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Production process at clothing industry and how to improve it

Case Tuli Trading Ltd.

Metropolia University of Applied Sciences

Master's Degree Program in Fashion and Clothing

Master of Cultures and Arts

Master's thesis

The 8th November 2018

Author Title	Tiina Granström Production process at clothing industry and how to improve it. Case Tuli Trading Ltd.
Number of Pages Date	46 pages + 1 appendices
Master's Degree Program in Fashion and Clothing	Master's Degree in Fashion and Clothing
Instructors	Raija Hölttä, Lic. Arts Sakari Saavalainen, CEO Tuli Trading Ltd
<p>This research gives an overall look to the production process in the clothing industry. It introduces the different parts of the production process from the point of view of an international buying house. The objective of the study was to learn how the process was at the beginning of the study and how it can be improved.</p> <p>The cooperative company in this study was Tuli Trading Ltd. It is a Finnish-owned company that works in Bangladesh and Pakistan. The research was implemented at the company's Bangladeshi office during spring 2018. Bangladesh is the second biggest exporter of clothing in the world and clothing industry covers 80% of the country's total exports.</p> <p>The research strategy that was used in this research was an action study. It is a participative method in which the researcher takes part into the daily work in the organization. The data of the study were collected with interviews and observing daily work in the office and other related places like at factories. Data analysis was carried out with Atlas.ti-program.</p> <p>The production process of Tuli Trading can be divided into three parts: designing and product development, manufacturing and quality control. Eight critical points were found in the data. The most critical time in production is the beginning of the manufacturing. Also, eight different problem types were defined. They are closely related to the critical points.</p> <p>As a solution to the problems, new work flow was created. In the outline, it follows earlier procedures, but small changes were made, and areas of responsibilities were clarified. Also meeting practices and report formats were updated and cooperation with factories densified.</p>	
Keywords	Clothing industry, production process, supply chains, Bangladesh

<p>Tekijä Otsikko</p> <p>Sivumäärä Päivämäärä</p>	<p>Tiina Granström Vaateen tuotantoprosessi ja sen kehittäminen. Case Tuli Trading Ltd.</p> <p>46 sivua + 1 liite</p>
<p>Vaatetusalan tutkinto-ohjelma (YAMK)</p>	<p>Vestonomi (YAMK)</p>
<p>Ohjaajat</p>	<p>Raija Hölttä, TaL Sakari Saavalainen, toimitusjohtaja, Tuli Trading Ltd</p>
<p>Tämä opinnäytetyö antaa yleiskatsauksen siitä, millainen tuotantoprosessi vaatetusallalla on. Työ erittelee tuotantoprosessin osia kansainvälisen ostokonttorin näkökulmasta. Tutkimuksen tarkoitus oli selvittää, millainen tuotantoprosessi oli opinnäytetyöprojektin alkaessa ja miten sitä voitaisiin kehittää.</p> <p>Yhteistyöyrityksenä tässä opinnäytetyössä oli Tuli Trading Ltd. Se on suomalaisomisteinen yritys, jonka toiminnot ovat Bangladeshissa ja Pakistanissa. Tutkimus toteutettiin yrityksen Bangladeshin toimipisteessä. Bangladesh on maailman toiseksi suurin vaateidentuottajamaa, ja 80% maan viennistä koostuu vaatteista ja muista tekstiileistä.</p> <p>Tutkimusstrategiana tässä tutkimuksessa oli toimintatutkimus. Se on osallistava menetelmä, jossa tutkija ottaa osaa tutkittavan organisaation päivittäiseen toimintaan. Tutkimuksessa analysoitu aineisto kerättiin haastatteluilla ja tarkkailemalla toimintaa yrityksen toimistolla ja muissa olennaisissa paikoissa, kuten tehtailta. Aineiston analysoimisessa käytettiin Atlas.ti -ohjelmaa.</p> <p>Tuli Tradingin tuotantoprosessi voidaan jakaa kolmeen osaan, jotka ovat suunnittelu ja tuotekehitys, tuotanto ja laadunvalvonta. Aineistosta löydettiin kahdeksan kriittistä kohtaa tuotannossa. Kriittisin vaihe on tuotannon aloittaminen. Tuotannossa esiintyy kahdeksan eri ongelmatyyppeä. Ongelmat ja kriittiset kohdat liittyvät toisiinsa vahvasti.</p> <p>Tulosten myötä muodostettiin päivitetty prosessikuvaus. Se noudattaa pääpiirtein aiempaa prosessikulkua, mutta siihen on tehty pieniä muutoksia ja työntekijöiden vastualueita on tarkennettu. Myös kokouskäytänteitä ja raportointilomakkeita uudistettiin ja yhteistyötä tehtaiden kanssa alettiin vahvistaa.</p>	
<p>Keywords</p>	<p>Vaateteollisuus, tuotantoprosessi, alihankintaketjut, Bangladesh</p>

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1 Introduction

Garments are something that concerns us all. In all cultures garments are worn and especially in Western countries people buy enormous amounts of clothing. Very few of ordinary consumers start to think how complex the production process is and how many people have taken part in making of one single piece of clothing. Supply chains are long and competition in production business is fierce. (e.g. Bevilaqua, 2013.)

At the moment Bangladesh is the second biggest textile exporter, right after China. (e.g. Lu, 2015). There are about 5 million people working in textile industry in Bangladesh. Garment business covers about 80% of the country's export (Fashion2Apparel, 2015). Due to problems in the whole industry, Bangladesh has been in the headlines in Western world. (e.g. Yle, 2016).

The importance of Bangladesh in textile industry and especially ready-made garment industry, cannot be belittled. Because of that it was very interesting to make this research for a company that has operated in Bangladesh for years. Cooperating company in this thesis is Tuli Trading Ltd., which is an international buying house. The company describes that it provides sustainably managed supply chain solutions to its customers. Tuli Trading takes care of the production process from the designing to shipment. The company aims to grow and that is the reason why the company management wants to improve their production process to more efficient manners. Company has customers in Europe and in America and they are brands, hyper markets and department stores, among others.

Tuli Trading has representatives in many countries but most of their operations are located in Bangladesh. In order to make this study, the company sent me to their Dhaka office for almost four months. I started working there in the end of February 2018. During my stay I observed the actions, interviewed most of the company's employees and had numerous talks with company management.

This thesis can be divided in three parts. Firstly chapters 2 Cooperating company and 3 *The object of the study* open up the starting position and situation both the objective of the study. After that chapters 4 *Clothing industry in Bangladesh*, 5 *Supply chains in global clothing industry* and 6 *Efficient production process* deal with the theoretical background of the research. The final part clarifies used methodology in chapter 7 *Research process and data analysis*, and results of the study in chapters 8 *Production process* and 9 *The critical points of the production process and how to develop them*.

2 Cooperating company

2.1 Tuli Trading Ltd

Tuli Trading is a European-owned design, development, sourcing and logistic company working mainly in Bangladesh but also in Pakistan. The company offers supply chain solutions for global brands, department stores, specialty stores, hypermarkets, e-commerce and catalogue companies around the world. Its biggest customers come from Finland, Russia, USA, Germany and Poland. Most of the company's customers have outsourced their production so Tuli Trading is responsible for sourcing the factories, getting products manufactured and controlling the quality. For some customers Tuli Trading also performs designing and 3rd party inspection functions.

Tuli Trading started operations in Bangladesh over 20 years ago and the organization has always been directed by European top management. Current personnel of the company consist of approximately 50 employees (of which 2 are working at the Pakistani office) which makes it a medium size company in this industry. Small and medium sized companies might face specific threats compared to large ones, such as limited availability to production material qualities and lower negotiation power (Liviú, 2018, 37). On the other hand, the limited size also results in benefits, such as flexibility in changing circumstances and possibility to serve smaller customer companies who might have difficulties to find a supplier. Key to success is to have good relationships both to customers and suppliers.

Tuli Trading is specialized in production of knitted items. About 85 % of production is knitted garments, the rest 15 % consists of woven garments and sweaters. Tuli Trading has put lot of effort on development of prints and wants to stand out from competitors with high-quality prints. Products that Tuli Trading produces for their customers could be described as basic-looking, but technically they are not all simple. Prices vary from low to mid-range.

The country manager of the company's Bangladeshi office is a textile professional from Finland while other employees are locals. Customers appreciate both local knowledge and European way to do business and that is why this arrangement has been highly valued by the customers. From the customer's point of view, European management at sourcing company increases reliability. Tuli Trading does not own any factories, but it cooperates with about 25 factories in the Dhaka area. Tuli Trading has achieved a closer partnership-like cooperation with a few factories. The factories that the company is mainly working with, are small or medium-sized on an international scale, because most of them have 4-12 sewing lines. Factories of this size answer Tuli Trading's needs well since small factories take smaller orders and customers' order quantities can be relatively small. Tuli Trading is a member of BSCI and 80% of cooperative factories are BSCI, WRAP or SEDEX audited and certified. They are certificates that are related to the social responsibility of companies. They will be introduced closely in chapter 4.

The most important things that make Tuli Trading stand out from the competitors are, besides European top management, a wide range of services and a sample section. At in-house sample section prototypes can be designed and produced on short notice. It has been an advantage that the company can provide samples fast and easily from customer's own or Tuli Trading's proprietary designs.

2.2 Organization of the company

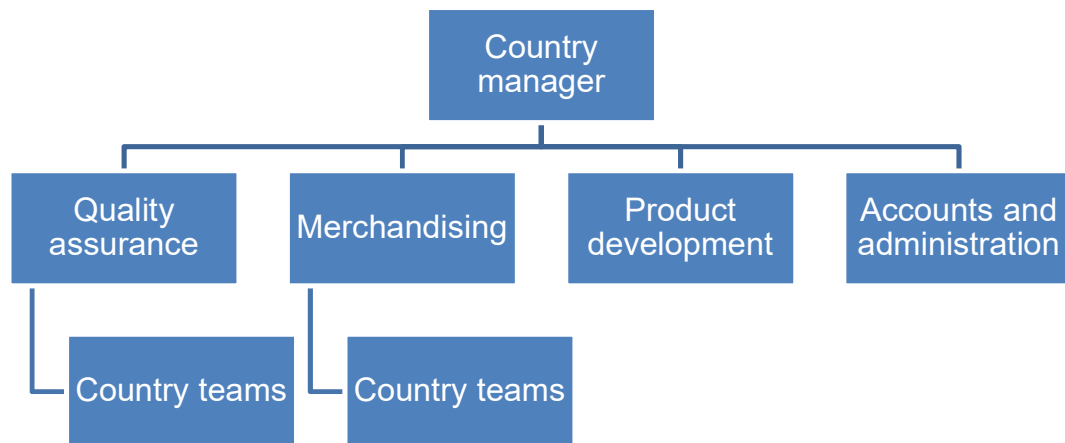


Figure 1. Organization of Tuli Trading

In Bangladesh Tuli Trading has about 50 employees. They are divided into 4 departments: merchandising, product development, quality assurance and accounts and administrative departments. This research focuses mostly on the work of three first of these. Merchandising and quality assurance departments have been divided into three teams based on customer origin: Finland-Russia, USA and Germany teams.

Merchandisers are responsible for the whole manufacturing part and communication with the customer while quality controllers (hereafter "QCs") are responsible for the part of the production that happens at the factory. Both merchandisers and QCs are communicating with the factory. Merchandisers start their work on products even before a prospective customer order is confirmed, and QCs jump in when it's time for pre-production meeting (hereafter "PP-meeting"). Merchandisers work mostly at the office while QCs spend their days at factories and come to the office not more than once a week. To reach the common goal – providing products that fulfil customers' expectations on time – merchandisers and QCs need to cooperate and communicate with each other seamlessly. This represents a challenge when employees working in these two roles barely see each other.

The development team, in turn, is responsible for sampling and product development. Development team makes all salesman samples (hereafter SMS) for their biggest customer Basic Fashion, and other samples such as development, fitting or styling samples for other clients. With salesman samples products are sold to customers. All customers require different kinds of samples, but salesman samples are important especially for Russian customers who don't order products only based on pictures and fabric swatches in any circumstances.

Currently merchandisers, QCs and product developers work rather independently, and Tuli Trading's management is looking to increase cooperation between the teams in the future. They believe that with better cooperation and communication the company will reach better results.

2.3 Customers of Tuli Trading

Tuli Trading has a multitude of customers on three continents. The main markets are Russia, Germany, USA and Finland. There are also customers in other European countries like in Poland and Sweden. Customers are different from each other by their target group, product types and price range. The customers are for example brands, hyper markets and fashion retailers. It can be seen both as a strength and a weakness that Tuli Trading has so different kinds of customers. It requires a lot of resources to keep track of different types of customer requirements. Handling small orders in particular takes a lot of effort compared to the profit. On the other hand, Tuli Trading has the capability to offer their customers almost anything because the company has experience in many types of products and maintains good relationships with its suppliers.

Tuli Trading is working very closely with Basic Fashion Oy which is a Finnish clothing company and one of the country's biggest textile importers as well as Tuli Trading's biggest customer. All Tuli Trading's Finnish and Russian customers are actually Basic Fashion's customers while Basic Fashion is Tuli Trading's direct customer. Basic Fashion manages all communication with customers in Russia and Finland. Especially with Russian customers it's good to communicate with

their own language. Basic Fashion designs and sources several collections for a variety of customers. It buys sampling and manufacturing services from Tuli Trading.

Basic Fashion's customers don't design their own products, but they want Basic Fashion to offer them new products and styles. That is why Basic Fashion designs a SMS-collection which Tuli Trading produces at their sample section twice a year. Basic Fashion's Russian customers are each other's competitors and there can't be same products in their collections. If more than one company orders same products from SMS-collection, they need to have some changes in them. The easiest way to implement the changes necessary is e.g. to change the print or other detail. Changing the product's material is more difficult and then orders can't be combined, which results in the benefit of big volume discounts being lost. Customers in Finland and Russia are mostly hyper markets that offer products in the lower price range.

The biggest challenge especially in Finnish customers' orders is that order volumes are small. Thanks to Basic Fashion's SMS-collection Tuli Trading can combine small customer's orders in Bangladesh so that they will reach the minimum quantities that factories demand. Owing to the process of combining orders the company is able to take low-volume orders from clients. In fact, order combining is crucial since factories do not deliver quantities that fall under the minimum thresholds.

Tuli Trading has a couple of customers in the USA and Germany. These companies provide their customers garments in the mid-price range. That's why there are more options in materials, accessories and techniques that can be used. Both American and German customers expect Tuli Trading to offer them new ideas and styles though they have their own designers as well.

German customers want their products to be tested in various ways. They follow very precisely rules of used chemicals and their level in garments. American customers are strict with certificates that factories which are producing their goods,

must have. The most common certificates that Tuli Trading's American customers demand are Accord that ensures safety of factories and WRAP that points out workers' rights.

3 The object of the study

The main goal of this research is to develop Tuli Trading's production process towards more efficient courses of action. In order to find new ways to do things, I had to learn how the initial situation is and what kinds of problems there are to be solved. The desire to improve the production process is motivated first and foremost by the company's drive to grow and expand business. Recently, Tuli Trading has obtained new customers but before expanding the customer base even further the production process must be standardized and clarified.

In the beginning of the research the company management estimated that many of Tuli Trading's practices are similar to those of small companies although Tuli Trading is medium sized. In management's opinion the process needs more structure. Company management wants that company's employees learn to recognize the essential and critical parts of the process better so those can be focused on.

The company management's goal is that 80% of orders would follow standardized procedure. There are always both surprises and differences between customers, thus, it is not feasible that all orders would follow the same process flow. Despite this there would ideally be a fixed guideline which the employees would try to follow. Company management's experience is that orders from Finnish and Russian customers, in particular, are quite complicated and the process needs to be improved. Of course, there already are guidelines for production and production follow-up but a lot of time is spent on solving surprising problems when things are not done the way they should be.

3.1 The framework of the study

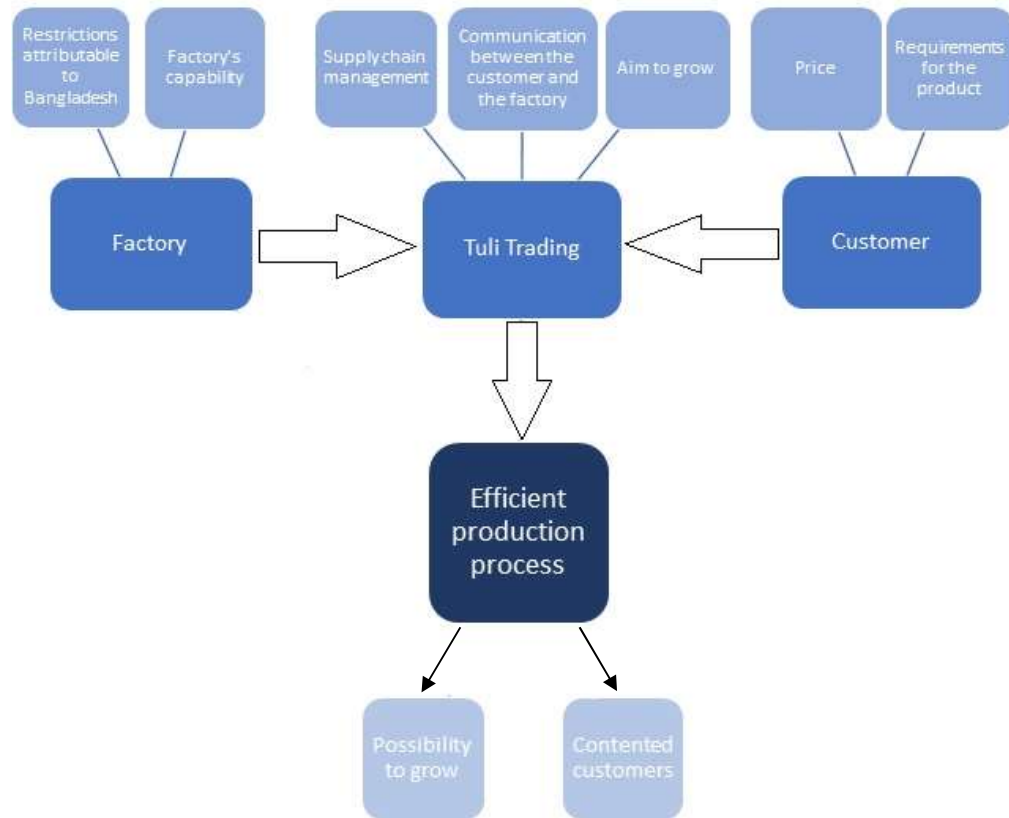


Figure 2. The framework of the study

Tuli Trading's work takes place between the customer and the factory. Company's purpose is to manage the supply chain. Employees need to communicate and cooperate well and openly between both the factory and customer so that customer's expectations will be fulfilled. They have to take both customer's needs and factory's capabilities into consideration.

Customers' actions and expectations are guided by the requirements they have for the products and the price they want and can pay for them. In a typical case the customer has several requirements for the products, and even production, as well as a certain target price they are willing to pay for the product and production. It is vital to know customers' requirements concerning quality and styles. Tuli Trading needs to find factory that can produce the ordered goods ordered within

their price range and delivery time. Tuli Trading doesn't own any factories, but they have a selection of cooperative factories. The measures taken to improve the production process are limited by cost; the resulting costs borne ultimately by the customers should not rise too high.

In other hand any particular factory works within the limits of its capacity and knowhow. Also, the fact that production takes place in Bangladesh results in some kinds of limitations to the production, e.g. materials, culture and laws and resources. When aiming towards a more efficient production process one must bear in mind that everything is not possible in Bangladesh. The country's inhabitants are used to a certain type of working culture and fundamental changes cannot be made in a short timeframe.

3.2 Research questions

1. What is Tuli Trading's production process like at the moment?
2. What are the critical parts of the process and what kinds of problems and mistakes arise in the current process?
3. How problematic situations could be prevented in the future?

Research questions are in line with the methodology of the study. Action research, which I'm implementing in this research, starts with surveying the initial situation. Based on that, the researcher makes a plan of action on how to improve operations. Then they are brought into action and evaluated. (e.g. Heikkinen, Huttunen & Moilanen, 1999; Anttila, 2018.) The methodology of the study will be discussed further in chapter 7.

A substantive part of action research is surveying the initial situation and setting a goal. That is why the first research question concerns finding out the starting state of the production process, when the goal is to have more efficient production process. The second research question focuses on critical parts and existing problems of production process in general, but eventually the case of Tuli Trading

will be discussed. By critical parts I mean those parts of the process where something can easily go wrong, and which need a lot of attention. The final research question considers the proposals for improvement.

The goal is that with the results of this research an improved model of production process can be defined. The idea is that Tuli Trading can use the developed operations model season after season. Objective is that problems in production could be prevented or at least there would be an understanding of what kinds of problems there are going to be, so they won't come as a surprise. In that case there is more time to prepare and inform customers about them. If suppliers change constantly, it's difficult to follow certain procedures. To succeed in reaching the goals it is mandatory to create long-term relationships with factories and other suppliers.

4 Clothing industry in Bangladesh

To understand how products are made in Bangladesh knowledge of conditions, history and habits of the country are essential. Bangladesh is really one of a kind because of its many unique characteristics. In this chapter I tell about the country, what kinds of impacts clothing industry has had there and about my own experiences of working there.

4.1 Poor and small country in Southern Asia

Bangladesh is a small country in Asia measured by geographical area but it's enormous number of inhabitants makes it one of the most densely populated areas in the world. Independent Bangladesh has only existed from 1971 when it declared independence from East Pakistan. Bangladesh is situated in an area where it is exposed to several natural disasters like flooding, earthquakes and cyclones (Wikipedia, 2018). This has a big effect on everyday life but also on clothing industry because of electricity cutouts, limitations on gas availability and condition of roads.

Geographically, Bangladesh is a rather small country and distances are short – if you measure in kilometers. Nevertheless, in Bangladesh journeys are counted in hours and even a very short journey might take many hours due to huge traffic jams. Clothing industry is centered principally in two areas: in Dhaka area and in Chittagong area. Dhaka is the rapidly growing capital of Bangladesh. People from villages are moving there with hopes of getting better work and income. Chittagong is situated in the southern part of the country. This southern city is home to the biggest port of the country through which most of the exported items leave the country. Distance between these industrial areas is about 250 kilometers but by car it would take 5-8 hours. Both huge traffic jams and the relatively poor condition of roads are to blame.

Political situation in Bangladesh is not very democratic though country is officially a democracy. It is even dangerous to say opinions against the government in public (e.g. Mahmud, 2018). In the end of 2018 there will be parliament election. For the garment sector the biggest political decision lately has been the raise of minimum wages. In December 2018 minimum wage in the country will raise 51% (Fashion United, 2018). This decision tries to fix the factories' well-known challenge of getting fair price of the products. Though rapid inflation has raised prices in Bangladesh, the readymade garment prices have gone down during past 15 years (Ali & Medhekar, 2016, 1179).

Religion has a big effect on many things in Bangladesh, also on working life. Bangladesh is an Islamic country. Almost 90% population are Muslims (Wikipedia, 2018) and religion is very important to Bangladeshi people. Daily life is punctuated by regular prayers and religious feasts like Ramadan slow down the production output. Factories have their weekly day off on Fridays due to Muslim culture but many trading houses, like Tuli Trading has day off on Saturdays so they will have more common working days with customers.

4.2 Clothing industry's impact in Bangladesh

Bangladesh started to open up for the rest of the world in the early 1990's when economic reforms made it easier for foreign companies to work with Bangladeshi companies. This led also to a quick surge in GDP (Kurpad, 2013, 81). One of the major industries that expanded in Bangladesh after economic reforms has been ready made garment industry (Kurpad, 2013, 82). Garment industry covers 80% of the country's overall export (Ali & Medhekar, 2016, 1179).

At the moment Bangladesh is the second biggest clothing exporter in the world (Lu, 2015) and there are almost 4,500 clothing factories providing work for over 4 million workers (Ali & Medhekar, 2016, 1180). Attributes that attract clothing companies to locate their manufacturing activities in Bangladesh are low labor costs, customs duties exemptions for clothing, specialization in jersey products, wide range in the size of factories and know-how. Additionally, complimentary yarn and fabric production and inexpensive quality laboratory services constitute a significant competitive advance for the country (Kurpad, 2013, 83). It is easy for suppliers to work in Bangladesh when companies can get everything done in the same place.

Low labor costs are the biggest reason why companies see production in Bangladesh profitable. Many of the companies working in Bangladesh are interested to get lowest possible price for the products. According to Kurpad (2013, 81) the biggest factor effecting garment price is labor. Bangladesh's closest competitor in labor costs is Vietnam (Kurpad, 2013, 83). But even after the upcoming raise of minimum wages Bangladesh still ranks lower than Vietnam in wage level (Das, 2018) so it will not lose that competitive advance. According to the pricing done by many factories, labor costs are so low that the biggest part from product's price come from the materials.

As mentioned, clothing industry has played a key role in the country's development. It has had huge impact for example in industrialization, economic growth

and empowerment of women (Ali & Medhekar, 2016, 1178). When clothing industry has brought a lot of jobs to Bangladesh it has also reduced poverty in the country. In just five years between 2005 and 2010, poverty declined by 8.5% (Ali & Medhekar, 2016, 1182). Little by little, standards of decent work, wages and working conditions have been improved and still keep improving. Along RMG industry, for example infrastructure, telecommunications and transport have made a long way towards modern standards (Kurpad, 2013,85).

According to the CEO of Tuli Trading who has worked in textile business in Bangladesh for almost 30 years, the country has made a huge progress in textile production. Similarly, the country manager of the company says that even 10 years ago mainly basic products like t-shirts could be made in Bangladesh. Nowadays, when it comes to clothing, almost anything is possible if the right supplier is found. Foreign companies have taught suppliers and they have been willing to learn to produce increasingly complicated products.

Though there has been a lot of socio-economic growth and ranking to income group “lower middle” (World Bank, 2018), Bangladesh still is a developing country. Typically, people working in clothing factories come from poor socio-economic background. Ali and Medhekar (2016, 1183) point out that though RMG industry has brought numerous jobs in Bangladesh, workers don’t have equal rights. In the worst position are unmarried women who work the longest hours. All the factories don’t respect regulations on working hours and don’t have needed fire safety equipment (Ali & Medhekar, 2016, 1187). These are things companies need to evaluate when they are choosing factories for their production. According to Kurpad (2013, 85) the problems with low wages and working conditions harm the expansion of the industry.

Especially during the past 5-6 years Bangladesh’s clothing industry has been in the headlines and under magnifying glass in western countries. Luckily, within a relatively short time working conditions have improved a lot because of legislation and international pressure on Bangladesh government and ready-made garment

(hereafter RMG) sector. There are new laws and regulations e.g. on working time, building safety and workers' right to unite (Kurpad, 2013; Ali & Medhekar 2016).

In particular American and European buyers are doing business in Bangladesh (Ali & Medhekar). After the disastrous Raza Plaza accident in 2013 the Western world woke up to the reality about Bangladesh and since then many monitoring methods and organizations have been established. The most important and common of these are BSCI (Business Social Compliance Initiative), WRAP (Worldwide Responsible Accredited Production) and Sedex, which aim to improve working conditions within international supply chains and to ensure ethical and fair work, and Accord that is mostly focused on building and safety on working environment. (Amfori, 2015; Sedex, 2018; Wrap, 2018; Accord 2017). Many buyers demand that products are manufactured in audited and certificated factories. Tuli Trading Ltd is a member of BSCI. In addition to the aforementioned, International Labour Organisation (ILO) keeps pushing Bangladesh government to fulfil labor law reform and have spot inspections in factories (Ali & Medhekar, 2016, 1181).

Despite many improvements several researches point out that not all factories are safe for workers (i.e. Ali & Medhekar, 2016; Kurpad 2013). That's why foreign companies working in Bangladesh have huge responsibility that they work with factories that are taking care of safety and don't restrict workers' human rights. Ali and Medhekar (2016, 1182) even state that Western international brands have even more power than other parties on this matter. They point out that companies offshore must demand that all the rules are respected and monitor factories' actions regularly. There are safe factories who take care of their employees in a fair way. Despite the flaws in the garment sector boycotting isn't a solution to help Bangladeshi industry to develop; instead they need support, solidarity and demands from buyers and organizations (Ali & Medhekar, 2013, 1183).

4.3 Experiences on working in Bangladesh

In my own experience Bangladesh is one of a kind working environment and there is a totally different working culture than in western countries. When working in

Bangladesh and with Bangladeshi you need to understand cultural rules and local habits. When telling about my experiences I will try to avoid making too strong generalizations. I am aware that all the individuals and companies aren't similar to each other, but I have noticed some characteristic things when working in Bangladesh.

Working life in Bangladesh exhibits quite strong hierarchy. Titles that express position within the hierarchy seems to be quite important to people and in professional life others should always be addressed with the right title, especially if they are in a higher position. People are also used to receiving and following explicit orders and not all of them are used to working independently. Employees are quite keen to their roles and don't do anything on their own initiative if the task isn't particularly on their responsibility.

I believe it is partly because of the whole culture but mostly because of a strong hierarchy in working life people don't say no to people that are in higher position. Though my idea was to work in the company like anyone else, in reality I was seen as part of the management among the employees of Tuli Trading. That might probably be the reason why it was surprisingly difficult to get comments on my ideas of how to develop the production process flow. When it was the time for commenting I got very few of them but when changes were already put in action then people might come and share their mind. This topic will be discussed further in chapters 9.3.

Sometimes in Bangladesh working ways can seem quite inefficient and that's one reason why Tuli Trading asked me to do research on this subject. From European point of view things happen quite slowly in Bangladesh at times. Sometimes it is possible to try to influence that and teach different ways to take care of things but sometimes you just need to adjust to local habits.

5 Supply chains in global clothing industry

In this research I will use terms clothing industry and RMG industry when writing about the industry in general. They are both part of textile industry, which also includes home textiles, carpets, technical and industrial fabrics (Pérez et al., 2013, 42). At the moment Tuli Trading is producing only clothing items but earlier it has produced some home textiles as well, e.g. bed sheets and towels.

In short, clothing manufacturing process follows procedure like this: Manufacturing starts with collecting the raw material and spinning it to yarn. Yarn can be dyed or it will be dyed after knitting or weaving it into fabric. After this there might be some special treatments to do, like peaching. Printing is done either before cutting (all over prints) or after cutting (placement prints). Then pieces are sewn together. After that there might be some special treatments like enzyme wash. (Pérez et al., 2017, 42.) Thomassey (2010,472) demonstrates it accordingly:

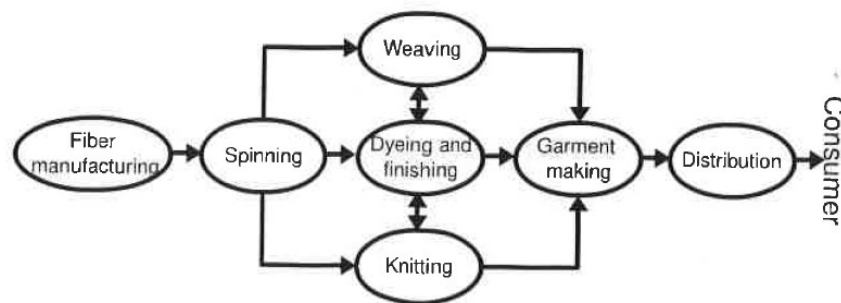


Figure 3. Manufacturing process according to Thomassey (2010)

In clothing industry it's characteristic that companies are small or medium sized. Pérez et al. (2017, 41) point out that usually companies in textile industry are strongly specialized in specific process. They can be specialized for example for example weaving or knitting, manufacturing accessories like buttons and zippers, or printing. Rather small sized organization is a benefit when trying to adapt to constant uncertainty and unpredictability. (Bevilacqua et al., 2013, 2.) There are also suppliers that are not focused only on one part of the production. Tuli Trading

has several cooperative factories that have own knitting, printing, dyeing and output. The most common combination is that factory has own knitting and output, sometimes also printing. The smallest factories with 4-6 sewing lines usually have only output facilities.

Due to fast globalization competition in garment sector is fierce. Companies need to response consumer needs that are difficult to predict. When you add long and inflexible supply chains and short lifecycles of products to this equation, it is easy to understand why efficient supply chain management is needed to survive in this industry. (Bevilacqua et al., 2013, 2.) Pérez et al. (2017, 41) even state that textile industry is one of the most complex industries of all. They validate this by telling that there are multiple sub-sectors covering the production of final process, like raw materials, accessories, manipulation of fabric and output.

Textile and clothing industry is also responsive to changes both in macro and micro level. Companies have to balance with economic crises, globalization, terrorism, ecological factors, like other international industries as well, but also characteristically to clothing industry hardly predictable customer needs, short seasons and life cycles of products and (Liviu, 2018, 37-38). Commercial success is closely correspondent to organization's flexibility and responsiveness to customers' needs (Bevilacqua et al., 2013, 2).

Supply chain in clothing industry follows two time-horizons, a long-term horizon and short-term horizon (Thomassey, 2010, 471). Clothing supply chains are strongly related to the seasons. Climate has its own effect on the styles and furthermore production-cycle and seasonality of the brand its own (Thomassey, 2010, 472). Number of seasons variate usually from 2 to 12.

Competition is fierce also in buyers' end. Sometimes buyers invite suppliers to bid too often so that they would get cheaper prices. They might get the price they are looking for, but they need to start from beginning with new factory and teach everything about their products. Good supplier relationship is usually worth of every extra penny. In the long run it is more cost-effective to build up long-term

relationships with suppliers than look for cheaper prices constantly (Pérez et al., 2017,48).

6 Efficient production process

6.1 Production process

It was surprisingly difficult to find previous researches about the whole production process in clothing industry. Most of the researches concern the manufacturing part of the production from factories' point of view. I found also some researches about the product development part. Recently there have been many studies about even design management, but even when combining results from all of these, it is not possible to get a picture of the whole production process from buying house's perspective. For this reason, I did not get much support from previous researches when thinking about the efficiency of Tuli Trading's production process. This research is quite exceptional because it describes the whole production process.

Major part of production process happens at factories. If buying houses don't own factories, they have quite little to say to that how factories are organizing and managing the work there. There are a lot of researches about e.g. how sewing machines should be placed or how to calculate productivity of sewing lines (e.g. Bevilacqua et al., 2013) but these kinds of things are on factories' responsibility. All buying houses can do for efficient manufacturing part, is to choose to work with factories that seem to take these kinds of things under consideration.

Though buying houses cannot have big impact on factory set up, there is lot they can do. Firstly, buying houses play a big role in coordinating production process. They can make sure that everything is working efficiently in their end. Very important is to have a good and open relationship with the supplier.

Key point in production process is time. Flow time depends on two parameters, batch size and the number of machines (Bevilacqua et al., 2013, 1). Also the type

and styling of the product affects: making a t-shirt is a lot faster than jacket with lining.

According to Bevilacqua et al. (2013, 2) the main thing in the efficacy is that there would not be gaps between the different parts in production, but it would flow forward. For example, if factory doesn't have color approvals on time they cannot start dyeing though they would have fabric in hand. Waiting times should be minimized in all production stages (Bevilacqua et al., 2013, 7). In addition, Pérez et al. (2017, 49) mention detection of defects but they don't tell further how it is done. In this research I am finding out what kinds of problems and defects are there in the production process.

6.2 Change management

Textile industry is exposed to many changes – both micro and macro level. Whatever the size of the change is, some kind of change management is always needed (Tudor, 2018, 44). Minor and sometimes major changes as well cannot be avoided when aiming for a more efficient production process. Change happens differently in all organizations, and organization's culture, resources and structure should be taken into consideration, but there are good general procedures for change management (Tudor, 41).

Tudor (2018) has done research on change management in the textile and clothing industry. The research refers to a large survey that shows that companies with change management programs were six times more likely to meet or exceed their objective. Key point in success in change management is commitment. The key persons in the company must work together and in a consistent way towards the change. Important is to handle personnel's resistance and to prepare the organization for the change (Tudor, 2018, 41).

According to Tudor (2018, 42-43) efficient change management in the textile and clothing industry has 5 parts. In the beginning the current situation is diagnosed and after that the optimal change situation is determined. That is the goal which the change is aiming to. Next the change and the ways to achieve that need to be planned

carefully. Next step, implementation of change, includes initiation, communication, coordination and evaluation of change. Close relationship between employees and managers has been discovered to be helpful though close relationship might decrease management's authority. Finally change needs to be anchored into organization's culture and practice.

Tudor (2018, 42) points out that small companies fail in change processes because they choose to make too many changes at a time. In addition to this finalizing the change might be failed because of limited funding and other resources. Especially small and medium-sized companies have tendency to go back to the old habits if new procedures are not well standardized. Success in change comes with active promoting and supporting of the change initiative and clear communication. But most importantly, organization culture needs to be open for change. (Tudor, 2018, 43.)

When it is time to do the changes into Tuli Trading's production process, things above need to be taken into consideration. The time and the way of change needs to be planned carefully by the company management, so everyone is committed to it and can encourage employees in the right way.

7 Research process and data analysis

7.1 Action study

The research strategy in this research is action study. Already the name of the strategy tells that the meaning is to carry out the operations and research in tandem. (Anttila, 2018.) Furthermore, the key point in this strategy is to develop and improve actions. Improving means that problems will be rectified not just recognize them (Routio, 2018). By its character, action study is research that improves actions. According to Anttila (2018) understanding the process in a new way is the focal point. The goal is to make real changes by interfering in real life situations and observing the influences of intervention. Anttila (2018) points out that

action study is cut out for situations where things are going to be changed and changes need to be understood at the same time.

The premises described above form the starting point in this study. The main objective is to understand the current situation at Tuli Trading's Bangladeshi office and at the cooperating factories together with improving practices into more efficient ways that are beneficial to all parties.

According to Routio (2018) there are four main phases in improvement process. Process starts with evaluative observation of current situation. Then needs of improvement are surveyed. It is followed by the analyzing phase that clears out the dependencies and possibilities to change things. The next phase, synthesis, suggests improvements. In the end comes evaluation that aims to make sure how the result answers to the needs and goals.

In contrast Anttila (2018) divides action study in six different phases. Like Routio, Anttila starts the process by defining the problem or setting a goal. After that comes an overview to literature, which helps researcher to find out if similar types of problems have been solved before. Based on these two phases the problems and approaches to them will be determined as precisely as possible. In the next stage the research is planned in a practical way: arrangements, needed processes and circumstances are defined. Lastly comes analysis and evaluation of the collected data.

Both Routio (2018) and Anttila (2018) picture the research process in quite the same way but Anttila's description could be described as a little bit more detailed. Usually action research goes on in cycles and the phases of the research can be repeated multiple times. The reruns aim to achieve even better results and clarify the situation and solutions (Anttila, 2018). Action study's goal can be only to solve the realized problem and results do not need to be generalized to other cases (Anttila, 2018). The situation in question is usually some kind of special case. In this study the goal was accordingly to improve actions in an individual company.

Of course, it is possible that the result may be generalized to another company's situation.

In keeping with the study process described above, this study started by observation of the starting situation and clarifying the improvement needs. Before I travelled to Bangladesh I worked for a couple of weeks at Basic Fashion's office in Finland. Many of Basic Fashion's employees are daily in contact with Tuli Trading's employees. Both sides feel that they are more in a collegial than in a customer relationship. Already at Basic Fashion I learned a lot about the production process and what happens at the customer's side. When I first arrived to Bangladesh I observed everything at Dhaka office and factories for a couple of weeks in order to learn the situation. After that we decided the research questions with Tuli Trading's CEO. I also had many conversations with him before and in the beginning of this research project. He told me about his opinions, experiences and expectations.

In action study it is important that the researcher recognizes their role (Anttila, 2018). The researcher is an integral part of the research and observes actions from inside. When observing for example some specific company, it is important to know the company and its functions thoroughly. Routio (2018) notes that by participatory methods it is possible to reach significant benefits compared to an outsider researcher. But when a company's practices are developed the vision and strategy of that particular company must be taken into consideration.

Routio (2018) underlines that in an action study it must be ensured that everyone who is affected by the study has an opportunity to take part and be heard during the process. In this study most of the company's employees were interviewed. In addition, they were introduced to the results of the research and the changes that will be implemented. They were given a choice to comment on them.

Routio (2018) emphasizes the significance of the dialogue of theory and practice in action study. It is important to reflect the practices into theory because that way it is possible to get objective information on how things could be improved. It

might be difficult to get into the level of theory but according to Routio (2018) these difficulties can be lessened by exploring things from different points of views. Different points of views can be e.g. work of individuals, the cooperation of the whole branch or the meaning of the work for outsiders. (Routio, 2018.)

The methods used in action study are mostly qualitative, but it is not exceptional to use also quantitative methods. It depends on the case which kinds of methods are needed. However, discourse is one of the generally accepted methods in action study. In short, it means discussion. In constant discourse actions are observed and reflected i.e. reasons of facts and claims are analyzed in a critical way. (Anttila, 2018.) The data can be for example interviews, discussions, diary notes or think out loud. In this study I will use interviews and diary notes. I will tell more about them in the next chapter.

7.2 Data

Data in this study are interviews and discoveries I have made when observing working at Tuli Trading's Bangladeshi office. I went to Bangladesh in the end of February 2018 and stayed there until mid-June. Data was collected during that time.

I started to plan interviews when I had been three weeks in Bangladesh. Before that I had followed everyday work at the office as closely as I could. I had been visiting factories, attending meetings and talking with employees in different departments, among other things. My goal was to have a close overall look into what is happening in different departments and understand their everyday tasks. I had no previous practical experience of this industry, so everything was new to me. Tuli Trading's management saw it as a benefit because I could observe working with fresh eyes.

When I was planning the possible data collecting methods, I ended up with choosing the interview method quite early. My leading thought was that everyone is an expert of their own work. That is why they should tell about their work with their

own words. I wanted to keep interviews as simple as possible but get as detailed answers as possible. That is why I decided to have half-structured interviews. In a half-structured interview questions are prepared beforehand but the order of question may vary. I also didn't want to give answer options to interviewees, therefore, half-structured was better option than structured interview (Alasuutari, 2011). All the questions in interviews were open questions. This means that there are no options for answers, but interviewees answer with their own words. There were only a few questions that could be answered with a simple yes or no. Others were formed in such a way that they required longer answers. I prepared three different sets of questions, one for merchandisers, one for QCs and one for the product development department. Some of the questions were the same to all groups, e.g. *"In your point of view what are the most critical points in your job and production process?"* and *"What kind of problems do you typically face in production process?"* These are also examples of questions I gave to the interviewees one day before their interview. I wanted to give them time to think about the answers for the most important questions. Interview questions can be found in attachment 1.

My first idea was to have an interpreter at interviews, so interviewees could speak their native language, Bengali. By using an interpreter, I assumed to get more detailed answers and interviewees would speak more freely. It turned out that finding an interpreter wasn't so easy task. Finding one took so long time that I started to have interviews before finding one. During that time, I had gotten to know Tuli Trading's employees so well that I knew who were the most comfortable with speaking English. I interviewed 2 merchandisers, the QC manager and 2 persons from product development department without the interpreter.

Later, when an interpreter was found, she attended the interviews. She was a crucial help in the interviews of two persons from the product development department. Their English skills and vocabulary were on a quite modest level. Rest of the QCs and merchandisers chose not to use the interpreter though she was attending the interviews. It seemed that they were a little bit offended that I might think that their language skills are not good enough. That wasn't my meaning but

to make the interviews easier for them. It was good that I gave them option to choose which language they want to speak. Also, one person said afterwards that he didn't trust the interpreter, so he wanted to add something to his answers afterwards.

It was also difficult to find time for interviewing the QCs because they are almost always at factories and their work there is very hectic. Most of the QCs would have also needed the interpreter to give detailed answers but they couldn't come to the office when the interpreter could. For this reason, I decided with company management that it is better to follow QC job at factories and talk more closely about improving QC work with the QC-manager. I interviewed only two QCs out of eight.

I recorded all the interviews and transcribed them afterwards. In the beginning of each interview I underlined that interviews are totally confidential and that I will elaborate them anonymously. I asked interviewees to tell everything that comes to their mind although they would think that I know those things already. I didn't transcribe all the interviews totally. When talking about the present procedures of production process, I stopped transcribing if I noticed that the same has been told already several times. I decided to do this to make the process faster. This didn't affect the results in any negative way because my meaning was not to find out how many times similar parts of the process were mentioned. I also corrected major grammar errors, so it would be easier to understand the transcribed text.

I made a lot of notes during the research period. They were another important data for my analysis. Wherever I went I had either a notebook or a laptop with me, so I could make notes. I wrote for example descriptions of how things were done or took notes if I noticed something was working well or if I doubted that something could be done in a more efficient way.

7.3 Analysis

Interviews were the most valuable data I used in this research. Altogether I interviewed 11 merchandisers, 4 persons from product development department, 2 quality controllers and one QC-manager. On top of that I had numerous discussions with the CEO, country manager and assisting country manager but those were not recorded because they were daily discussions. Instead I took notes.

I analyzed the transcribed interview data with Atlas.ti -program. Atlas.ti is meant for analyzing qualitative data. In this program the researcher can mark parts of the data with codes. I determined the codes based on the research questions. Codes I used, were *merchandiser's task*, *QC's task*, *product developer's task*, *critical point and problem in production*. What I did in practice was that I read the transcribed data and marked parts of the text with right code. Afterwards I could get a list of coded text sections for further analyzing.

When I had coded the whole data, I made another check-up round. I went through all the quotes and ensured that they were under the right code. After that I coded again the quotes about problems in production under sub-codes, so I could analyze which types of problems existed. I determined the codes while marking the quotes. In the end I chose the following codes to be used: *communication*, *distributing work*, *follow-up*, *materials*, *negligence*, *resources*, *schedule*, *supplier management and technical problems*.

8 Production process

In this chapter I describe about how the production process was like in the beginning of the research period. Tuli Trading's production process can be divided into three main parts: (1) designing and product development, (2) manufacturing and (3) quality control. In this chapter I will introduce the production process in chronological order. One noteworthy matter that is present in every part of the whole process is communication and production management. That is why I start by describing the communication ways and production management tools.

8.1 Communication and production management

There are two important aspects in communication of Tuli Trading's production process, firstly between customer and then internally. Tuli Trading and all their customers are located geographically very far from each other so success in communication is a key point in fluent production. Because Tuli Trading has many different customers also communication with customer varies a lot. Interaction is carried out mostly by email but also Skype is used. Occasionally customers or Tuli Trading's salesmen from different countries come for a visit to Bangladesh. Product managers and designers from Finland and buyers from Germany come frequently, others from time to time.

Another crucial key to success is communication between Tuli Trading's internal teams. Company management's experience in the beginning of this research was that it should be improved. There were a lot of information gaps and people were making double work when they were doing something that someone else had already done. Among other things, like hierarchy in working culture, I think that also office layout can affect the lack of communication. The office is in four floors and people don't move so easily from floor to floor. Unfortunately, it's not possible to move the office to a better suitable building so miscommunication needs to be solved in other ways.

In the beginning of this research period only the development team and the Finland-Russia team merchandisers were using SharePoint which is a file-sharing platform and part of Microsoft product family. SharePoint was mostly used for sharing documents and as a document library. SharePoint was originally Basic Fashion's tool for sharing designs, artworks, measurement tables and other essential materials. In my experience it's very convenient and easy to use and it's possible to share big files. When making improvements to production process company management agreed to start using SharePoint also internally. I will tell more about this in chapter 9.

Internally Tuli Trading is using also STEP which is an enterprise resource planning (ERP) program used in server. It has been in use for about 2.5 years but only recently all employees have been noticing the benefits of the program. All products, developments and orders can be found in STEP. Merchandisers use STEP also for production follow-up. For that purpose, there is a time and action plan feature. Financial department uses STEP for making proforma invoices (PIs) Also company management gets a lot of important reports and calculations from STEP. Within this research a lot of updates were done to STEP as well. I will introduce them more closely in chapter 9.3.

8.2 Designing and product development

Manufacturing process can start when there is an order, but a lot needs to be done before the client gives the order. In Tuli Trading's production process four main paths that lead to the order can be identified.

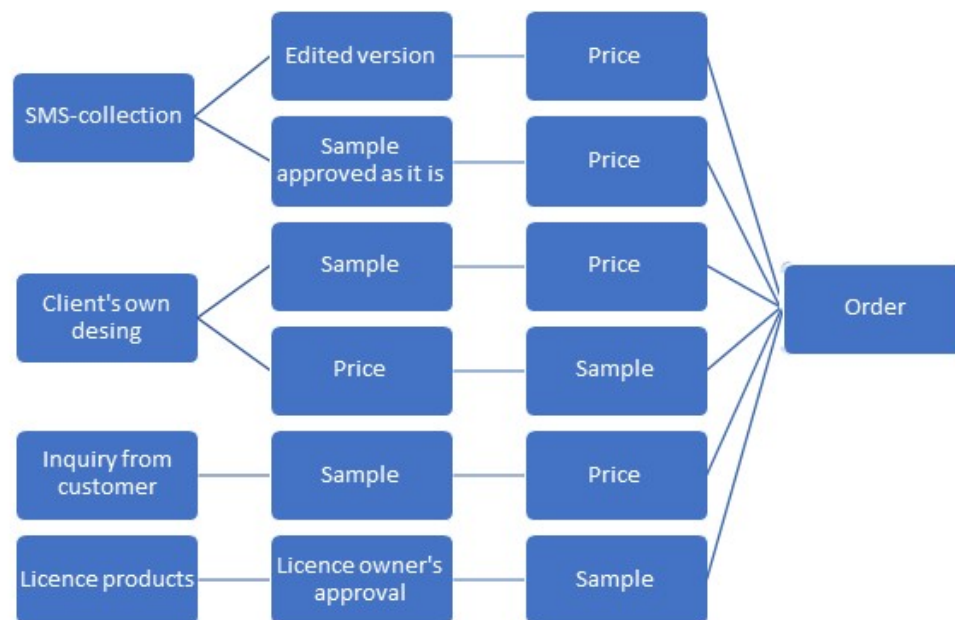


Figure 4. Product development process

Most of the company's Finnish and Russian customers buy products from the SMS-collection that is designed and made by Basic Fashion's design team and

Tuli Trading's development team. Similar products can't be sold to different Russian customers. That is why the first come are the first served. If another customer would like to make an order of the product that some other customer has already ordered, designers need to make an edited version. Usually it means changing print or colors. Samples are important especially for Russian customers. They will not give orders based on pictures and fabric swatches. Finnish customers are more flexible, and they might buy products with picture or reference sample and fabric or color swatches.

All the company's German, Polish and American customers and some of the Russian and Finnish customers have either their own designs or they have an idea of the products they want. If designs are ready it is easy to proceed to sampling. Usually the first sample customers are asking for is a development sample. In development sample, materials, colors, prints and accessories must be as close to actual as possible. Samples are either made in Tuli sample section or the concerning merchandiser organizes the sampling in a factory. When the sample is made it is time to do pricing for the product. Both sample and price are needed before gives the order and sometimes they are given to the customer at the same time. Sometimes customer might ask for price idea even before making the sample, so they know if it is worth to prepare samples.

Some of Tuli Trading's customers have a right to produce licensed products. Mainly these customers come from Finland. In the case of licensed products, the sampling phase is slower because the license owner's approvals of designs are needed before production can start.

Success in pricing is a prerequisite for getting an order. The customer won't place the order if the price is too high, but the price cannot be set too low either because you need some profit on your own hand as well. Several things have an effect on the garment price. In Bangladesh material and accessories are the most expensive cost components of a product. Special treatments like acid wash or peaching also increase the price. In Bangladesh the labor costs are very low in an international comparison as discussed in chapter 5.

When giving a price idea for customers merchandisers and their seniors are calculating price based on their experience on similar type of products. But final pricing is made with factories in most of the cases. Merchandisers invite a couple of factories to tender the order based on the given schedule, design and other details. Factories calculate their best price and Tuli Trading adds there their own commission. Company management hasn't been very happy with the pricing. They have noticed that it is sometimes inconsistent and needs more analyzing.

8.3 Manufacturing

Tuli Trading has 12 merchandisers who are divided into country teams: 5 in Finland-Russia team, 1 in USA team, 5 in Germany team and one concentrating exclusively on woven products Finland-Russia and USA teams.

As explained earlier a customer order comes to Tuli Trading in different ways. Merchandiser starts to take care of the order at the latest when the order is confirmed. Merchandiser has the overall responsibility for the production and especially the manufacturing. Firstly, merchandiser needs to find the best factory for the production. This usually happens at the same time with pricing because the factories issue their price quotes. Only senior merchandisers and team leaders are doing the pricing.

Manufacturing phase starts with sampling and booking the yarn. Factory is in charge of both of these, but merchandiser needs to give instructions to the factory and follow up the situation. It depends on the customer which samples are needed. Usually the first sample customers ask for is a fitting sample but that is not always needed if bulk production follows the SMS or development sample without modifications. In the fitting sample the fabric doesn't need to be the actual one to be used and there are not any prints or accessories because it is made for checking the measurements. Pre-production sample (hereafter PP-sample) is mandatory in every order. In a PP-sample everything should correspond to the bulk production: fabric, print, accessories etc. That is the piece that should be followed in production.

There are a lot of preparations at factory that the merchandiser needs to follow up. Merchandiser has to get approvals of e.g. lab dips, prints, embroideries, accessories from the customer before PP-meeting. Merchandiser collects all the information about the product and order to QC-file which he hands over to the concerning QC before PP-meeting. Merchandiser acts as the link between the factory and the customer. He gets his instructions from the customer and passes them to the factory. Because the merchandiser is responsible for manufacturing, it is his task to ensure that everything that is sent to the customer are according to their requirements. It is crucial to ensure that the samples are as per requirements because the bulk production is based on them. If the merchandisers send something that is not according to requirements for customer's approval a lot of time is wasted. Two technicians at Tuli Trading office help merchandisers in checking samples and doing wash tests before sending to the customer.

One of the main tasks of merchandisers is to follow up the schedule of production. Very often there are delays and surprises in the production. Time and action plan in STEP helps them to follow up the schedule. The main parts of production are mentioned in the time and action plan and it gives them automatically a date by which the parts should be completed based on the template the merchandiser has chosen. The template is chosen according to the production time. There are 60 days, 90 days and 120 days templates of which the 90 days is the most common. The parts of production process that time and action plan gives the dates for are Lab dip, fit/ styling/ proto sample, print/ embroidery/ applique strike off, bulk fabric submission, photo/ ad sample, 3rd party lab test, PP-sample, bulk fabric inhouse washing test, PP-meeting, inhouse garment washing test, shipping sample and final/ 3rd party inspection. QCs are at the factories, so they know what the real situation there is like. That is why the cooperation between QCs and merchandisers plays an important role in production follow-up.

8.4 Quality control

Tuli Trading has a QC-team that consists of 8 quality controllers and a QC-manager. As described earlier the QCs are divided into country teams. Five QCs are

working with Finland-Russia orders and 3 with Germany-USA orders. Though German and Russian orders are bigger than Finnish and Russian, the quantity of orders is much higher. There are various small orders and that is why also more QCs are needed. During this research period the QC-manager quit working for Tuli Trading and a new one started. That was a natural timing for making changes in the QC routines.

The first QC manager didn't want to keep an individual QC at the same factory for longer than one month. His idea was that then factories wouldn't get too familiar with the QC and stop taking him seriously. That caused sometimes double work for merchandisers. If the QC changed during the production time merchandiser needed to explain the order again to the new QC. The new QC manager keeps the same QCs posted at the same factories. Each QC has 1-4 factories they are working at, based on the order quantity Tuli Trading is having at those factories.

The main parts of QC work are PP-meeting, inline and final inspections, and reporting these. QCs main tool is the QC-file which includes all the instructions for the production, like measurement chart, artworks and approved PP-sample.

It is mandatory for QCs to attend the PP-meeting, while the merchandiser involved attends when he can. QCs' task is to observe if everything is going in production like agreed in PP-meeting. They do it with inline inspections and observing the work at the factory in general. They have to inform the merchandiser if they notice any deviations. QCs also need to give instructions in sewing lines if they see mistakes in production.

Final inspection takes place when at least 75% of the order quantity is finished and packed. There is a certain procedure that QCs follow in the final inspection. AQL (acceptable quality level) determines how many products need to be inspected and how many major and minor defects there can be so the products still pass the final inspection. The goods cannot be shipped to the customer if the final inspection is failed. Currently in Tuli Trading's management's opinion, there are

too many problems that are noticed only in final inspection. Then it is too late to correct the situation, and this causes a lot of extra work.

QC makes a report of the PP-meeting and all the inspections he has done during the production. There are report formats that will be filled in. QCs send them to the concerning merchandiser, QC-manager and company management by email. The reports used in the beginning of this research period were quite old and included a lot of slow handwriting.

9 The critical parts and problems in the production process and how to improve them

9.1 Critical parts in production

One of the most important questions in the interviews was *“In your opinion what are the most critical parts in the production process?”*. This was also one of the questions I gave to the interviewees before the interview, so they would have time to give it a thought in advance.

Critical parts of the production process are related to preventing problems and defects in production process. By critical parts of production process, I mean those parts which people need to focus on most and where mistakes could most easily happen. Focusing on the critical parts is basically problem forecasting. When critical parts are handled well, it reduces problems in production. My hypothesis, which was based on Tuli Trading's CEO's viewpoint, was that the biggest turning points in production process were getting the order, PP-meeting and delivery.

Eight critical parts in production could be defined in the data. They are:

- Schedule and follow-up
- Controlling the factory and choosing the right factory
- Communication and teamwork
- Knowing each own's remits

- Knowing the customer and their requirements
- Bulk fabric and yarn inhouse on time
- PP-meeting
- Inline inspections

Sticking to the schedule and following up the production was seen as the most critical part in production among the interviewees. Follow-up is mostly merchandisers' task, but QCs are their ears and eyes at the factories. Time and action plan is the tool that that is helping merchandisers to follow-up the schedule when it is used in right way. One problem is that in the beginning of this research all of them weren't using it properly.

Choosing the right factory is critical schedule-wise but also in other ways. Firstly, the factory must have time and capacity for production in customer's time frame. There is no point to place the order to the factory that will be late anyway due to overbooking. On the other hand, to be suitable for a particular order the factory must have also knowhow of producing the products that the customer has ordered. Some factories are better organized, and their management is more cooperative than in the others. That is why Tuli Trading should name key suppliers that it builds stronger cooperation with. It would be beneficial for both parties. A cooperating factory could then be assured that it will have a certain amount of orders and Tuli Trading could trust the factory. In the beginning of this research period Tuli Trading had a couple of key suppliers but it would need some more.

In the interviews it came out that cooperation and team work are seen as an important thing. Despite this most of the interviewees thought that there is no need for more cooperation between and inside the teams. An exception to this is the development team. All the interviewed persons from the development team would like to have more cooperation with merchandisers in the future. This can be seen as a problematic situation as the company management thinks that increasing the teamwork is essential. More than half of the interviewees stated that they see their own team as hardworking and everything goes well, but the other teams don't take care of their responsibilities as well as their own team. Two

interviewees stated this in an extremely strongly. The confrontation was strongest between the merchandisers and the QCs. The problem seemed to be at least partially that teams didn't know what the other teams were actually doing, and which were their own responsibilities. It came out strongly that the whole process and each own's remits should be clarified to everyone. Otherwise it would be impossible to proceed with improving the team spirit in the company within this research.

Most of the time in production is consumed in the process of making the bulk yarn and fabric. Making the fabric is the first step in manufacturing so without fabric nothing else can be done. According to the interviewees it usually takes about one month from booking yarn before the factory has the bulk fabric in hand. Usually after that it still needs to be dyed. For this reason, the involved merchandiser should ensure very strictly that the factory is proceeding with bulk fabric in schedule. Otherwise it might cause delays on production. In that case the customer needs to be informed immediately.

Apart from the procuring of fabric, getting all the approvals from customer side takes a lot of time and might cause delays on production. If approvals take more time than planned the booked production time at factory might be lost. If the factory is fully booked, they might not find additional time for production very soon. That is why it is important to know the customer requirements. Some customers want to approve everything themselves and some customers only need PP-sample for their approval. Some customers can approve for example prints and embroideries from picture, some let Tuli Trading's merchandisers do that and some of them want to do it themselves seeing the actual sample or strike off. The more the customer wants to handle the approving process by themselves from the actual sample or strike off, the more time should be reserved.

PP-meeting is the important individual part of production that affects the success in production. QC (and sometimes QC-manager and merchandiser) and representatives of factory, e.g. merchandiser, production manager, quality manager

and cutting in charge, attend the PP-meeting. There all the critical issues of production are talked through, the PP-sample is checked, and production plan determined. All the needed information should be in the QC-file because that will be the guideline for the PP-meeting and the whole production. If a merchandiser is not attending the PP-meeting, he should go through the details of the product and hand over the QC-file to the concerning QC a couple of days before PP-meeting. In the research I found out that quite often there are shortcomings in QC-files and QCs don't always get the QC-files early enough or they do not familiarize themselves with the files before the PP-meeting.

Inline inspections take place to the early stages of production. In an inline inspection QCs check if products and production is proceeding according to what has been agreed in the PP-meeting. The beginning of the output is the most critical in terms of the whole manufacturing. If something is wrong in the very beginning it takes a lot of work to correct the defects if it is not noticed immediately. But if the first pieces are sewn in a right way, most probably the rest of the production goes well. When order quantities are small, production times can be very short. Because of the limited number of QCs in the rush times it is impossible for them to attend all inline inspections.

It is noteworthy that the critical points take place either in the first half of production process, like bulk fabric in-house on time, PP-meeting and inline inspections, while the rest of critical point are longer, or actually they last for the whole production time.

After identifying the critical parts, it was important to analyze how those critical parts would need to be taken care of because there were already some major shortcomings. How do people act if a mistake is noticed? Who has the responsibility? These things are pondered in chapter 9.3.

9.2 Problems in production

Another important question in the interviews was “*What kinds of problems have you faced in the production process?*” This was one of the questions that were given to the interviewees beforehand. In the interview I asked the interviewees to tell about the problems as precisely as they can. When analyzing the data, I noticed that the problems in production are strongly connected to the critical parts of the production. If critical parts weren’t handled well, it caused problems. Some of the problems are also related to each other. In some cases, the problems could have been categorized to several groups. In those cases, I tried to think about the ultimate cause of the reason in order to help decide which group should it belong to.

From transcribed interview data I identified altogether 192 different mentions of different kinds of problems in production. I categorized them into groups that are schedule and follow-up, communication, managing the factory, resources, materials, negligence, distributing work and technical problems. The four most common of these were schedule, communication, technical problems and managing the factory. The rest four groups were mentioned significantly less.

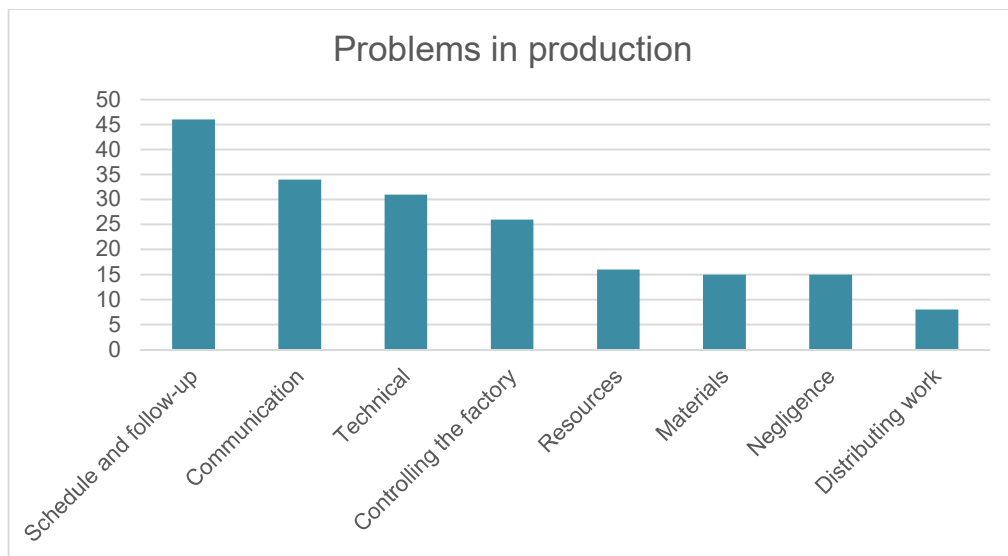


Figure 5. Problems in production, N=192

The most frequently mentioned problem was schedule and follow-up. Many of the problems are related to being late because being late causes other problems. If production needs to be done in a hurry the risk of making mistakes increases and quality suffers. For example, wrong size labels can be attached to garments, prints are placed wrongly, hems and foldings are uneven etc. For this reason, one of the most important things to improve was to think what should be done so that things happen early enough and in schedule.

First of all, there needs to be a realistic schedule. In the beginning it can be a sketch and it should be updated when there is more information on production. Schedule problems appear when merchandiser hasn't analyzed the critical dates carefully enough or if QCs and merchandisers are not communicating about the real situation at the factory or they haven't reacted to the situation. When most of the time is wasted in waiting for approvals and bulk fabric production merchandisers shouldn't send to customers anything that is done wrongly, and bulk yarn should be booked immediately after order and fabric approval.

All the teams highlighted communication problems. There were problems in communication towards the customer, the factory, the different teams and also inside teams. Two interviewees mentioned that some people from other teams are not speaking to them in a nice way.

Technical problems are usually related to the output of the products or patterns. Usually miscommunication or failing in managing the factory causes these types of problems. Having a proper PP-meeting and good QC-file could help in avoiding these. In addition, QCs need to be very careful in inline inspections. An example from interviews:

"When we make the sample sometimes they [factory] don't understand way we're making. Then they have already done differently and we have to go there and see what is happening and tell them to do like this."

Problems associated with the electronic tools used by Tuli Trading were categorized under technical problems. Sometimes internet connection is not working or

STEP is working very slowly. That has a negative effect especially on merchandisers' work.

Managing the factory is closely related to the critical part "choosing the right factory". Problems related to the controlling factory were mostly about cooperation and communication with the factory:

"I couldn't reach the factory MD for many days"

"Sometimes factory people don't listen to us and follow our instructions"

Sometimes communication gaps existed also inside the factory:

"Factory merchandiser has ordered wrong amount of fabric"

Problems related to resources were all about deficiencies in human resources. In development team's and QC team's opinion there is not enough manpower in their teams. That makes them underachieve. As mentioned, working in a hurry and under too hard pressure causes defects that are usually time consuming to correct.

"Since we're getting more and more orders, I have a feeling that we would need two more persons in sewing could help us big time"

Problems with materials were mostly related to the availability of fabrics, accessories and other materials. Some problems with the construction or features of fabrics were also mentioned, like "*huge shrinkage*" or "*multiple shades*". Problems with materials should be taken care of by the factory. Usually Tuli Trading's QCs or technicians who perform the in-house wash test noticed these kinds of problems.

Negligence means human errors. When there are a lot of people involved in the production it is impossible to completely avoid human errors. However, they can be minimized with good communication and orientation, and by giving the employees enough time to recover and take rest.

There has been a lot of schism between merchandisers and QC's. In interviews both teams complained that the other team is not doing their job. One example is

QC-files: merchandisers accused that QCs are not reading the QC-files while QCs said that merchandisers don't put all necessary information there.

All teams had experiences that work is not distributed equally inside the team. Some of the interviewees said that some persons have more work than the others. They felt it was unfair. For this reason, among others, it was important to observe carefully which tasks are on who's responsibility.

9.3 Improvements to production process and testing them

When I started to think how Tuli Trading could improve their production process I had to keep in mind the environment where the activities of the company take place. Although I would have known some good practices from Europe I couldn't apply them here because it would have caused too big change at one time.

The main target when planning the improvements for problems and handling critical parts, was firstly to prevent problems and secondly to ensure that all the employees know what they and their colleagues are supposed to do if any problems appear. One fundamental critical point and problem in production process was that it wasn't always clear to everybody what others are doing and what are each employee's tasks and responsibilities. If it's not clear to everyone what is happening, in which order and how it's affecting the whole process, how could the production proceed smoothly? Furthermore, many problems and critical points twine around schedule and especially running late on that. Also, allocating human resources efficiently and distributing work equally has been troublesome.

As a solution to all of the aforementioned issues I decided together with company management to form a production work flow, or timeline as we have been calling it. It is also supposed to clarify the schedule and the order in which things should be done. I have placed every single task from the production process on the timeline. The timeline consists of only the bulk production, so the product development part is left out. I wrote separate instructions for product development part but product developers have tasks also during bulk production. The tasks are

color-coded so the timeline also points out who's tasks they are. The groups are merchandiser's, QC's, product developer's, technician's, company management's and financial department's task. In the timeline there is only the name of the task, e.g. *Start making QC-file* or *Check shipment sample and send it to the merchandiser*, but on a separate sheet there is a closer description of the details that every task includes. In a way, the descriptions are like a checklist for employees, i.e. stating what they need to do in which parts of the production. It also advises what to do or who to contact in problematic situations. The timeline is concentrated on preventing problems. The objective is that if everyone follows the timeline attentively, possible problems will be noticed when there is still time to make a change. Tuli Trading's management sees that the timeline is a significant competitive advantage for the company, so it is not attached to this research report.

I made some changes and added new tasks to the timeline compared to the starting point of production process in the beginning of this research period. The timeline starts with a new task: inquiry meeting in which merchandiser, company management and sometimes product developer take part. Inquiry meeting is needed if the customer is new or the products are somehow complicated. The details of products and customer requirements are discussed.

When I attended PP-meetings in the beginning of this research period I noticed that a lot of time was consumed on measuring the size set. Usually PP-meeting of several orders are held in the same day, so a lot of time is wasted when QC is measuring the size set. My idea was that PP-meetings would be mostly for talking about the critical points in the product and determining the manufacturing schedule. That is why now QCs are supposed to measure size set before PP-meeting so that everything is clear in PP-meeting. If there is something wrong in the measurements, they can still be corrected before the PP-meeting. This requires that QC gets the QC-file early enough.

QC-file is the most important tool for QCs. I noticed that merchandisers were putting them together in the very last minute. Now the timeline advises them to

start with the QC-file as soon as they get confirmations from the customer and make it little by little. Now merchandisers are supposed to give as many QC-files that are ready in QC-meeting or at least 3 days before the PP-meeting.

The general guideline in the company has been that all the samples and strike offs that are sent to a customer need to be checked first that they are compliant with the requirements. Earlier it was somewhat unclear who is checking which sample and who should react to any noticed defects. That is why customers have been receiving samples that don't fulfil the expectations. Now it was clarified that merchandiser has the responsibility for samples. Technicians help them to check the samples, but they cannot know all the different customer requirements. That is why merchandiser needs to give good instructions to the technician. It is the technician's task to let merchandiser know if there is anything wrong with the garment. Then merchandiser can decide or ask if the customer might accept the defect or if sample needs to be rectified. It was decided that QCs check all the samples at the factory before sending them to the office, but they have to be extra careful with shipping samples. Merchandisers will not check them again at the office unless it is a critical style or customer. Shipment sample is from the bulk production so if procedures have been followed, everything should be correct in the shipment sample.

In addition, the timing of two in-house tests were defined. It was decided that PP-sample testing should be done before PP-sample is sent to customer. Wash test should be passed before sending in order to avoid unnecessary costs and waste of time. Not all customers require PP-sample testing. Alternatively, bulk fabric wash test needs to be done before size set. Bulk fabric is tested for shrinkage, twisting and color fastness. There is no reason to proceed to size set if fabric will be rectified.

PP-meeting and inline inspections, i.e. most of the QC-job in total, are critical points in production. The new QC-manager agreed that practices in those parts had plenty of room for improvement. Improvements started with writing instructions to timeline task descriptions. In addition to that, PP-meeting and inspection

report formants were revised. QCs were using very old report forms when they were implementing PP-meetings and inspections. They included a lot of hand writing. QCs send them separately to email. I created new forms with the QC-manager. They are more informative and faster to fill in than the previous ones. PP-meeting reports can also be filled in with computer but so far none of the QCs has started doing that. Because reports were on paper they were difficult to find afterwards unless they were in good order. Now QCs place the reports into SharePoint where they are easy to find under the right folder, identifiable by the style number.

In order to increase communication both between QCs and merchandisers and inside the teams and to make it easier for company management to follow the situation with orders, meeting practices were revised. Earlier there was so called Monday meeting to which all merchandisers and QCs attended. There all the running orders were reviewed. There were many things that were not relevant to all attendees to the meeting, so most of the time people were just sitting and listening situation of other people's orders. Very often Monday meetings were cancelled because QCs were too busy to come to the office. Monday meetings took a lot of time. Occasionally there was also team meetings with merchandiser teams.

As the first measure we decided with company management that both team meetings and Monday meetings will be arranged every week. They are mandatory for QCs and merchandisers. We also wanted to keep all the meetings as short as possible and leave everything unnecessary out. We noticed that agendas and memos were needed, so company management could follow better if the things are being done like agreed. Monday meetings got a new name: QC-meeting. It is mostly lead by the QC-manager. It starts with general issues after which QCs and merchandisers will divide into country groups and talk about the upcoming week's PP-meetings, inspections, shipments and general situation at factories. Orders are talked about more closely in team meetings. They are for merchandisers and they meet in country teams once a week. Moreover, only critical issues are brought up also in team meetings.

Tuli Trading started to use SharePoint in other ways as well. Because it was earlier sometimes unclear for merchandisers where QCs are, QC-manager puts the QC schedule to SharePoint every week. QCs maintain a log book which records where they have been and what they have done. Earlier each QC had their own logbook format and they send them to management's emails. Now they all follow the same format and update it in SharePoint. In addition, team meeting and QC-meeting memos can be found in SharePoint. If someone can't attend a meeting they can read there what has been discussed.

One thing that was not raised so much in the interviews but rather in conversations with company management and from observing the work was that it was difficult for the country manager and assisting country manager to keep track of what was happening in the company and with the orders. The new meeting procedures and check points in the timeline are meant to remedy this problem but updates to STEP were also made. Two new reports were designed. One report is supposed to help in placing the orders. From the report it can be seen which factories have production and when. Then company management can decide which of the key suppliers would need more orders and which factories are fully booked. Then merchandisers can be advised to do the pricing in the right factories. The other report tells the quantity of orders that have been received and shipped and the value and commission of these orders within the selected month. The report also compares the numbers to the previous year. It is possible to get the report either factory or customer wise.

The major change in most of the employees' work was the timeline. The new timeline was introduced to merchandisers and QCs in separate training sessions in the end of August 2018. I planned the merchandisers' training mostly on my own and the QCs' training with the QC-manager. The new PP-meeting and inspection report forms were also introduced in both trainings. Furthermore, QCs were taught how to use the new report formats. Neither one of the teams had ever had any training sessions. The tasks of the teams were introduced in a very

detailed way. Merchandisers gave some comments on the work flow and questioned how some parts are going to work in practice. They were discussed, and some minor changes were made. QCs didn't give any comments.

When observed afterwards I think that if someone from the actual company management would have organized the trainings, they would have been more effective. Especially some of the merchandisers took the improvements in that way that they are getting more tasks when the reality is that their work is now organized in a slightly different way and the tasks are only clearly specified and brought up. The rationale behind the timeline is to make their work easier, not more burdensome. After two months of launching the new timeline it seems that company is still facing similar types of problems in production. It seems that part of the employees do follow the new instructions but some of them are doing things in the way that they are used to. Because there are so many small parts in production process and employees are so many, it is difficult to superintend if instructions are followed on each level. Committing the employees is not easy and it is one of company management's main tasks when they lead company towards more efficient procedures. The change needs everybody.

In some things there has clearly been improvement. The meetings are serving employees' needs much better. People are not wasting their time when listening things that have nothing to do with their work. Also, company management feels that they know better what is happening with the orders. Especially the country manager of the Bangladeshi office has gotten tools that help them keep on track in critical things. All in all, critical points are discussed more. Cooperation between teams has improved. This has resulted in reduced amount of duplicate work. When people are communicating more they know what the others are doing. Also timeline has helped people to recognize their own and their colleagues' responsibilities.

The idea on the timeline is based on forethought. Practical experience gathered after the publication of the timeline has demonstrated that anticipation is much more difficult than I had thought. For example, merchandisers might know only

the preceding day that there will be PP-meetings next day. Critical dates, like bulk fabric wash test date, PP-meeting date and final inspection date, can be analyzed beforehand, but they don't necessary tell anything about the real dates. It is very common that factory announces one day before that not it is time for PP-meeting.

9.4 Conclusions

This research has described the clothing manufacturing process from the point of view of an international buying house. This research has also pointed out the critical points and different problem types in production process. It was noticed that critical points and problems in production are very closely related to each other.

Within this research many improvements were done to Tuli Trading's production process. The major improvement was the timeline that helps in scheduling, recognizing each one's remits and reacting to problematic situations and critical points in production. One way to make production process more efficient is to avoid gaps and waiting times. Sometimes it is difficult due to rapidly changing situations. This research has pointed out that the more planning can be done, the more fluently production will proceed.

All the improvements that were planned to the production process weren't implemented as well as they could have. Management should have prepared to the resistance to the change more carefully. It might be that against Tudor's (2017) advice too many changes were implemented at the same time. Then it is difficult to standardize them all and make as a habit.

Tuli Trading's company management has been happy with the results of this research and improvements that have been put into action. The results have helped the company to work more efficiently. Evaluating of the improvements is still ongoing process because noticing the effect of improvements in practice takes time.

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Attachment 1. Interview questions

Questions marked with star (*) were given to interviewees one day before the interview.

Development team:

1. How does the product development process begin? Tell about different customer cases.
2. How does the development process continue? Step by step
3. * What are your tasks in the process? Please tell as precisely as you can.
4. Bushra:
 - a. What are your responsibilities?
 - b. Do you plan schedule for making the samples?
 - c. How do you divide tasks between your team members?
 - d. How much time do you need to have between receiving the artwork and sending the SMS?
5. *How do you get the detailed information of the products?
 - In which form?
 - Who gives you instructions what to do?
6. How do you purchase fabrics for SMS-samples?
 - How do you know what to order and how much?
7. Accessories:
 - Where do you purchase accessories?
 - How could you expand the selection?
 - How can you ensure availability of the accessories in production?
8. In which parts of the process do you cooperate with merchandisers? In what kinds of matters?
9. How do you communicate with merchandisers? For example meeting, email....
10. In which parts of the process are you in contact with customer? In what kind of matters?
11. Do you cooperate with QC's? In what kinds of matters?
12. What kind of cooperation/ help would you need more in your opinion? *
13. Do you go to the factories? What do you do there?
14. In which kind of situations would you need support from company management? *
15. In your point of view what are the most critical points in production process? *
What kind of problems have you faced in production process? *
16. What kind of actions have you made or could do if production is running late?
17. In your opinion how important is for you to know the client well? For example, price range. Do you have possibilities to influence the final product or do you just make the garment as you've been told to do it?
18. When we have more quiet season what kind of tasks would you like to do? *
19. Where people do double work? *

QCs

1. How do you know where and which order you work with?
2. Do you report your work to QC manager? How? How often?
3. What kinds of instructions do you get from QC manager?

4. What kinds of tools do you use?
5. Do you cooperate with development team?
6. In what ways do you cooperate with merchandisers?
7. What kinds of instructions do you get from merchandisers?
8. In what ways do you cooperate with factories' QSs?
9. What kind of cooperation would you need more in your opinion?
10. When do you get QC-file?
11. Do you take part in PP-sample production?
12. How do you prepare yourself for PP-meeting?
13. Which inspections do you make?
14. When is inline the inspection? What do you do in that?
15. When is pre-final inspection? What do you do in that?
16. When is final inspection? What do you do in that?
17. In your point of view what are the most critical parts in production process and your job? *
18. What kind of actions have you made, or could do, if production is running late? *
19. What kind of problems have you faced in production process? *
20. In which kind of situations would you need support from company management? *
21. Where do we waste time in production?

Merchandisers:

1. Which brands are your clients?
2. How does your part of the production process begin?
3. What are your tasks in product development process? (When there is no order yet. For example pricing.)
4. When you get a new client how do you get to know them? Do you search information about them?
5. How do you get the order? In which form? Please tell about different client cases
6. Do you agree the conditions of order with client before they make an order?
7. Could you explain to me, how do you do pricing?
8. After getting the order, what are your tasks in the process? Please tell as precisely as you can and different customer cases.
9. How do you prepare yourself for the PP-meeting?
10. In your opinion how much time there should be for production after PP-meeting?
11. Communication with customer:
 - Are you in contact with customer? In what kind of matters?
 - Would you need more information of the products or other issues from customer side?
 - Are there sometimes any information gaps?
12. Which things you can approve in production and what do you have to ask from customer? For example lab dips. Tell about different customer cases
13. How do you cooperate with other merchandisers in your team? Do you think that in the future you should cooperate more with them? In what kind of matters?
14. Cooperation with factories: When do you need to go to the factories? What do you do there?

15. How do you cooperate with factories' QCs? In what kind of matters? Do you think that in the future you should cooperate more with them?
16. How do you cooperate with factories' merchandisers? In what kind of matters? Do you think that in the future you should cooperate more with them?
17. How do you cooperate with company's QCs? In what kind of matters? Do you think that in the future you should cooperate more with them?
18. In your point of view what are the most critical points in your job and production process?*
19. What kind of problems have you faced in production process? *
20. What kind of actions have you made, or could do, if production is running late? *
21. Do you need help from your team leader? In what kind of matters? Do you get help from him when you need?
22. In which kind of situations would you need support from company management? *
23. How useful is Time and action plan in STEP in your opinion? What is good and bad about it?
24. Where do we waste time in production

