one of the world’s most favorite dyes.

Loom
A loom is a weaving machine that produces fabric by weaving vertical threads of yarn with horizontal threads. There are three types to be distinguished: Dummy shuttle, Rapier, and Fluid Jet.

Nylon
This material first saw the light of day in 1935, courtesy of Wallace Carothers at DuPont. It was developed as a substitute for silk, and is one of the strongest artificial fibers around. It is durable and light weight. In fact, the only drawback to it is that it doesn’t absorb well. Nevertheless it is commonly used in outer wear.

Natural Indigo Dye
A costly and time consuming process. It takes up to almost one hundred days to prepare the dye, called sukumo in Japanese, made from dried polygonum leaves. The dye is then mixed with lye and lime and fermented. The dyeing is usually done by hand, by dipping the garment in and out of the dye pulp. The more dips, the deeper the shade of indigo. Natural indigo, unlike synthetic form, is colorfast and its will not run when washed.

Open End (yarn or denim)
Often referred to as ‘O.E.’ this is the most common type of denim. Open End is an industrial type of yarn spinning using turbine machines. Open End denim
was adopted by many manufacturers because it produces strong, durable jeans for less money and in less time, but is said to lack the quality that ring-spun or ring-ring denim typically have.

Organic Cotton
This is cotton that is grown in soil, free of any chemicals, for three years. It therefore has a low impact on the environment and also shies away from genetical modifying.

Plain Weave
Also known as tabby weave or linen weave is one of the most straightforward ways to produce cloth. The filling yarn passes over and under each warp yarn in alternating rows. The fit of the cloth can be adjusted by varying the tension of the threads during weaving. The thicker the yarn, the stronger the final fabric.

Ring/Ring Denim
This is the term for traditionally made denim, where ring-spun yarn is used for both the warp and the weft. The yarn is created by rolling the fibers, rather than pressing them into shape, and creates a contrasting structure with a slightly washed denim look. Also named “double-ring spun denim”.

Ring Spun Denim
Ring spun yarn is made by constantly rolling and thinning fibers, using a ‘ring’ for spinning. It uses longer fibers which means the end result is a more uneven yarn. It was used as method of production until the late 1970s, but because it is labor intensive and takes more time, ring spun denim was replaced by cheaper, open end yarns. The rough and uneven look is now back in demand, because of its likeness to traditional vintage denim.

Sanforized
Indicating jeans that underwent the process of sanforization. Raw fabric is likely to shrink up to 20% on the initial wash. Sanforization stabilizes the fabric before it is cut or washed, by stretching and pre-shrinking it. It reduces the chance on shrinkage to less than 3%. The process was named after Sanford Lockwood Cluett and was patented in 1928 and first used in 1936 by J.C. Penney Big Mac. Lee jeans soon became sanforized, Blue Bell used them on their overalls and the Lady Levi’s introduced in 1938 were sanforized too.

Singeing
Once the jeans are as good as finished, the last thing that is done to it is singeing, whereby any stray, loose fibers are burnt off using a small, controlled flame.

Skewing
To prevent leg twist that can happen during the shrinking process, manufacturers minimize this effect by skewing the cloth in the opposite direction of the twill. Karin Hakanson patented this step in 1976. Denim is usually skewed between 4% and 10 %, depending on the fabric’s weight, twill weave yarn size and yarn twist.

Stretch Denim
This refers to a denim hybrid. It is denim fabric made with a percentage of elastane fiber in the weft, which makes the model cling to the body thanks to its elasticity. Cone Mills was the first (American) mill to produce it, back in 1962.

Twill
A specific type of weave: the weft thread is passed under and over several warp threads rather than just one (plain weave).

Warp
A specific construction of yarn in which the vertical yarns are alternately woven over and under the weft. It makes the resulting material stronger. In denim, warp runs parallel to the selvage. The term “warp” is said to have been derived from either the Norwegian “varp” or from the Dutch verb “werpen” i.e. to throw across.

Weft
This is the term for the horizontal threads that pass through the warp threads during weaving. The term ‘weft’ would have originated from the Old English ‘wefan’, to weave. In jeans, weft threads are typically white. Weft threads are generally not as strong as warp threads because they’re not as much strain and stress.

Yarn Dyed
Fabrics where the yarn has been dyed before the weaving. Denim is a prime example of a yarn dyed fabric.
5.3 Sources

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Due to the lack of written information about denim weaving in the Netherlands, and weaving denim with an innovative factor a lot of the research contained interviews with professionals from the industry. Furthermore this also covered the absence of a case study on a similar development centre.

Denim Professionals on Denim & Innovation
Personal interview Liam Maher, head designer for Denham. @ Denham’s corner store in Amsterdam, 01-Nov-2013
Liam is work wear inspired. This said, the cultural meaning of denim that comes with it passionate him the most.

After short explaining my thesis; bringing Dutch innovation to the Dutch denim market and researching the structure and setup of a development and innovation centre, Liam says the following. The Netherlands is known for his innovations. As an example he uses the project ‘Smoke’ from designer Maarten Baas. Which is a collection of furniture that is literally burned. (HTTP://WWW.MAARTENBAAS.COM/) From this example Liam explains Dutch design/innovation as a tripod. First of all it’s visually recognisable; if you see a piece of burned out furniture, if it’s a cheap knock-off you come across or you enter your house for the first time after there was a fire, you think of the designs of Maarten Baas.
The second pillar is story telling. Dutch design makes you wonder where it came from and how it is made. The last one is the actual innovation. The process of making the ‘Smoke’ collection is very interesting. The furniture burns down, but is still recognisable. After this is impregnated with an inventive resin that makes the material even stronger than it was before. The rivet in a pair of jeans does that for the denim world; visually recognisable, it makes you wonder about the story and there is an actual innovation level.
This level of Dutch design is not recognisable in the Dutch fashion world. Only within Haute Couture, with Victor and Rolf as it biggest ambassadors. Sometimes projects work out, like the G-star Elwood. But it would be great if the quantity flow of these products could be increased.
According to Liam the best approach for my project is this. First capture the essence of denim, than define the essence of Dutch innovation. And melt those two together in one project. Even if the innovation part doesn’t work as expected and we can only manage to create an small scale mill which produces small amounts of ‘Dutch Denim’ that would also be a real nice achievement. This statement is carried by a beautiful and interesting story of Liam’s latest summer project. Which contains three British designers, one from Florentine, a new invented diet and it made him realize that as for both fashion and food the cultural connection is very important. In other words, products get more value if they sourced and produced on the land where it grew.

Great cases of another approach of Dutch design are Vlisco and ‘Delfts Blauw’, Vlisco(since 1843) is the Dutch batik textile company, which brought the batik technique from Dutch East Indies to copy for cheaper knockoffs. Vlisco innovated the technique. The products got via the African soldiers from the Indies to Africa, now many years later Vlisco is the most appreciated brand amongst the African continent. The case of ‘Delfts Blauw’ is a little bit the same, what copied the Chinese porcelain and made it their own.

On the structure of the innovation centrum Liam says the following; Open source will be difficult but I would appreciate it a lot. Research for a study case Ecco Leather, which uses creative minds from other brands and branches to innovate their leather. If Liam had the chance to innovate something from the denim industry right away, he would invent an indigo like dying
with exactly the same characteristics like the fading and colour but without the staining(crocheting?) on your white couch.

As last advise he give the tip to maybe work with a bigger weaving mill, like the example Ecco* Leather which is originaly a Danish company. Also as a work wear inspired person with a small amount of dedication towards denim, he likes to see such a centre in all woven fabrics.

*Ecco Leather, the production facility in Dongen(NL) is completely R&D. Open circle approach.

Personal interview Miles Johnson, Design Director for Levi’s XX, 6-NOV-2013, @Levi’s XX office, Olympic stadium

Quite simply, according to Miles Johnson from Levi’s Vintage Clothing, denim is fabric that contains 2 different colours; warp and weft. If you have the same colour warp and weft ,it’s twill. You have to keep it quit open, that broad.

Denim always evolves and tweaks itself. It always moves slightly, is not going to be a reinvention of the fabric itself. Someone will spin the yarn in a new way or ad a fibre content that they didn’t think of using before. Or adjusting some kind of component of the cotton measure. To change its appearance. The obvious is thing is to do this by shade.

It doesn’t have to be that much of a move on to look different enough to get exited about. One of the things about a denim trend is that you don’t have to reinvent the wheel to please people. There has to be a familiarity to the fabric and the detail, for it to be successful. You don’t want to completely change and try to revolutionize; people want a pair of jeans. Don’t go beyond people’s expectations, beyond what they expect from denim. There is a whole world of what you can do with it as a fabric, but it still has to register as denim.

The collaboration with DSM came from the US department of Levi’s. It has nothing to do with LVC department in the Netherlands. Levi’s has a complete R&D department in San Francisco*, that are dedicated to innovation in to basic platforms like denim. So they always look in to new and interesting ways to spin it or twist it, and there are projects on-going with all the mills that we work with. Considering the size of the brand, it is important for us that we do that. If Levi’s wants to be number one jeans brand, than it has to keep putting innovation in the product.

For the department in the Netherlands, LVC and Made & Crafted, they work very close with the mills to create the fabrics they want. In the case of LVC it is reproducing it historically correct. With Made & Crafted they often go to their main suppliers like Cone Mills(USA) and ask them to, for example, do a structure that similar to something from LVC but spin something else through the weave. A combination of historical background the craftsmanship of Cone Mills, but then visual different.

Miles doesn’t see the direct need for R&D here, mainly because they brief the mill clearly about want they want to develop. He don’t thinks he’s going to us it very much. Because Levi’s has an exclusive development centre in Turkey, which he uses on a very regular basis.

According to Miles there is a big difference between mills and that they are not equally suitable for innovation. For example; Isko(Turkey) is more forward thinking then Cone Mills, but the minimum quantities that you have to order are enormous. That can be 9000 of meters fabric. Now a company like Levi’s can compensate a smaller run with the other orders, or ask the mill if they change the warp yarn or the weft yarn on the loom for the last 200 meters of the run. And even with Cone mills the minimums are 4000 meters, which is a lot if you want to create a special. There are fabrics that can go smaller, but that also affect your possibilities. In the term of brands, the smaller you are the less you can ask for with the mills. This sounds
logical, but this fact is very interesting for a niche development centre in the Netherlands. Normally smaller brands end up ordering of the rack, but what if they shouldn’t have.

A really important aspect for brands is to think about where you want to use the developed fabric fore. It is not only about the creative idea of this amazing fabric, but where are you going to use it. And how many of it do you need. Ones you developed the fabric it is best to use it right away, because the mills or the factory is not going to store it for you. So you have to use it or store it yourself, which costs money. Otherwise the brand uses half of the 9000 meters and the factoryoughs the rest out or sell it to someone else. And that was not the intention when you started developing the fabric.

Levi’s doesn’t really work with third parties on there fabrics, development comes is all in house. The only parties Levi’s asks to help out are mills, yarn supplier or a chemical company.

They work with a great chemical company from Italy, called Garmon. Besides that, they not really work with people outside of their company. Other then their suppliers. But he mentions that most companies doesn’t have this luxuries position that Levi’s has. It is much more interesting for smaller companies, if they are willing to put their money on innovation.

On the subject of open source, open innovation and closed culture within the fashion industry; Mr Johnson isn’t not necessarily protecting Levi’s his DNA and ideas, but in the early stages of the process he likes to work within a closed environment. Most likely his own company. In the end you’ll end up all in the same factory, by that time it is to late to copy it for this season. The part of the process where the ideas will hit the table, he doesn’t like other brands to walk around that same table. In an ideal world the innovations should be completely exclusive, from a brand point of view. But mills do it all the time, they come up with a fabric and then sell it to several brands at a time. Miles doesn’t care about brands using the same fabric, it is what the brand does with it and how they use it.

According to Miles the best set up for an innovation and development mill in Holland with small runs is the push-innovation strategy. Innovate from ideas the company has and than run the outcome by brands that would be interested. The important thing to remember is that before you show the product you like to sell, the company signs a confidentiality agreement. So that in the case the other party doesn’t continue with the product, they don’t have the chance to run of with the idea.

Pitch the idea to a brand, then give the brand the opportunity to buy themselves in. Give them first option. Then develop the idea further more with both parties.

Miles can’t talk for other companies and can’t say if they need the help from third parties. Normally the development takes part between mill or thread supplier and the brands.

Miles noted that to set up a small-scale innovation and development mill, you have to be able to control skewing, shrinkage and sizing. The machinery to do this is huge, a lot and expensive. So first find out how to control this. Otherwise everything is ‘loomstate’-straight from the loom without after care- in which case not suitable for commercial purposes.

*Levi’s R&D centres are mini versions of a large factory. They contain all sorts of machines for washing, scraping, sewing, sprayers and the people that are specialized in it. And there is a big studio where all the designers can work. But it is all with ready made fabric, they don’t weave/invent fabric there. SF is named Eureka. (1 yr old) The Turkey one is in the city called Corlu. Also one in Vietnam(10 yr) and Poland[small]
Denim to me is firstly the description of a fabric I love. It is tough, durable, honest and natural. But apart from the fabric it’s a feeling and a way of life. Its banned in some situations along the way which I like........it has a rebellious streak running right through it which has always appealed to me.

Denim fabric will evolve in many ways. Firstly there is the comfort factor, every season there are new innovations in weave and in finishing which are improving functionality and comfort. Then there is evolution in sustainability. Recycled denims are looking visually better and its easier to make the decision to choose them. Years ago to be sustainable you had to make a compromise on the fabric. Now each season that improves. Of course it is also market demand, the consumer is more educated to the waste caused by denim and it now means more to them when they can help by choosing a more sustainable product. Of course also the waterless ozone washings are improving and are more readily available at different laundries. So you can now even offer a lower priced jean which looks good and is more sustainable too, this used to be impossible even five years ago.

Our obsession with self image will also effect fabric. Look at the new Levis Revel women’s denim. The fabric is partly restricted in areas on the jean to hold your body in more effectively. Vanity is changing denim.

But the 3x1 twill conventional constructions should always stay and I don’t worry about that as there will always be purists out there who want to guard the history. Also denim is rooted in its durability and that is an effect we will always want from a denim, that tough durability.

Innovation is in every part of the jean. Pattern and fit innovation are massively important to the evolution especially to Womens Jeans. The new fabrications also help the fit and the aesthetics of design compliment it too. To me every single element is just as import, from the fabric, to the trims, to the fit, to the washing and the identity of the jean. When I wear a jean what is it communicating?What am I or anyone else saying about myself? I’m also very interested in the whole marketing and branding psychology side to it.

I would like to see (and know it will happen) more sustainability in denim fabric and washing. Also more fabrics which act and look as a traditional denim but have the best comfort and recovery.

It sounds simple and obvious but these are hard to find. The consumer demand for low cost and speed of trends is destroying a higher level of the craft. It makes me a little sad that consumers are very happy, oblivious even to cheap fabrics and production. Making a perfect high quality pair of jeans can be an art, but I’m not sure how many people care about it.

It would be great if all brands could be involved and go to experiment in workshops. There would obviously have to be confidentiality agreements, theirs a lot of paranoid denim perverts out there.

Techniques and machines that would most echo what would be used at the “real” laundry would be the advantage. Also having real technical experts on hand to advise designers and as said above, it sounds crazy but complete privacy.

R&D as part of the turnover is hard to measure. In actual scheduled in time and budget for R&D it looks very little in the grand big scheme. And as there is constant designing with the evolvement of many denim injections into the market the designer never stops designing.

A true designer works 24/7. Your eyes are always taking things in. Luckily you love it so your spare time is spent searching for new ideas, themes, details and trends. It’s a bug.
So luckily for the brands they are benefiting from the poor designer’s passion. I can’t give you a figure here for the amount of dedicated turnover but every designer will tell you, it needs to be more.

I’ve seen the biggest cut backs of course in the last few years of the crisis. Teams travel less, buy less samples and work for less. Unfortunately it means many brands will just copy more. But not to worry there are still many creative’s and pioneers out there to push us forward and hopefully the consumers who will continue to appreciate that!

Personal interview Lennaert Nijgh, Founder Benzak Denim Developers (BDD) + denim developer for Kings of Indigo, @BDD’s studio Amsterdam, 12-Nov-2013

Lennaert explains denim is a woven fabric, originated from a functional and durability. Worn by every layer in the society, with a lot of historical symbolic. The fabric has the beautiful characteristic, like leather, to live. It brings personality to a product, by the shadings of the indigo after wearing. Collection wise, fabric is very important for me. Because the fabric is my starting point, I built my products based on aspects of the chosen fabric. All denim fabrics are based on indigo, but all colours differ. Within a range of fabrics and even within one fabric you get this amazing colour scheme.

He agreed with on the idea, I heard from Rene Strolenberg (Tenue de Nîmes), that the differentiation between the mills in Japan is getting bigger. Some of them choose for low cost production in China, with lower quality. Others, like Kuroki, choose to innovate. This comes from point that for the last 15 years these companies didn’t further evolve and only relied on heritage. The fabric research and developments on the highest level in Japan, mostly Kuroki, he finds amazing. Most crazy developments are used by the brand Naked and Famous. For the vintage inspired segment the developments within fabric will be small. A lot of developments are going on in the fields of stretch fabrics and recycled fabrics. Note that within the recycled fabrics a lot of improvement could still be achieved, because today these fabrics are really hard to control in washes and quality. The movement in water reduction within the washing process, with laser techniques and Ozone bleaching, demands also a lot in fabric development. Today not every fabric is suitable for these techniques, which creates a demand for fabrics that are.

So that these ways of washing jeans can evolve to the new standard.

Lennaert advises on innovation; work as far as possible away from the market, at the stage where the ideas and the creation start to generate on a material level. To explain this Lennaert states; the denim market is in most cases not aware of all current possibilities of materials and techniques, not on the level that professors and institutes are, simply because it is not an everyday activity of a jeans developer. Also its best in his opinion is to generate a two-way approach towards the denim brands. One is to pitch complete developed products to the brands, the second is pitching concept ideas to the brands and when a brand is interested develop it exclusive for the brand.

Open source innovation is not an option within the denim industry with the simple explanation; money. A brand will not reveal its secrets. It is also harder to create open source innovation amongst the community, because knowledge of fabrics is scares amongst the average consumer. Within the digital world this works much more easily.

During the interview I had with Lennaert Nijgh, he asked the question; why, besides the fact that it would be amazing, would people built a weaving mill in the Netherlands? He asked this because of the fact that the Dutch have no historical knowledge of weaving denim and Netherlands has not the right environment to generate a big producing company. So the Netherlands could never compete with the already established countries. He answered his own question by highlighting the bright sight; our technical and chemical knowledge on materials
and innovation is enormous in Holland. This makes a small-scale development of fabrics with this approach an opportunity.

Personal interview Tony Tonnaer, founder of Kings of Indigo(K.O.I.), @Office K.O.I. in Amsterdam, 14-Nov-2013

The simpler technical explanation of denim is a woven twill construction with a blue and white thread. In which the blue thread started as a natural indigo dyed yarn that later on evolved in a chemical extract. The indigo makes the characteristic fabric ‘alive’. On a personal level, Tony says, denim is always in motion; the many variation, the rich history of the fabric and also the bright future of this product. The fabric constantly evolves in ways of construction, compositions of fibres and new ways of laundering.

Comfort and Craftsmanship are the two development pillars of the last ten years, which will keep evolving in coming ten years. Especially comfort will innovate the fabric. Another main innovation trend is the ecological components that will replace the current components, think of recycled and biological cotton. Also the research and demand for cotton replacement, other that the now known examples like hemp, flax (both not strong enough on its own) and Tencel® (which has a very smooth and shiny character, not so suitable for menswear), is growing. Which is needed because of the polluting factor of cotton and the future global demand. On other levels of innovation like technological or health issues is a personal interest, other then some current comfort finishes like they have now with aloe Vera for skincare. He definitely believes in more technological innovations in other fabrics but states that denim isn’t the right platform for it from a K.O.I. point of view. Not said that there isn’t a market or brands for these modern and ‘high-tech’ types of innovation within the denim industry.

“Sustainability is no longer a ‘niche market’; it becomes a substantial part of today’s society. Unbranded, it will be the standard within every aspect of future products. The whole world will slowly change this way, look at coffee, food, gasoline and cars. Clothing is no exception, there is no way back.” – Tony Tonnaer

Denim fabric developing in the Netherlands is a tough job, especially the dying part. Therefore Tony recommends buying ready made warp ‘trees’ or the spun thread and then work from that to solve the complete indigo dye process. This process is very capital intensive.

For Tony and K.O.I. the most interesting field of innovations is the sustainable level. If they find a beautiful fabric they try to develop a sustainable variant of this fabric with the providing mill. In most cases, outside of Japan, the minimum ordering quantities are too high. From this point of view, and the conceptual aspect of a ‘Dutch woven denim’ are very good USP’s. It is a really tough road, financially and also on a knowhow level. The Netherlands has no background in weaving denim, but on a small-scale level, with a Japanese approach, it is definitely possible.

Tony points out that, for him, it has more value as a conceptual marketing tool and that it will not work for mass production. And still then it needs a very dedicated team and a large investment to make it happen.

On a small-scale level it is still a big investment to make the concept work. The city of Amsterdam or the government should fund this, although if the concept has reliability there would also be a good chance that a prosperous private person will invest, or a mill that invest in a dependence in the Netherlands. Tony notes that he has more faith in this set up within other fields then denim.

If the Netherlands had such a development centre it would for Tony be very interesting to see parties on board as KICI (a Dutch innovative textile recycle company) for recycled cotton. Or
maybe an agricultural university Wageningen for developing better raw materials like hemp or nettle.

For approaching the market it has to be innovation driven. People have a lazy nature, this said it is better to innovate and develop based on own ideas. Then create a base and present that towards the brands. Most denim brands are not that technical experienced, so it is better present the innovation ‘on a plate’. When the word spreads, the brands have maybe questions they will come with themselves.
To round up ‘Think local, act local’ is one of their main pillars, so if the possibility is open to make use of a completely Dutch woven product with a durable character it is even more beautiful. But without a sustainable character it’s not useful for K.O.I.


Denim described by James is simply a blue and white woven fabric of cotton. A beautiful fabric, that feels great and can be used to create amazing products.

House of Denim, established in 2009, with the motto; Towards a brighter blue. Dryer, cleaner and smarter. To accomplish this vision the created workshop with several experts, and out of these sessions came four instruments to come to their goal. The four instruments are Education, Research, Entrepreneurship and Network-meetings. These network meetings have the important factor to link the people in the industry that normally doesn’t talk to each other (like the spinning mill and the CMT department or the buyer and the laundr), but should collaborate to innovate and accomplish ‘a brighter blue’.

At the moment there is the education is set up in the Netherlands with the jeans school in co-operation with the ROC. This project growth in the future and go international to cities and countries who are important for the industry such as San Francisco, San Paolo and Japan, Italy and Turkey.

The pillar entrepreneurship will start within the new building the ‘Tramremise’ in Amsterdam, in which a company will start which creates a new denim products with recycled jeans/denim. A kind of repair, re-use and recycle workplace.

As for the network part of the project they established the Indigo Embassy, which travels around the world the talk and inform people within the industry and is used as an instrument to brand Amsterdam as a jeans capital.

For the research part they noticed that a lot of R&D parties work within their own lab without communicating. To provide a higher level of outcome they are building a lab that also functions as place to combine different fields of knowledge. He also states that the denim industry needs to apply more scientific knowledge to innovate.

The new building in Amsterdam will be divided in a workshop with CMT, an archive for educational use with fabrics, books, and jeans. And the hardest piece to accomplish is the laundry lab. This laundry lab has the same approach as the project I’m researching at the moment, it will be used to create washing concepts (for commercial use) and next to that the lab will function as a place for innovation. The possibility for brands to create the washings for their collections within their own city, close to the office.
Important for the denim industry within the Netherlands, James states, that the USP’s are small-scale, High quality and explorative. Craftsmanship and innovation within Amsterdam. James also defines that it is a big opportunity for the Netherlands that we are able to combine
academic institutes and the denim world. For the moment he only had conversations with several institutes but no concrete agreements.

For the financial part he teamed up with the Turkish FG group, and sourced half of the investment within the Netherlands. This is only to renovate and transform their part of the ‘Tramremise’ into a laundry lab. On the other hand they are still working on the financing for the exploitation, this investigation takes place amongst the denim brands. They ask their prospects; is this idea desirable for you as a brand and is this a reason for commitment/investment, besides that the parties can join as customer. James notes that after all the work he put in to it the last couple of years, he still can’t assure that they can continue to pay the rent in 3 years. The request to be a part of this institute comes from all over the world and from all departments of the industry. But he can’t make any promises, which is logical. To end this financial part with the exact words of James; Let’s just decide to do this motherfucker.

James Veenhof also told me that they managed to get a funding by the city of Amsterdam, ones all the parties are on board. And that the city of Amsterdam also arrange a funding by the EU. He also notes that this is a lot of work to make this funding happening. They make use of funding for reordering of public areas, which I think is easier to achieve than the earlier mentioned funding on innovation as Professor Ir. H. Daanen told me about.

For this thing to work it is important to have a strategy and approach that it has some commercial value. For example he states that if we only buy an old shuttle loom, which we run from time to time, it would look like an open-air-museum. Which can achieve a very small amount of fabric a year, with a price that is too high. It is also very important for him to keep the lab independent as an institute, to provide the best environment for sustainable innovation.

They way they approach the market is that they see their location as a bungalow park, in which a brand can rent a box (bungalow) or own their box within HoD’s location. Then depending on the need of the brand, they can choose out of a range of services that the institute supplies. Like a menu. For brands it is really important that the institute provides closed working places, so no open source developments.

On the weaving project he states, because of the high capital intensity of the spinning process it is really hard to create a workable business model. But without a the process of spinning the innovation still comes from the yarn suppliers, so it’s needed to be relevant. The idea to have denim from Amsterdam is super interesting to him. But his idea for a woven product is slightly different; Collaborate with Kici (recycle specialist) for post-consumer denim, then fiberize the jeans, spin the recycled fibres and weave in for example Italy. Then bring back the woven product for CMT in the Netherlands. So the original recycled fibre (raw material) comes from the area of Amsterdam. It could also work when also woven in the Netherlands, for example with an old loom from the Textile museum in Tilburg, but still the spinning part is done somewhere else. This recycled denim, has a different look and feel, so it needs to be branded differently.

James states that a weaving mill in the Netherlands has to conquer different difficulties to succeed, one of them is the financial part. But also on the operational part you have to compete with companies like Candiani, Ortha and Isko, which have all three more, then 100 years of experience. The idea of a weaving mill in the Netherlands is never completely gone, but while he’s at it for so long the cons seems to win it from the opportunities.

During the interview, which looked more as a brainstorm session, the idea came across that it is maybe enough to create the opportunity for concepts to arise. Like the place is in the Tramremise is going to be for the denim industry, but with more opportunity to come up with
ideas and develop concepts with different parties. House of denim will be the neutral place to
invite people to brainstorm and initiated co-creation.

Personal interview with Alberto Candiani from TRC Candiani denim mill Italy, @Jeans school
Amsterdam, 26-Nov-2013

On the idea to set up a new mill in the Netherlands he commented that it is for two reasons
very hard to make it successful. The first is that it is a super high capital investment. This is also
what Tony Tonnaer(K.O.I)stated and that you need someone behind it that really believes in it
and is willing to invest on the long term. On the other hand Mr. Candiani thinks that the world
of denim mill is saturated, even in the developing countries he think that there is no place for a
new mill. At least not for production. On a development level it is possible, but it is still very
difficult according to Alberto. And he explains what difficulties we have to conquer for this
weaving lab to be successful. This is a factor that didn’t accured to me in an earlier stage, but
Mr Candiani is saying that at their mill they have already a real hard time to reproduce exactly
what they developed in their R&D department. To transfer they exact ‘recipe’ form development
to production is almost impossible. The cost and risk for Candiani each time they want to put a
development in production is about €100.000, because of the fact that it takes them 6000 to
8000 meters to get it right. That’s why they normally start developments from production.
He also states that we could manage to get a 80% reliability between development and
production that is enough reason to start. We talked about the requests from brands to develop
something for them and what the MOQ’s of Candiani are in that case. It really depends on
what they want but especially what is on the looms at the time the request comes in. If it is a
fabric the are producing at the moment and they only want to change the weft and that weft is
available, so the warp could stay on the loom, the minimum is 50 meters. Which is nothing. Of
the have to develop a fibre, thread or have to start a new production because the warp has to
differ from a available fabric the minimums are from 8000 to 17000 meters. Which is a lot,
but very understandable due the fact that they have a investment of 6000-8000 meters to get
correct.
Out of the top of his head Mr. Candiani thinks that for the smallest fully vertical mill the
minimum space you need is 1200 to 2000 square meters. This could be done different, with a
supplier for the yarns, which skips the part of spinning and dyeing. In that case the mill is more
of a gimmick and can’t accomplish the needed development to be successful. The biggest part
of development is done in construction, composition and dyeing of the yarn. This, together with
the finishing part of the process is development wise the most interesting. He states that he
thought about this kind of project himself but that the suppliers of the machinery then have to
make the one of the biggest inventions; small equipment.
The EU signalises that a lot of research for innovation doesn’t hit the market, because these innovations do not evolve to the commercial level they should have to be market ready. The so called TRL (Technology Readiness Level level).

A lot of institutes, universities and academics are mostly interested in the theoretical part and leave the implemented part for what it is.

Another explanation for the not commercialized innovation is the problem of the risk for buyers. People within this position mostly choose for certainty, not for options that are not secured for profit. The EU is decreasing this risk for the buying parties to cover a percentage of the costs on innovative products.

Besides these problems professor Daanen states that the textile knowledge on Dutch universities is very low. And there is a big gap between the innovators of materials in Europe and the designers that make use of these materials.

For the future Hein Daanen thinks that the outside world and technology will further and further integrates into current and new textiles. He also sees a change for sensors in textiles and clothing, which creates a platform to extent the signals of the body to better monitor and understand what is going on.

But also signals form mobile devises that connect through textile with your body. As for parties for a development centre within the Netherlands professor Daanen informs that TNO isn’t that interesting. Because they handed their textile lab over to TUV Reinland in Germany, which could be used for testing, and on textile-innovation the team is very small. The knowledge is mostly gone to the material department of Eindhoven. Hein Daanen explains that within the Netherlands it is most likely for a development centre within the denim industry to work with parties like Saxion for material innovation and Alcon (co-initiator of the Texperium-project ‘Jeans for jeans’ for denim recycling) from a sustainable point of view.
Telephone interview with Giovanni Henssen, Application Manager at DSM Dyneema, 12-Nov-2013

Giovanni is responsible for development of the fibre Dyneema. About the current collaboration with Levi’s he states that the concept and first development of the fabric-combination of cotton and Dyneema came from DSM. After they developed and licensed the idea, they got in contact with Levi’s.

DSM developed the first draft of the fabric at IFTH, an independent textile lab in France. This institute for developing and testing fabrics, originated round the year 2000 from the ‘bankruptcy’ of the French textile industry.
DSM is more and more pro open source innovation but warns for a lot of problems with the licensee and rights. With open innovation between companies it is hard to pinpoint which contributions is worth what percentage of the licensee. This is why the contracts need to be very strict for starting this type of project.

For now they achieve their goals by intern development and when the concept is ready they search for a commercial companion to get the product ready to hit the market.
Giovanni states, after explaining the concept of the innovation centre on denim, they see potential in developing solutions for problems assigned by the brands themselves.
The added value according to DSM to be part of the innovation pool is knowledge on chemicals, Dyneema and other synthetics and the knowledge for developments within industries like defence or aerospace.
Personal interview Walid Zaazaa, Senior design manager of Calvin Klein Europe, @ Calvin Klein office Amsterdam, 19-Nov-2013

Walid Zaazaa, former Replay and DKNY designer, describes denim as culture platform, instead of a fabric. As a fabric, he has to be honest, it is getting less interesting for him then the fabrics developed today. For example all the innovations withinnyons are much more future forward then the developments within denim of the last years. He’s born and raised within the denim industry and really appreciates a well woven denim cloth, but todays denim doesn’t really exited him anymore. He thinks to make this happen again it would be really interesting to move the field of knowledge and inspiration outside of the denim industry and see what is going in on in other departments of the clothing business.

For future evolution he likes to combine the established denim and mix it up with what current innovations in other fabrics bring to the table. To search for more novelty in denim. For his own collections he works the same way, to provide solutions for some problems he works with outerwear manufacturers instead of denim producers. Because the developments in some areas of the clothing industry are further developed.

On the developments with the current mills he explains, that the problems lay in the minimum order quantities and price ratio. As a possible future customer he states; if tomorrow someone could provide an innovative mill with small quantities on a reasonable price level(between 8 and 14 euro according to Walid Zaazaa), that could change the denim game in Europe for a while. A more flexible mill would be very interesting within Europe, because the following reason. In Europe there are no commuters, people that combine the demands of several brands and then work that out with the mills, within the Asia this phenomenon is common. This people solve the problems of high quantities.

As a future development he likes to see denim from nylon, without the smoothness of nylon, with an indigo effect. That also age in a beautiful way. He likes to combine the best of denim with the best of nylon.

For a market strategy Walid thinks the mill should initiate the innovation, because a lot of people in the denim world know really a lot about denim. But if you only know denim you know nothing, this is applicable for everything.

For a structure and set up of the development centre, Walid thinks on an innovation level, it is very important to also work with or have your own spinning capacity. The level of innovation is probably much bigger at the stage of the fibre or the yarn then in the weaving process. Look at companies like Goretex, Dupont and Tencel they only produce threads.

It is important to learn the rules properly, and ones you learned them properly you need to break them down.” – Walid Zaazaa

“I always liked denim, I will always like authentic denim. But it doesn’t excite me anymore. Even if you bring it back to the original story; cultural the product was something to contest the power, but now it became the norm. Hopefully some people can bring revolution back to denim, it is the time to do that.” – Walid Zaazaa, 2013
Telephone interview with Pieter van den Acker owner of the textile mill Van den Acker (since 1807) in Gemert (NL), 02-Dec-2013

This interview is to find out how the operational part of a mill works.
Machinery for a small-scale fully vertical denim mill.
The calculation made, is with ‘young second hand’ equipment in mind, with the total expenses between the 2.5 and 3 million euro. This indication is build on their own equipment and experience since the year 1807. Within the calculation for the development mill the following machinery is included;

Steam machinery
Spinning department +/- 450 m2:
Spinner
Winding machine
Warp beam
Starching machine
Dyeing department +/- 300 m2:
Paint kettle
Pre treatment barrel
Dryer, Air dryer
HT pressure paint equipment
Hoist
Weaving department +/- 150 m2:
5 small looms
Finishing department +/- 300 m2:
Pre-skewing machine
Tented frame
Singeing machine
Pre-shrinking machine
Testing lab

The complete list can differ on the choices you make on flexibility and differentiation. For example within the finishing department you have the choice between a continue or discontinue system. Pieter states that with a total of 1500 m2 it should be enough room to built this mill. But he marks that for the dyeing department you need to build extra height, by creating a basement beneath the machinery or work with an extra level on top. The maximum capacity for this mill based on 1 shift a day, 40 hours a week and 5 looms should be around 100.000 meters a year. He notes that this is not completely reliable, there are so much factors that can change this number.

We also spoke about the possibility to create a denim fabric in his mill, as an extra end product for my thesis. We came across the fact that we both worked with Rubia, company for natural dyestuff near roermond, and that this something for me to research this possibility. Two other companies for a closer look are Hempflax (Dutch producer of hemp and hemp fibre) and Artofil (a Dutch spinning company). This would maybe work as a great combination for the first Dutch denim cloth.