THE INFLUENCE OF BREAST ASYMMETRY ON THE PRODUCT DEVELOPMENT OF BRAS
– A MIXED METHODS RESEARCH

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Sanne Jansen
Alina Milbradt

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THE SWEDISH SCHOOL OF TEXTILES
UNIVERSITY OF BORÅS
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Author: Sanne Jansen, Alina Milbradt

Supervisor: Daniel Ekwall

Abstract

Background: The fashion world is increasingly aware of different body types and becomes more diverse every year. However, breast asymmetry, which is highly common among women with a rate of 88 percent, is not addressed by the fashion industry at all. Current advertisements of lingerie brands mainly support a flawless, slim and symmetrical body type. This beauty standard seems not in accordance to the high rate of affected women with breast asymmetry. Moreover, there are several factors which are negatively influenced by breast asymmetry, such as a failing weight support of the bra, an asymmetrical look due to the ill-fitting bra and confidence issues.

Purpose: The aim of this research is to empirically investigate the influence of breast asymmetry on the product development of bras.

Method: The research makes use of a mixed methods research design. This concurrent design has the focus on the quantitative part. The empirical tools, which are selected for this research, are a survey and semi-structured interviews. In order to obtain more information about the research topic, a literature review has been conducted first. The systematic review critically examines the already existing literature. The theoretical starting point of this research begins with breast asymmetry and product development to then continue with conducting a survey among women and interviewing experts, based on interview guides.

Results: The results are gathered through the survey and interviews. More than 65 percent of the respondents of the survey see or feel a difference between the two sides of their breasts. In total, almost 60 percent of the women identifies the left side of their breasts as larger. More than 80 percent of the women mention volume as the affected asymmetry factor. The degree of difference between the two sides of the breasts differs from woman to woman. Around 25 percent of the respondents, who say they are affected with breast asymmetry, indicate that they try to even out the breast asymmetry.

Conclusion: In consideration of the rate of affected women and current product development practices, a differentiation between a low degree of asymmetry and a high degree of asymmetry has to be made. Lingerie companies should consider to adapt low breast asymmetry in their product development, as current solutions are sufficient to even out small differences. Adequate labelling and branding of the products, which are suitable for breast asymmetry, need to be introduced. For the high degree of asymmetry, special bras need to be constructed. This is feasible for most brands, yet only successful for brands where this type of bra matches the product portfolio and values of the company.

Keywords: Breast Asymmetry, Product Development, Bra Development, Intimate Apparel
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Preface

Before you lies the thesis; ‘The influence of breast asymmetry on the product development of bras – A mixed methods research’, an objective research about breast asymmetry, the effects of breast asymmetry on women and the fashion industry, and the question whether or not it is necessary to change or adjust the future product development of bras. This master thesis has been written to fulfil the graduation requirements of the master ‘Textile Management’ at the Swedish School of Textiles. From April 2019 until June 2019 we were engaged in researching and writing this thesis.

We would like to thank Daniel Ekwall, PhD, for his constructive feedback, excellent guidance, advice and support throughout this process. We also would like to thank all the interviewees who provided us with knowledge about the current product development process of bras and predictions about the future product development process. Last, but not least, we would like to thank all the respondents who filled out our survey. Without the effort of these people, the outcome of this thesis would not have been the same.

We hope you enjoy your reading.

Sanne Jansen & Alina Millbradt

Borås, 22 May 2019
Glossary

**Amastia:** Absence of the breast and nipple

**Areola:** The circular area of darker skin around the nipple

**Bilateral:** Pertaining on both sides

**Directional asymmetry:** Occurs whenever there is normally a greater development of a character on one side of the plane or planes of symmetry than on the other

**Fluctuating asymmetry:** Small random deviations from perfect symmetry in bilaterally paired structures

**Gigantomastia:** Excessive breast growth; also referred to as massive breast hypertrophy

**Hypertrophy:** Increase in size, structure, or function

**Iatrogenic:** Caused by medical examination or treatment

**Mamma:** Synonym for breast

**Mammae:** Plural form of mamma

**Unilateral:** One side or a part of one side of the body
Chapter 1: Introduction

1.1. Background

The fashion world is in change; the demand for fashion for all shapes and sizes is strongly growing, and tolerance and equality are the core themes these days. Customers turn to authentic companies, which offer various products, in order to find the perfect matching product (Solomon, et al., 2013).

Fashion firms, which are not willing to let go of outdated beauty standards, feel the new gained consumer awareness in the form of decreased sales, as experienced, for example, by the American lingerie brand Victoria Secret (Forbes, 2018). By mainly promoting flawless, well-trained slim body silhouettes, they are not able to speak to the diverse society with all kinds of different body types. Even though different body shapes and skin colours are more noticed by fashion brands nowadays, some differences may not be taken in consideration for new product developments and innovations.

One of these differences, which is barely covered by fashion companies, are asymmetrical breasts in women. A study found that 88 percent of women have asymmetrical breasts, which includes differences in volume, shape, size or position (Rohrich, et al., 2003). Already 65 percent of women have a noticeable difference in volume of their two breasts (Kayar & Çilengiroğlu, 2015), which can lead to challenges in finding a proper fitting bra. The bras of the commercial bigger lingerie brands have always the same cup size on both sides, which explicitly raises the question whether these bras fit the affected 65 percent of women with different sized breasts.

This situation is aggravated by potential confidence issues of women, who have severe differences in their breast sizes and therefore feel less attractive and even ashamed (Møller, et al., 1995). Influential actresses, like Jennifer Lawrence and Keira Knightley, are trying to set a good example of body positivity, by talking openly about their asymmetrical breast measurements on television and in magazines. Keira Knightley, a British actress, took the awareness spreading even a step further by posing topless in the ´Interview Magazine´ and enforcing a ´no-photoshop of her breasts´ policy (Interview Magazine, 2014). She highlights that ‘it does feel important to say it really does not matter what shape you are’ (The Times UK, 2014). Sentences like this and the concomitant actions are setting an example for the increasing awareness of breast asymmetry in the media.

However, only spreading awareness about asymmetrical breasts does not directly influence lingerie companies and subsequently the development of a fitting bra for women with breast asymmetry. Research of LaBat and DeLong (1990) showed that fit is a primary factor for determining comfort in clothing. Women in general already appear to wear the wrong bra size in 85 percent of the cases (McGhee & Steele, 2010). When the fit of a garment is not satisfactory to customers, it might give customers the feeling that there is something wrong with their body (Alexander, et al., 2005). Therefore, the product development is a crucial process in the product creation process. It determines the fit of the garment and has therewith a high influence on women’s appearance, confidence and awareness.
Furthermore, a fitting bra has the main purpose to support the weight of the breasts, create an aesthetic pleasant look as well as to cover or enhance the breast shape (Luciani, 2009). This is the case for symmetrical breasts. If the purpose of a bra can be fulfilled for asymmetrical breasts can be questioned. The need for adaption creates therefore a challenge for the current product development.

To understand moreover the importance for lingerie companies to own an eminent product development department, a look at the current sales numbers are inevitable. The retail lingerie market has an estimated value of over 38.19 billion US dollar and is expected to grow over 59 billion US dollar by 2024 (Statista, 2019). In order to get a share on the market, brands need to adapt to consumer needs: ‘You do not find customers for your products. You find products for your customer.’ (Godin, 2009). Understanding what is demanded by all different women is crucial in order to succeed.

Some companies, such as the lingerie brand Thirdlove, can already celebrate a great success story through their inspiring acknowledgement of diversity (Papermagazine, 2019). This brand offers half sizes and a big range of different skin tones, and minimises thereby fitting issues. Yet, the bras are not adaptable or suiting for asymmetrical breasts in particular. Affected women still have to use inlays, which can start to smell or move out of position.

According to some people, it is time to rethink the concept of the bra and time to find a new perspective for a product which should be just as versatile and diverse as its owner (Zheng, 2006). No woman is the same and no breast is the same or symmetric. The question is where the fine line, between customisation and commerciality, lays, for such a complex product as a bra, in order to make it fit.

1.2. Problem statement

The main purpose of a bra is to support the breast and to provide comfort. This clothing piece is designed to match the unique shape and needs of the breasts in order to fulfil these purposes. At the moment, commercial available bras have two same sized cups. However, most women have asymmetrical breasts, and therefore two different sizes or shapes of the two breasts. This creates a discrepancy between the symmetry of the cup and the asymmetry of the breasts. Fitting issues might correlate to breast asymmetry, whereby the influence of the product development of this type of product must be investigated.

1.3. Purpose

This study aims at empirically investigating the influence of breast asymmetry on the current product development of bras as well as the potential future influence of breast asymmetry on the product development of bras. Moreover, it is connecting the already existing medical breast asymmetry studies with newly gathered data of consumers, to be able to register current problems of the bra development and to identify possibilities for market share expansion for underwear companies. Furthermore, this research is offering new insights and facts on this topic and raising awareness of the constraint of breast asymmetry.
1.4. Research questions

The following research focuses on the topic of breast asymmetry, the effects of breast asymmetry on woman and the fashion industry. Furthermore, the question, if it is necessary to change or adjust the future product development of bras, is raised. The study is conducted to evaluate if the medical problem of asymmetrical breasts can be directly connected to fitting issues.

In order to be able to cover all aspects of this topic, several questions have been set up. These questions cover the medical side of breast asymmetry as well as the side of the product development of bras. Therefore, the first two questions are used to guide the quantitative research. Question three and four are guiding the qualitative part of the research. Moreover, the fourth research question combines the outcome of the first three research questions, in order to come to a final conclusion. The questions are as follows:

1. ‘How are women affected by breast asymmetry?’
2. ‘What are the effects of breast asymmetry on women in context of their bra and clothing choices?’
3. ‘What is the current product development process of bras?’
4. ‘Is there a need to change or adjust the future product development of bras in regards to breast asymmetry?’

1.5. Relevance

To this day, breast asymmetry is only discussed in literature in conjunction with medical problems, such as breast cancer. Herewith, the relationship between the difference in volume of the two breasts and the risk of breast cancer is investigated. Apart from that, literature about the mental effects of breast asymmetry on women is present in a limited amount. For instance, the relationship between asymmetrical breasts and the concomitant lack of confidence is only partly discussed and recognized by scientific literature. However, literature regarding breast asymmetry in regards to product development of clothing is not discussed so far. Let alone literature about breast asymmetry in combination with the product development of bras.

Since there is only a limited amount of literature about breast asymmetry available, and no literature in combination with product development of bras, this research will be of great importance for the fashion industry. The basic information for future product development, taking breast asymmetry into account, is created through this research.

1.6. Schematic outline

This research is divided in several chapters. For an easier navigation through the study a schematic outline is presented below.

In chapter 1: ‘Introduction’, the purpose and background of this study, as well as the relevance, are presented. Furthermore, the research questions that this study attempts to answer are stated. In the second chapter: ‘Literature review’, a systematic review of current studies of breast asymmetries are presented in addition to literature about product development practices of bras and consumer insights. An overall picture of the current state of scientific research is drawn. Chapter 3: ‘Methodology’ includes the methodology of the conducted research, step by step.
The methods of the conducted survey and interviews are presented, which show how this research is exactly carried out. In this way, the necessary data will be collected. Thereafter, in chapter 4: ‘Results’, the analysis of the conducted data gathering of this study will be presented. These results are the findings of the research. In chapter 5: ‘Discussion’, the findings of the previous chapter are taken into the context of the literature to identify potential application of this study. The overall outcome and main conclusions of this research are stated in chapter 6: ‘Conclusion’.
Chapter 2: Literature review

The first part of the literature review focuses on different aspects of breast asymmetry and the effects of breast asymmetry on woman, in different disciplines. Since the influence of breast asymmetry is one of the most important parts of this research, it is important to understand the basics of the asymmetry first. This includes information about the different definitions of asymmetry, statistics about breast asymmetry, classification systems, the side on which breast asymmetry appears more often, and the physical and mental effects of breast asymmetry on women.

The second part of the literature review covers all the different aspects of the product development of bras. This includes information about the construction of bras, measurements for bra development, sizing systems, challenges within the product development and technologies to overcome these challenges. This information is given in order to understand what the current product development process is and what the possibilities for the future are.

The third part describes the current state of literature in regards to breast asymmetry in context of the product development of bras. Therefore, this part of the literature review creates the interface between the literature about breast asymmetry and the literature concerning product development. This will ensure that all parts are included within the research.

2.1. Breast asymmetry

According to Maliniak (1934), perfect symmetry of the breasts does almost not exist. Thorough examination of breasts of woman would expose a small variation in size or shape of the mammæ, in basically every woman. The mammæ is the plural form of mamma, which is a synonym for breast (Segen, 1992). The definition of mamma is defined as follows by Oxford Dictionaries (2019): ‘A milk-secreting organ of female mammals (in humans, the breasts)’.

2.1.1. Asymmetry according to dictionaries

Asymmetry has different definitions according to dictionaries and researchers. The definitions depend both on the context in which the term is used and the user itself. The meaning of asymmetry given by Cambridge Dictionary (2019) is as follows: ‘With two halves, sides, or parts that are not exactly the same in shape and size.’

The definition of the term asymmetry according to Oxford Dictionaries (2019) is described as follows: ‘Lack of equality or equivalence between parts or aspects of something; lack of symmetry’.

2.1.2. Breast asymmetry according to literature

In previous research, there are not many definitions given for asymmetry in combination with breasts. Kayar and Çilengiroğlu (2015) made use of two criteria to measure the degree of asymmetry. The first criteria is the asymmetry value (quantity). This is the plain difference between both breast volumes and is measured in millilitres. The second criteria to measure the degree of asymmetry is the asymmetry ratio. This is the rate of asymmetry value to the volume of small side of breasts. The following formula for calculating the asymmetry ratio is used:
Asymmetry ratio (%) = \( \frac{Asymmetry\ value}{Breast\ volume\ of\ small\ side} \)

The Queen Victoria Hospital (2017) describes breast asymmetry as a difference in the size of the breasts, a difference in the shape of the breasts and also a difference in the position of the nipple. The difference in the size of the breasts can result in underdevelopment or overdevelopment of one breast, or a lack of development altogether.

As mentioned before, perfect symmetry of the breasts does not exist according to Maliniak (1934). A slight variation in the size or shape of the mammae occurs in almost every woman, although the asymmetry sometimes consists of minor differences. These differences can present itself in for instance the areolae and nipples. However, sometimes the proportions and the ratios of the breast on the one side do not correspond at all with the breast on the other side. This is in line with the definition of asymmetry according to the Queen Victoria Hospital.

### 2.1.3. Statistics breast asymmetry

Research of Rohrich et al. (2003), showed that 88 percent of women have some degree of asymmetry in their breasts. This asymmetry can, among others, emerge in the nipple and areola size, the nipple position and the volume of the breast. The same study shows that 65 percent of the women have more than one factor that indicates asymmetry of the breasts. The areola is the circular area of darker skin around the nipple (Cambridge Dictionary, 2019).

Dr. Kirtly Parker Jones mentions that at least ninety percent of women have a difference of 15 to 20 percent between their breasts. Also, it is mentioned that a very high percent of women have 10 to 15 percent disparity in breast size, but that they may only notice the discrepancy when they wear bras which are designed to be symmetrical (University of Utah, 2018).

Other research states that breast asymmetry is very common and that it affects more than half of all women. They indicate among others trauma, puberty and hormonally changes as reasons why woman’s breast can differ in size or volume (Anthony, 2017).

The study ‘Breast volume asymmetry value, ratio, and cancer risk’ investigated the criteria for determining the cancer risk. Therefore, the differences in breast volume asymmetry levels of healthy women and women with cancer were compared. The outcome of this study showed that 65.92 percent of the women without cancer had a difference of > 25mL in breast volume. Over 38 percent of this control group had a difference of > 50mL (Kayar & Çilengiroğlu, 2015).

King, et al., (2017), conclude that the cup size of women equates 130 cc by bras with narrower band widths. For bras with wider band widths, it requires 150 cc to increase with one cup size. The article also confirms that there is no standardization within the bra manufacturing industry in regards to the volume of cups.

### 2.1.4. Types of breast asymmetry

There are different types of breast asymmetry identified by different researchers. In the paragraphs below, the main classifications of asymmetries of breasts are described.
2.1.4.1. Classification by Maliniak

In the early thirties, Maliniak (1934) started with the classification of asymmetries of the breast. He defined four different types, which are mentioned below:

1. Asymmetry due to unilateral hypertrophy, with the opposite side normal
2. Bilateral asymmetrical hypertrophy
3. Asymmetry to unilateral amastia or micromastia
4. Asymmetry caused by reversed development of the two breasts

The first group; ‘asymmetry due to unilateral hypertrophy, with the opposite side normal’, is shown in Figure 1. Unilateral hypertrophy is an enlargement of one side or a part of one side of the body and is characterized by an increase in the volume of the muscle mass (Kebede & Megersa, 2011). Hypertrophy is an increase in size, structure, or function (Cambridge Dictionary, 2019). Unilateral hypertrophy is the most common asymmetry and can occur in many degrees (Maliniak, 1934).

![Figure 1: Maliniak, 1934. Unilateral hypertrophy and asymmetry of the right breast.](image)

An example of the second group; ‘bilateral asymmetrical hypertrophy’, can be found in Figure 2. Bilateral asymmetrical hypertrophy is an enlargement of the body, that is characterized by an increase in the volume of the muscle mass. Bilateral means that it is pertaining on both sides (Medical Dictionary, 2019).
Figure 2: Maliniak, 1934. Bilateral asymmetrical hypertrophy.

Figure 3 shows an example of the third group; ‘asymmetry to unilateral amastia or micromastia’. Amastia is the absence of the breast and nipple (Huppert & Zidenberg, 2008). Maliniak (1934) refers to it as ‘undevelopment’ of the breast. Micromastia describes the post-pubertal underdevelopment of a woman’s breast (Willis, 2017). Often is micromastia characterized by an abnormal smallness of the breast (Merriam-Webster, 2019). Figure 3 shows an example of amastia, which is a bilateral form of amastia.

Figure 3: Tsakalakos & Jordaan, 1986. Asymmetry to unilateral amastia or micromastia.
The fourth group; ‘asymmetry caused by reversed development of the two breasts’ is represented in Figure 4. Micromastia can be seen on the left-hand side of the body. Hypertrophy is shown on the right-hand side of the body.

![Figure 4: Maliniak, 1934. Asymmetry caused by reversed development of the two breasts](image)

The cases which are shown in Figure 3 and Figure 4 are very rare. These groups are mainly characterized by the high visibility of the asymmetry (Maliniak, 1934).

### 2.1.4.2. Classification by Vandenbussche

Vandenbussche (1984) proposed, in the mid-80s, a new system to classify the asymmetry of the breast. Similar to Maliniak, Vandenbussche classified four different main groups. However, here every main group has three subgroups within each of them.

1. True malformative asymmetry
2. Precocious primary asymmetry
3. Secondary or progressive acquired breast asymmetry
4. Tertiary or induced breast asymmetry

True malformative asymmetry of breasts is an asymmetry that is present from birth. The characteristics of this main group are visible from early youth (Vandenbussche, 1984). The three subgroups are shown below:

a. Patients with associated deformities and chest deformities accompanying asymmetry, with or without other deformities, such as the Poland’s syndrome
b. Patients with asymmetry accompanied by nipple differences
c. Patients with breast asymmetry as an expression of a congenital syndrome or systemic disease
In Figure 5, an example of a patient with associated deformities and chest deformities accompanying asymmetry is shown. This deformity is an example of the Poland’s syndrome. In Figure 6, an example of a patient with asymmetry accompanied by nipple differences is presented.

In Figure 5, an example of a patient with associated deformities and chest deformities accompanying asymmetry is shown. This deformity is an example of the Poland’s syndrome.

In Figure 6, an example of a patient with asymmetry accompanied by nipple differences is presented.

Precocious primary asymmetry, the second main group of Vandenbussche, appears first during puberty. The essential characteristics are the asymmetrical breast development and the fact that there has not been any irregularity before (Vandenbussche, 1984). The three subgroups are as follows:

a. Patients with precocious asymmetry, without obesity
b. Patients with precocious asymmetry, with obesity
c. Patients with precocious asymmetry and gigantomastia

An example of a patient with precocious asymmetry, without obesity, is shown in Figure 7. Figure 8 shows also an example of precocious asymmetry, but with obesity. The last subgroup, precocious asymmetry with gigantomastia is presented in Figure 9. Gigantomastia is, according to the National Center for Advancing Translational Sciences (2016), excessive breast growth. It is also referred to as massive breast hypertrophy (Lokuhetty, et al., 2010).
Figure 7: Vandenbussche, 1984. Precocious asymmetry, without obesity

Figure 8: Vandenbussche, 1984. Precocious asymmetry, with obesity

Figure 9: Vandenbussche, 1984. Precocious asymmetry, with gigantomastia
Secondary or progressive acquired breast asymmetry usually appears after pregnancy. This type of asymmetry develops slowly (Vandenbussche, 1984). The three subgroups of this type of asymmetry are mentioned below:

- a. Patients with asymmetry, without obesity
- b. Patients with asymmetry, with obesity
- c. Patients with pathological acquired asymmetry

The first two subgroups of this type of asymmetry can be compared with the first two subgroups of precocious primary asymmetry. However, the difference is the moment in which the asymmetry arises.

Pathological means ‘relation to or caused by a disease’ (Cambridge Dictionary, 2019). Patients with pathological acquired asymmetry have asymmetry in their breast caused by a disease. This involves patients with benign tumours or abnormal breast growth during the menopause (Vandenbussche, 1984). An example of pathological acquired asymmetry is displayed in Figure 10.

![Image: Pathological acquired asymmetry](image)

**Figure 10: Vandenbussche, 1984. Pathological acquired asymmetry**

The fourth main group, classified by Vandenbussche (1984), is tertiary or induced breast asymmetry. This group consists out of all asymmetries that are provoked or induced, which means that it includes asymmetries that are very different from each other. The three subgroups are as follows:

- a. Patients with precocious iatrogenic induced asymmetry
- b. Patients with tertiary induced asymmetry
- c. Patients with tertiary asymmetry

Precocious iatrogenic induced asymmetry is a form of asymmetry caused by a medical examination or treatment. This subgroup consists out of patients who have undergone a medical treatment when they were younger, that results in asymmetric breast development at maturity (Vandenbussche, 1984). Figure 11 shows an example of this subgroup.

Tertiary induced asymmetry is the result of a trauma. Examples of a trauma are a chest burn or a plastic surgical procedure on the breast (Vandenbussche, 1984).
The third subgroup is tertiary asymmetry. This type of asymmetry is caused by a surgical procedure. In Figure 12 an example of this subgroup is presented, where the subject had a classical breast amputation (Vandenbussche, 1984).

Figure 11: Vandenbussche, 1984. Precocious iatrogenic induced asymmetry, caused by radiotherapy

Figure 12: Vandenbussche, 1984. Tertiary asymmetry

2.1.4.3. Classification by Kayar & Çilengiroğlu

Kayar & Çilengiroğlu (2015) classify three types of breast asymmetries. These types of asymmetry are noted below:

1. Asymmetry in shape
2. Asymmetry in position
3. Asymmetry in size

In the case of asymmetry in size, Kayar & Çilengiroğlu (2015) refer to asymmetry in volume.
2.1.5. Development of breast asymmetry

There are multiple stages during a woman’s life in which breasts develop. Breast development is a vital part in the human female, and the first stage of breast development begins at about six weeks of foetal development. At birth, a new born baby girl is supposed to have nipples, areolas, and the beginnings of breast tissue. However, it is also possible that the breasts are not developed in the correct way in this stage (Javed & Lteif, 2013).

The first visible signs of breast development begin when a girl approaches her teen years. During this time, the breasts start to enlarge. The left and right breast often develop at a slightly different pace and might become asymmetrical from this stage onwards. The breast asymmetry can express itself in different shapes and/or sizes of the breasts. The asymmetry can remain throughout the whole life of a female (Johns Hopkins Medicine, 2019).

The third main stage in which the breasts may develop in an asymmetrical way is during pregnancy. These changes are a normal part of pregnancy and occur because of hormonal fluctuations. According to Leonard (2019), these changes can continue after the baby has been born. There is also a possibility that the breasts of a women change, increase in size or become asymmetrical while she is breastfeeding. This type of asymmetry can also remain throughout the whole life.

Changes to the breasts can also happen when a woman reaches menopause. Pain or tenderness in their breasts can be experienced, while the levels of oestrogen and progesterone in the body fluctuate unpredictably. The hormonal changes may influence the size or the shape of the breasts of women, which can lead to breast asymmetry (Kandola, 2018).

Besides the different development stages of breast asymmetry as described above, breast asymmetry can occur because of medical reasons. These medical reasons are for instance an operation of an illness. In 2018, more than two million women worldwide got diagnosed with breast cancer (WCRF, 2019). According to the American Cancer Society (2017), most women with cancer have some type of surgery. Only three to seven percent of the women with early-stage breast cancer does not have surgery. Curative treatment for breast cancer aims to cure breast cancer, whereby surgery is one of the possibilities. Surgery can be a breast conserving operation, mastectomy, or a breast reconstruction after the women is cleared of breast cancer (Kanker.nl, 2019). These types of surgeries and illnesses can also cause a form of breast asymmetry.

2.1.6. Side of breast asymmetry

There is a general believe that the left breast is larger in comparison with the right breast, regarding breast asymmetry in volume. An explanation for this belief is that right-handed women prefer to feed their baby with the left breast (Maliniak, 1934).

Maliniak (1934) mentions that the development of breasts can be influenced by hormones, which can lead to an acceleration or slowdown in breast development. This might explain bilateral over- or underdevelopment of breasts. However, this is not an explanation for unilateral over- or underdevelopment.
Research is conducted by several researchers with the aim of finding out whether there is actually a significant difference between the volume of the left and right breast. Manning, et al., (1997) described the absolute asymmetry in their research as the volume of the left breast minus the volume of the right breast. The outcome of the study found a small positive average of 11.83mL. This means that the left breast is slightly larger, although the results were not significant.

Gray (1974) states in his book ‘Anatomy, Descriptive and Surgical’, that the left mamma is generally a little larger than the right one. In ‘Morris’ Human Anatomy’ expresses Schaeffer (1914) that the size of the two breasts is seldom equal. The left breast is, as a rule, a little larger.

However, not all research that has been carried out in this particular field comes to the same conclusion. Loughry, et al. (2004) compared the volumes and the volumetric differences between breasts, and analysis did not confirm the generally accepted impression that the left breast is bigger in volume. Even though size differences between the breasts were documented, neither breast dominated in volume.

The study of Møller, et al., (1995) showed no directional asymmetry in their sample. Directional asymmetry described as follows: ‘Directional asymmetry occurs whenever there is normally a greater development of a character on one side of the plane or planes of symmetry than on the other.’ (Van Valen, 1978). The values of the left-minus-right character did not deviate from zero (Møller, et al., 1995).

The same study did also not demonstrate antisymmetry in breast size, since the values of the left-minus-right characters did not deviate from the normal distribution (Møller, et al., 1995). Antisymmetry is a form of asymmetry that affects most individuals within a population, but whereof it is not possible to predict which side of the individual will develop more (Graham, et al., 1993).

Manning, et al. (1997) researched the individual changes in asymmetry which are related to the menstrual cycle. The asymmetry is highest at the beginning and the end of the menstrual cycle, when women are infertile. In the middle of the cycle, when fertility is highest, the asymmetry is low. These temporal changes may be used by males to indicate a female’s position in the menstrual cycle.

2.1.7. Effect of breast asymmetry on women

A difference between the sizes of each breast is no exception (Queen Victoria Hospital, 2017). However, woman are generally unaware of the difference between the volumes of the breasts, until the difference is announced in such a way that the asymmetry becomes visible to women when they are fully dressed (Maliniak, 1934).

Maliniak (1934) stated in 1934 that not much has been published about breast asymmetry in literature, while asymmetries of the breast occur with relative frequency. Nowadays, still not much has been published on the subject and therefore, an impression that it is rare to have asymmetrical breasts is created.

Malformation of breast size, or volume, and shape can both have a physical and emotional effect on women (Neto, et al., 2007). The different effects of breast asymmetry are discussed in the paragraphs below.
2.1.7.1 Physical effect of breast asymmetry on women

Hypertrophy can cause great physical discomfort, because of the size and weight of the breasts (Maliniak, 1934).

In order to find out what factors are influenced by having asymmetrical breasts, research has been conducted. During this research, researchers evaluated the impact of breast asymmetry surgery on health-related topics, by having the women fill in questionnaires about the quality of life at three different times. The questionnaire was completed before the operation, three months after, and ultimately six months after the operation. Two statistically significant and physical results emerged from the questionnaire: pain and vitality. Both of these factors improved significantly after the operation. This means that breast asymmetry has a negative influence on pain and vitality (Neto, et al., 2007).

Physical attractiveness turned out to be very important in personal and sexual relationships. One of the factors that is essential for sexual selection is fluctuating asymmetry, which refers to small random deviations from perfect symmetry in bilaterally paired structures (Jones, 1996). Since men are attracted to symmetry, symmetry is seen as an important physical characteristic in women (Zelazniewicz & Pawlowski, 2011).

So far, there is no published research that investigates the physical effects of breast asymmetry on women or a study that analyses the relationship between breast asymmetry and the physical effects on women.

2.1.7.2 Mental effect of breast asymmetry on women

Breast asymmetry can affect the well-being of young women, mainly because breasts are a symbol of femininity and provide sexual confidence (Chan, et al., 2011). Young women, or teenagers, are very self-conscious about this topic (Queen Victoria Hospital, 2017), which is a reason why breast asymmetry during the development can have a psychosocial effect on them (Chan, et al., 2011).

Nuzzi, et al., (2014) compared a control group of girls without breast asymmetry, between the age of 12 and 21, with girls who had at least one cup size difference between their breasts. The results of this study showed that the girls with breast asymmetry had a lower self-esteem. Besides that, they also suffered from a worse emotional well-being in comparison with the control group.

According to Neto, et al., (2007), there are not only physical factors which are influenced by having asymmetrical breasts. Asymmetrical breasts affect the mental state as well. The mental factors that are influenced are emotional role and mental health. After comparing questionnaires, which were filled out before and after breast asymmetry surgery, it turned out that both of these factors improved, in comparison with before the surgery, and were both statistically significant.

Since breast asymmetry may have a negative impact on the emotional well-being and the quality of life (Nuzzi, et al., 2014), some women try to hide or camouflage their breast asymmetry by wearing padded bras, bra inserts, or loose fitted clothing (Queen Victoria Hospital, 2017). Nonetheless, it must be noticed that the mental effect of breast asymmetry on women depend on the adaptability of the patient. (Hueston, 1968).
2.2. Product development of bras

Earlier conducted studies show that most of the women wear a wrong bra size. For instance, Wood, et al., (2008) state that 80 percent of all analysed females are not wearing the bra size recommended for their shape and volume. Another research, conducted by Chen, et al. (2011), is fostering these results, by claiming that maximum 10 percent of women wear the right bra size. The product development for bras is complex and requires expertise and knowledge to develop a good fit, as well as shape. This argument is further proven, as it can take patternmaker up to 10 years to create patterns for well-fitting bras (Hardaker & Fozzard, 2003).

For the product development, the main factors; grain, set, line, balance and ease are in focus (Brown & Rice, 2013). Thereby, grain refers to the placement of the pattern on the fabric. Set is describing if the fabric is fitting without any creases on a figure. Line comes in place to evaluate the silhouette and proportions of a garment. Similarly, the balance factor helps to construct the garment in relation to the figure. Lastly, ease describes how loose a clothing piece is constructed. Especially for the bra development, another factor is added: functionality. A bra needs to be able to defy gravity, but at the same time it needs to look aesthetically pleasant (Shin, 2014). A good fitting bra should therefore comfortably strap around the body and the breasts should be well supported and filling the cups without gaps (Chen, et al., 2011). No breast tissue should be squeezed or spilled out at the top side or bottom (Zheng, 2006).

Moreover, the comfort aspect is accompanied by the health related factors. If a bra is not well fitted, the potential risk for fatigue or pain is rising (Chen, et al., 2011). The main challenge of the bra development lays therefore in coping with the very complex three dimensional geometry of the breast (Zheng, 2006). As the current sizing system in Europe is based on only two measurements, the under bust girth and the bust girth, fitting problems are predestined. These two measurements are translated into a numeric band size and an alphabetical cup size, which creates a sizing system. Chapter 2.2.3. Sizing system of bras is going into detail to describe the different sizing systems.

2.2.1. Construction of bras

The bra belongs to the women’s intimate apparel and offers support by lifting and shaping the breast. It is constructed through many cut pieces, which are sewn together to create a three dimensional cup which is fitting comfortably the unique and complex shape of the breast (Yick, et al., 2016).

The core components of a bra are the centrepiece, cup, band, straps and underwire (Shin, 2014). Thereby, the bra band, which is optimally 10 to 15 cm shorter than the ribcage, is creating a tension through negative ease. This tension creates the support and is the weakest link of the bra. If this part is not adapted to the body shape, the bra is destined to fail, as it is not able to support the weight of the breast. The band around the under bust should be the main support, not the straps over the shoulder, as this can lead to discomfort and pain in shoulder and back.

To achieve the optimum tension, which is the overall goal in the bra development, different properties of different materials need to be taken into account. The materials need to be soft and elastic to provide comfort. At the same time they need to be resistant and strong, to provide support and durability. Moreover, a good colour fastness and high quality trims are requested to guarantee a long lifetime for this everyday garment. All these factors result in high
manufacturing and material costs, which are potentially passed on to the customer (Yick, et al., 2016). A good bra can therefore be a pricey purchasing decision.

2.2.2. Measurements for bra development

Essential for the construction of a bra are the pattern and the aligned measures of the bra. These measurements of given measurement points and distances are stated in the measurement chart, which is part of the development sheet. During fitting sessions and quality checks, the measurement chart is compared to the actual bra. If some adaptations are required, for instance some measurements are out of range or because the bra is not fitting well, the measurement chart gets updated and forwarded to the pattern maker or supplier, in order to change the pattern of the bra.

2.2.2.1. Technical drawing of a bra

In Figure 13, a technical drawing of a bra is presented. The technical drawing is marked with the most essential measurements for the bra development (Garbarczyk, 2012). They are given in the development sheet as a guideline to adapt the final pattern and to make it fit to the bust measurements.

Number 1 is marked as the half circumference of the under bust and is slightly shorter than half of the actual body measurement of the girth to create the negative tense. Number 2 is the closure height, which stands in relation to the wing height, number 3. The increasing cup size is affecting the height of the closure. Thereby, more support is needed, so the wing and closure will increase to offer more support. Additionally, the centre front insert height, number 4, is another part of the bra that influences the comfort. However, it is moreover also an aesthetical component. Number 5, the upper wing length, and number 6, the underarm length, are increasing interrelated with the cup size. Number 7 and 7a, the back length and front strap length, are connected through a slider and are a crucial construction part. The material selection is of high importance, as the material should not wear out, not cut in, offer support and look pleasant. The cross cup width, number 8, is determining the general cup size of the bra.

If all measurements are perfectly attuned to one another and to the breast measurements, the bra will fit well. The material and trim selection of the developer are the other two factors which have an influence on the comfort (Yick, et al., 2016).

![Technical drawing of a bra](image-url)
2.2.2. Cups of bra

In general, bras can be divided into four big subgroups: padded and unpadded bras with or without a wire (Luciani, 2009). Whereby the word padded refers to the cup upholstery. The two cups of the bra are either just fabric or fabric with a proper moulded cup. Both solutions have the option to add an underwire for further support. Since the sleek look wave in the 1990s, bras developed from a sharp edgy look to a round fitted shape. This round fitted shape can be achieved by moulding, laminating, welding and the recently introduced seamless technology (Shin, 2014).

If the developer chooses a proper cup for a bra design, additional manufacturing steps are added to form the cups. This is happening through transient heat, which is forming the raw material into a permanent three dimensional shape (Yip & Ng, 2009). In detail, a male mould is pressed, under high pressure and temperature, on a female mould, which contains the raw materials. At a material specific temperature, the raw material is softened and the morphological hard segments, together with the soft segments, are rearranged to the mould shape in the foam, fabric or the laminated combined layers (Yu, 2006).

After the shaping phase, the cooling phase starts to preserve the new shape. The mould can be removed and the cups can be further processed.

2.2.2.3. Bra shapes

Every brand divides their product portfolio into different categories for an easier overview for the consumer. Some lingerie companies offer their ranges under the categories of unpadded/padded bras, other companies directly present the different shapes of the bra.

Especially online, these categories provide structure and an easy navigation to the desired bra. In the online shop of Triumph, the consumer can choose between different styles as padded/unpadded and wired/non wired bras and special bras as plunge, a deep cleavage bra, push-up bras or t-shirt bras (Triumph, 2019). Hunkemöller, on the other hand for instance lets the consumer decide if they want to organize and shop after styles, types or shapes (Hunkemöller, 2019). The customer can sort the products after the style, as for example t-shirt, sports, plus size or basic bras. Another option is to search in the categories of type, where the products are divided into groups as padded/unpadded with or without a wire. The last selection are the shapes of bras, which are balcony, plunge, full cup/coverage bras or demi cup bras, which have a low cut cup and only covering half of the breast.

Other brands as Thirdlove have slightly different categories (Thirdlove, 2019). Their portfolio is presented in Figure 14 and show their offered shapes and styles. Balconette bras have short cups and often wider straps. Furthermore, the centre front height is for most balconette bras increased. Plunge bras are allowing a low cleavage. They lift naturally due to the low cut. Contrarily, the full coverage cup bra is covering more of the breast and moreover offering more support. The t-shirt bra is quite similar to the full coverage bra. However, the main purpose is the invisibility under t-shirts due to reduced cut lines and smooth fabrics. The comfort is in focus for this basic bra. The multiway bra is the all-rounder under the bras. The reason lays in the adaption possibilities of the straps. This versatile bra can be worn with crossed straps in the back, one shoulder strap or strapless. The bra can adapt to the requirements of the wearer. Another bra type is the wireless bra, which can come in different shape and forms, but they have the missing wire in common. Bralettes can be grouped into this category. Some brands
offer, apart from these main shapes, special occasion bras, as sports bras or nursing bras, which have different specifications as the previous mentioned bras.

![Bra Images](image)

**Figure 14: Thirdlove, 2019. Portfolio of bras of Thirdlove**

### 2.2.3. Sizing system of bras

The highly complex shape of the breasts and the diversity of women create a challenge for product developers and patternmakers. Zheng & Yu (2007) identified 98 body measurements, which are relevant to describe the breast shape. However, to standardize the production process, sizing systems simplifying breast volumes by taking only two measurements into account and translating them into a numerical and an alphabetical character. This creates a scale to evaluate the matching bra size.

The first measurement, the under bust girth, is determining the numerical band size length. The second measurement, the measurement over the breasts, in relation to the under bust girth, is translated to the alphabetical cup size. For the mass production only these two measurements are taken into account. Moreover, body measurements have to be rounded up or down for the bra selection, which leads to a lack of accuracy (Shin, 2014).

#### 2.2.3.1. European sizing chart of bras

Figure 15 presents the European sizing chart for the bra selection, as here presented in the Swedish Standards manual under the document name SS-EN 13402-3:2017 (Swedish Standards Institute, 2017). Bra companies, such as Triumph, are using it to offer a guideline for customer to choose their right bra size. Another challenge, especially for internationally operating companies, is the difference between sizing charts across the world. There are not only differences between continents, as for instance the United States and Europe, but even within Europe there are differences. An example of this matter is the difference between the United Kingdom and France or Italy (Brasize, 2019). Furthermore, not only are sizing systems inconsistent, but moreover supplier sometimes deviate from the standards. Current sizing systems are in conclusion not sufficient to offer a reliable base (Zheng & Yu, 2007).
<table>
<thead>
<tr>
<th>Range</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
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<th>110</th>
<th>115</th>
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<tr>
<td>Intervals</td>
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<table>
<thead>
<tr>
<th>Cup girth</th>
<th>Dimensions in centimetres</th>
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</thead>
<tbody>
<tr>
<td><strong>Cup AA</strong></td>
<td>70-72</td>
</tr>
<tr>
<td><strong>Cup B</strong></td>
<td>74-76</td>
</tr>
<tr>
<td><strong>Cup C</strong></td>
<td>76-78</td>
</tr>
<tr>
<td><strong>Cup D</strong></td>
<td>78-80</td>
</tr>
<tr>
<td><strong>Cup E</strong></td>
<td>80-82</td>
</tr>
<tr>
<td><strong>Cup F</strong></td>
<td>82-84</td>
</tr>
<tr>
<td><strong>Cup G</strong></td>
<td>84-86</td>
</tr>
<tr>
<td><strong>Cup H</strong></td>
<td>86-88</td>
</tr>
</tbody>
</table>

The cup size: AA: 10 cm to 12 cm  (The letter describes the difference between bust and underbust girth)
A: 12 cm to 14 cm
B: 14 cm to 16 cm
C: 16 cm to 18 cm
D: 18 cm to 20 cm
E: 20 cm to 22 cm
F: 22 cm to 24 cm
G: 24 cm to 26 cm
H: 26 cm to 28 cm

Figure 15: Swedish Standards Institute, 2017. Ranges for bras, corsetry and swimwear with cups with intervals of 5 cm
2.2.3.2. Methods for bra size calculation

A study of Chen, et al. (2011) analysed three different methods for the bra size calculation. The research team compared the results from the band method, the so called Victoria Secret method, the Washington State method from 1986 and the Wright method from 2002. The Victoria Secret method and the Wright method have in common that they use the same two measurements: under bust and bust girth. They differentiate in the amount they are rounding up, if the body measurement is an uneven number. The Washington State method on the other hand is using the chest measurement, instead of the under bust girth, and the bust girth. The researchers then compared the measured fit with the self-claimed best fit of the women. After analysing the results, the research team concluded that with the Victoria Secret method none of the women wear the right calculated bra size. With the Washington state method 3.9 percent conformity could be found and with the Wright method 9.7 percent. Through an additional survey Chen, et al (2011) found out, that only 8.17 percent of the participating women were satisfied with the support their bra was offering. Moreover, they were annoyed by loose straps, gliding down the shoulders, uncomfortable fastener as well as tight cups.

2.2.4. Challenges within the product development of bras

To develop well-fitted bras, not only product development knowledge is required, but furthermore, a good understanding of the female body. Breasts are changing daily, periodically and in their life cycle due to weight and hormonal changes, reproduction in terms of breastfeeding and extensively due to aging. Ashdown & Na (2008) studied the differences of breasts of younger women with the breasts of older women. The younger group had smaller bust point distances and longer bust point to waist heights. The bust point distance is defined as the distance between the bust point to centre front. These differences of the bust shape need to be recognized by lingerie brands in order to provide satisfaction and a good fit (Shin, 2014).

Especially the older generations showed frustration over the limited clothing options for their changed fit requirements as well as the lack of fashionable pieces for their age (Howarton & Lee, 2010). Not only the aging, and as a consequence thereof of the different fit requirements, has an influence on the demand for different shapes and sizes, but furthermore ethnic differences (Chen, et al., 2011). Every ethnicity has a slightly different body type, which is influencing the measurements of the bra. A uniform bra shape is difficult to realize due to the different requirements of the consumer.

Another argument, which needs to be considered, is that not only the breast size itself has an influence on the right bra choice, but also the fitting itself. While taking measurements, the measurement technique can vary, for example finding the exact measuring position and guaranteeing the consistent tightness of the band. Moreover, human factor needs to be considered. To be more specific, breathing and posture have an effect on the measurements as well (Zheng, 2006).

The next challenge bra developers are facing are the different properties of the different materials. Especially the different tensions of materials require proper fittings and tests to estimate if the materials can be used for future designs (Shin, 2014). As the band is the main support of the bra, it needs to be strong enough to hold weight, but at the same time it needs to offer comfort. It should not cut into the body, nor should it wear out easily (Hardaker & Fozzard, 2003).
Due to the extremely complex shape of the breast, fitting patterns are challenging to construct. The three dimensional breasts need to be translated into a two dimensional pattern. The cut fabric pieces will then be reassembled, sewn together and fitted to the bust. This procedure requires special trained sewing and pattern experts. It takes several years to be able to create a good fitting bra pattern (Hardaker & Fozzard, 2003).

2.2.5. Technologies to overcome challenges within the development

There are several technologies that can be used to overcome challenges within the current development of bras (Shin, 2014). The most important technologies are discussed in the paragraphs below.

2.2.5.1. Memory foam

Memory foam, which is highly recognized in the mattress industry, is finding its way in the bra industry due to their versatile thermo-responsive characteristics. The basic concept of memory foam can be described as a temperature depending deformation and therefore as a reversible adaption process. If this material is exposed to increased temperatures, the skin for example, it deforms and moulds to the shape of the breast within a few minutes. Higher density of the material is responding the body heat and materials with lower density are responding to pressure. Both versions are made from polyurethane with different chemical additives (Singh & Gangwar, 2015). The different properties of the memory foam result in a better fit and comfort for the wearer. Furthermore, this technique could be used for bras for asymmetrical breasts due to their unique property adaptions.

2.2.5.2. Memory wire

As previously stated, the band of the bra offers the main support. To further stabilize and strengthen this support, a wire under each bust can be inserted. The memory wire has similar properties as the memory foam; it has a shape memory and recovers in its prior shape after use through cool down. The advantage of a memory wire, in comparison to a normal wire, is their ability of recovering from high amounts of strain and pressure (Singh & Gangwar, 2015). A company which is using this technology is Triumph. They patented the memory wire as ‘magic wire’ and advertise it as a metal free, comfortable version of the original wire (Triumph, 2019).

2.2.5.3. Seamless technologies

The more seams a garment is holding, the more potential for uncomfortable cutting points are given. This is the reason why the seamless technology is a general trend in the fashion industry (Shin, 2014). Zheng (2006) developed, together with the Hong Kong Polytechnic University, a seamless bra. This bra is based on a three dimensional scanning method of the breast and offers a more fitted and therefore comfortable fit. The focus of this project laid on the right under band pressure, the perfect fitting knitted wing and an increased cup volume. Moreover, it additionally contains a soft wire which is developed by taking fourteen key measure points into account, and gets inserted in a knitted tunnel. An example of a prototype of a seamless knitted bra can be found in Figure 16.
2.2.5.4. Scanning technologies

Not yet commercial methods to create good fitting bras, but technologies with potential are the scanning technologies. They are able to measure breast volume and shape and then use the gathered data for the creation of individual patterns (Chen, et al., 2011). A previous study explained, by joining five manual measurements with ninety-eight three dimensional measure points, captured by a laser, how a virtual breast shape can be created (Zheng, 2006). The captured heights, curvatures, widths and distances from different angles can be translated into the matching pattern measurements. The custom made bras are especially beneficial for bigger breast shapes (Chen, et al., 2011). This technology can be used in combination with the seamless technique and thereby increasing the fitting comfort.

2.2.6. Potential of product development of bras

Since the mass production of clothing began, it has become a challenge for retailers and manufacturers to produce well-fitting over garments for consumers (Chen, et al., 2010). The same applies to the mass production of undergarments, as there also is a growing demand for well-fitting bras. However, it is challenging to find a well-fitting bra that is enhancing the body shape of different women (Luk & Yu, 2016). As a result, poorly fitting bras are put on the market, while these can cause discomfort or pain (Chen, et al., 2010). Negative health outcomes which are mentioned, resulting from ill-fitting bras, include an incorrect posture, headaches and back ache. For that reason, a poorly fitting bra is an important issue regarding women’s health (Coltman, et al., 2018).

Despite the fact that there are negative health outcomes of poorly fitting bras, there is no research published that investigates the relationship of physical contours to bra fitting problems (Chen, et al., 2010). However, factors that affect the way in which bras fit are researched. These factors include the body size and shape, the style and shape of a bra, the pattern dimensions and the pressure that is applied on the skin (Luk & Yu, 2016). According to Coltman, et al., (2018), the consequences of an incorrect bra fit are much greater for women with large breasts than for women with small breasts. Shin (2014) mentioned that, in total, more than 70 percent of women are wearing the wrong bra size, while Coltman, et al., (2018) state that only 10.03 percent of the women are wearing a bra that is rated as fitting correctly, as previously stated. As there is still room for improvement, designing a bra which fits well and supports the breast, should be
a priority for the industry (Shin, 2014). In the end, a poorly fitting bra has the potential to not only result in discomfort or pain, but also in lost sales for retailers and a reputation loss (Chen, et al., 2010).

2.3. Breast asymmetry in product development

The current literature is lacking information regarding product development of bras which take breast asymmetry into account. This chapter presents the interface between the literature of breast asymmetry, the product development of bras, and the resulting challenges.

As previously stated, the product development of bras, for more or less symmetrical breasts, is already compound. The breast in general has a unique and complex shape (Yick, et al., 2016). If a difference between the two breasts is now considered, the complexity of the bra is increasing to match two separate highly complex shapes instead of one. This creates a challenge for pattern makers and material developers.

The only bras which consider breast asymmetry, which are currently on the market, are targeting breast cancer patients. These bras are constructed with pockets on the inside to fill the cup by inserting a prosthesis (Amoena, 2019). However, a new solution is coming up for women with asymmetrical breasts but without a cancer background necessarily. The start-up Bravaria is developing a bra for women with breast asymmetry. The customer can select the side of the cup which is cushioned to even out one cup size difference. At the moment, only a t-shirt bra in a black colour is available (Bravaria, 2019).

A challenge which occurs to affected women is the sizing system for bras. The current sizing systems are based on symmetrical breasts, and are taking two measurements into account. These measurements are the under bust girth and the measurement over the breasts (Shin, 2014). The two measurements stand in relation to each other. Moreover, the difference between them indicates the cup size. By measuring the girth over asymmetrical breasts, the average cup size is calculated instead of two separate cup sizes.

The mentioned technologies in chapter 2.2.5. Technologies to overcome challenges within the development, can also be discussed in context of asymmetrical breasts. All the mentioned technologies, memory foam and wires, scanning technologies and seamless knitting, can be considered in regards to breast asymmetry. None of these technologies have an exclusion criterion why they cannot be used for bras that take breast asymmetry into account.
Chapter 3: Methodology

The methodology used for this research is based on a mixed methods approach. By performing a mixed methods research, the different perspectives from consumers and producers were taken into account. This created new data for the topic of breast asymmetry in context of the fashion industry and specifically in the bra development. The quantitative method had the higher priority in this concurrent design. The empirical tools which were selected for this study were a survey, to gather quantitative data, and in addition several interviews, in order to gain qualitative data.

To be more specific, the survey was established in order to collect data from the affected women and therefore, from the perspective of the target group of several lingerie brands. On the other hand, the semi-structured interviews with product developers and designers from lingerie brands were conducted to collect data from the opposite perspective of this topic: the provider of bras for the target group. Combined, both data collection methods were able to integrate the information of breast asymmetry into the in context of product development, to draw a holistic picture. This dual strategy was needed, to cover all aspects of breast asymmetry in the fashion industry.

3.1. Literature review

In order to obtain more information about the research topic a literature review has been conducted first. Bryman (2008) described a literature review as following:

‘A critical examination of existing research relating to the phenomena of interest and of relevant theoretical ideas.’ (p. 14)

This chapter is giving a critical examination of the already existing literature. A literature review has the aim to provide an overview of the literature that is comprehensive, capable of replication and transparent in its approach. For this research, close attention was paid to the assessment of the quality of the research, in order to decide whether or not a study should be included in the literature review.

The first part of the literature review focused on different aspects of breast asymmetry and the effects of breast asymmetry on women. The second part of the literature review covered all the different aspects of the product development of bras, including information about sizing systems, challenges and new technologies.

The secondary data that was used to write the literature review was mainly derived from articles, books and reports. Among others, Primo and Google Scholar were used to find the correct literature. In addition, various key words and terms have been used in the search engines to find more relevant data.

The key words that were used were of great importance for finding the right literature. When certain terms would not have been used, the availability of literature might have been limited. Conversely, if too many key words were used, the literature might have been no longer relevant or too extensive (Statistics Solutions, 2018).
The following keywords have been used during the literature review:

- Breast asymmetry
- Effects of breast asymmetry
- Statistics breast asymmetry
- Types of breast asymmetry
- Intimate apparel
- Lingerie
- Product development bras
- Sizing systems bras

3.2. Survey

A survey, or questionnaire, is a collection of questions administered to respondents. The term usually denotes a self-completion questionnaire, which is a questionnaire that the respondent answers without the aid of an interviewer (Bryman, 2012). During this research, the survey was used to gather more information about the amount of women that have a degree of breast asymmetry and how they are affected. The first two sub questions, as mentioned in Chapter 1.4. Research questions, were answered by the survey.

3.2.1. Description of method of data collection

In order to prepare a survey, it is important to have the right background information. The background information for the survey of this research has been obtained by performing a preparation interview and by carrying out a literature review. In this way, useful information about the topic was collected, which formed the basis for the survey. The literature review can be found in Chapter 2.1. Breast asymmetry.

The literature that has been found on breast asymmetry was used for a preparation interview, with a woman who has a high degree of breast asymmetry. By performing a preparation interview, which was held as an unstructured interview, it was possible to dive deeper in the topic and to see the topic from a different angle. Ultimately, the preparation interview led to potential questions for the survey. Before the interview started, an introduction was given to the interviewee. The introduction was ensuring that the interviewee knew what the goal of the interview was, what was expected, and what the timespan was. Besides that, also an approval for recording the interview was asked. The interview finished with a closure. The introduction and closure of this preparation interview can be found in appendix I.

A topic list, which can be found in appendix II, has been drawn up to ensure that various topics are discussed during the interview. The topic list consisted out of topics which were identified during the literature research. Since the interview was held in an unstructured way, there was also the option to talk about topics which were not identified in an earlier stage.

The preparation interview was held on the 4th of April, 2019. Afterwards, the interview was coded axial, which can be found in appendix III, and selective, which can be found in appendix IV. Based on the axial and selective coding, the previous stated questions for the survey were formed.

The first draft of the survey, which was covering various topics of breast asymmetry, was pretested to a group of ten women. This pilot survey was conducted to critically examine whether the questions were clear and to check whether the right information was obtained. After the pilot survey, the first draft of the questionnaire got adjusted, to extract and sort the final
survey. The final survey contained twenty-seven questions ranging from general bra fitting questions to specific asymmetry related topics.

In order to make sure that the respondents received the right information before the survey started, an introduction has been set up. In this introduction of the survey, an overview about the purpose of the survey and the research was given. Besides, the respondents were thanked for their participation. Furthermore, information about the approximate duration of the survey was given. Also, it was mentioned that the survey was anonymous and a definition of breast asymmetry was stated. After the last question of the survey, a final message was presented to the respondents. In this closure, the respondents were informed that the survey had ended and the results had been saved. In addition, the respondents were thanked again for their participation. The introduction and closure can be found in appendix V. The final survey can be found in appendix VI, and was conducted via SurveyMonkey.

Data was extensively gathered through the survey over the course of three weeks, from the 10th of April until the 1st of May 2019.

After the survey was closed, the gathered data was downloaded via SurveyMonkey. SurveyMonkey provided percentages, graphs and tables per question, whereby it was not possible to combine the data of several questions together. This means that the survey has been analysed by looking at the data of each single question separately. In a later stadium of the research, the results of questions have been combined manually in order to discuss the results and in order to be able to state conclusions.

3.2.2. Description of the population

Marshall & Tanner (1969) described five stages of development in the breasts at puberty. In the last stage, stage 5, the breasts are described as mature adult breasts. In this stage, the breast becomes rounded and only the nipple is raised. The results of their research showed that this stage is reached around the age of 15/16.

The survey was only conducted among women aged sixteen or older, since they might have had experience with breast asymmetry and were able to give their opinion regarding this topic. To be more specific, the focus laid on women older than sixteen, since this is the age when the breasts of women are fully grown according to Marshall & Tanner (1969).

By asking women from different age ranges, it was possible to get more information about the relationship between age ranges and breast asymmetry. Also, the group of people represented a great diversity in body shape and fit preferences. These different characteristics allowed proper research into breast asymmetry and the question whether or not it is necessary to develop better fitting bras for women with breast asymmetry.

To calculate the needed number of respondents the formula below has been used (Qualtrics, 2019).

\[
Sample \ size = \frac{z^2 \times (1-p)}{e^2} \times \frac{1}{1 + \left( \frac{z^2 \times p(1-p)}{e^2 N} \right)}
\]
To find the ideal sample size the population size (N), margin of error (e), confidence level (z) and percentage value (p) were filled in. The female population, in April 2019, was over 3.8 billion (Countrymeters, 2019). This population included females under the age of sixteen, since there was no up-to-date data available on the population of women over the age of sixteen. The margin of error that was used was 5 percent, with a confidence level of 95 percent. When all the parameters were filled in, an ideal sample size of 385 respondents arose.

The survey has been distributed via various social media channels, which ensured that the respondents could easily access the survey and fill in the questionnaire. The social media channels that have been used were among others LinkedIn, Facebook and WhatsApp. A link of the survey, together with a description of the research, has been shared on these channels. To gather more data, several Facebook and Reddit groups have been contacted in order to spread the survey among groups in which only women were allowed. Examples of these groups are ‘Women for Women’, ‘All Round Women’ and ‘Women United’. Furthermore, the link was posted in specific bra related topic groups, as for example on Reddit in the group ‘ABraThatFits’.

3.2.3. Reliability, validity and generalizability

By conducting a survey in this research, valuable quantitative data has been gathered, so the impact of asymmetric breasts on the product development and the fashion industry could be measured.

Reliability is the degree to which a measure of a concept is stable (Bryman & Bell, 2015). The survey is reliable if it is carried out among a large group of respondents. As mentioned before, the respondents were selected on the basis of gender and are approached by several social media channels. Because of the large group of respondents, the important results have been mentioned more often in comparison with the results that are not as important. Once the research is repeated, the same results will emerge, unless the problem is addressed in the meantime.

Validity on the other hand, is a concern with the integrity of the conclusions that are generated from a piece of research (Bryman & Bell, 2015). However, the survey measured exactly what the intention of the survey was, namely to measure what the impact of asymmetric breasts on the product development and the fashion industry has been.

Besides the general validity approach, specifically the external validity needed to be addressed. Bryman & Bell (2015) describe external validity as following: ‘A concern with the question of whether or not the results of a study can be generalized beyond the specific research context in which it was conducted.’ To guarantee a high generalizability, a large participation group needed to be approached, which got followed in this research.

3.2.4. Description of the content of the survey

The survey consisted of several parts. The survey was opened by asking demographic questions such as age and gender, to then continue to questions regarding European fitting sizes of clothes and bras. These questions were raised to evaluate if the problems, which occur with asymmetric breasts, could be connected to the size of the women and their breasts.
Following, the topic of the bra fitting was in focus. Here, it was questioned, how well the bras were fitting, and if the person got measured in order to decide the right bra size. These questions were important to understand if the potential fitting problems of asymmetrical breasts were related to general fitting problems or due to the asymmetry. A direct question, what properties of the bra needs improvement was raised after. This question got connected to the question what improvements were needed for bras for women with asymmetrical breasts. The comparison was offering insight into what impact asymmetrical breasts had on the comfort of the bra.

After this rather general part, a central question was dividing the survey. If the contestant was stating not to have asymmetry, the survey stopped. However, the survey continued for the rest of the participants, in order to acquire information regarding the breast asymmetry. This section started with general questions. To be more specific, it was disclosing which breast was affected, when the asymmetry developed and if it was related to breastfeeding. Furthermore, this part was offering insight into how the asymmetry was characterized and whether the affected women tried to even out the difference between their breasts.

The survey continued to the consumer behaviour part, with the sub topic of purchasing places and required service and concluded in the subjective impact of asymmetrical breasts on confidence and advertisement preferences.

The gathered data from the survey is presented in Chapter 4.1. Survey, and then presented and discussed, in context of the literature review and gained information from the conducted interviews, in Chapter 5: Discussion.

3.3. Interview

There are different types of qualitative research, of which qualitative interviews are one. ‘Qualitative interview’ is the umbrella term for different types of interviews. The two main types are the unstructured interview and the semi-structured interview (Bryman & Bell, 2015). During this research, semi-structured interviews were used to answer the last two sub research question, as mentioned in Chapter 1.4. Research questions.

3.3.1. Description of method of data collection

This study contains several semi-structured interviews. Semi-structured interviews refer to a context in which the interviewer has a series of questions that are stated in an interview guide, but in which the order of the questions can vary. The interviewer also has the ability to ask further questions in response to what the interviewee has said during the interview (Bryman, 2012).

In order to prepare the interview guides for the semi-structured interviews, it is important to have the right background information. The background information for the interviews was obtained by carrying out a literature review on product development of bras. In this way, useful information about the topic was collected and a basis for the interviews was formed. The literature review can be found in Chapter 2.2. Product development of bras.

In order to be able to conduct interviews, interview guides have been drawn up. An interview guide needs to be drawn up to ensure that various topics are discussed during the interviews. The preparation of the interview guides starts with theoretical variables. These variables are the concepts that needed to be mapped. When the right theoretical variables were created, more
Concrete concepts were added to make the theoretical variables measurable. These concrete concepts fall under indicators. The indicators divide the theoretical variables in such a way that meaningful questions could be created. After the theoretical variables and indicators were made, the items were composed. The item is the translation of the indicators into real questions. One indicator during this research was converted into at least three different questions. By going through the different steps of the theoretical variables, indicators and the items, a balanced list of questions was finally compiled, that fitted well with the research.

Before the interviews took place, an introduction was given. The aim of the introduction is always to indicate the purpose of the interview. The first part of this introduction consisted of background information. In this part the interviewee got thanked for their participation, and information about the research was given. The second part of the introduction described why the interviews were held and contained a topic list. The last part of the introduction explained the way in which the interview was going to be held. Also, there was asked for permission to record the interview and to use the obtained data in the report later on.

At the end of the interview, the interviewee got asked if they have any comments or additions which were not discussed during the interview itself. It was important that the interview was not stopped too abruptly, to give the interviewee the opportunity to add information, which they did not express before. After the last additions were made, it was mentioned that the recording equipment has been turned off. Last, but not least, the interviewee was thanked for the cooperation and the provided information. The introduction and closure of the interviews can be found in appendix VII.

The interviews were held based on an interview guide. The interview guide can be found in appendix VIII. By using semi-structured interviews, follow-up questions could be asked, so that the interviewees could provide more information. Therefore, the interviews of this research were rich in data and information.

All the interviews were recorded, with the approval of the interviewees. During the interviews, notes were written down. The process of making notes during the interviews can be compared to open coding, a process that usually takes place when coding a transcribed interview. The notes of the interviews were grouped together in several topics. This was helping to group information topic wise, from different interviewees. This part of the process was referred to as axial coding. The outcome of axial coding was a schematic overview of the main topics and provided answers and information. The axial coding of these interviews can be found in appendix IX. After the axial coding, selective coding was conducted in order to provide an overview of the obtained information. This overview was created by taking the main topics of the axial coding process, and putting these topics in a figure. The figure, of the selective coding process, showed how the main topics of the interviews were standing in relation to each other. The selective coding is included in appendix X.

### 3.3.2. Description of the population

To get in-depth information about the product development of bras, it was important that experts were willing to give an interview. Important information was obtained by interviewing employees of lingerie brands, who were for instance working as a product developer, pattern maker or innovation manager.
To get a good overview of the current product development process, various lingerie brands were selected, which were selling bras on the worldwide market at that time. Several employees of different lingerie brands were contacted via customer service, LinkedIn, mail and phone. Employees from, in total, 25 lingerie brands, based all over the world, were approached to take part in an interview.

However, it might have been possible that not only the brands itself were important in the product development process of bras. Suppliers and manufactures were also involved in this process and could therefore also be of importance. The producers’ perspective was necessary to draw a holistic view on this topic as they had further knowledge of pattern making and production capabilities. For this reason, two suppliers have been contacted to take part in an interview.

To receive more insight information on the product development of bras considering breast asymmetry, brands that took this aspect in consideration have been contacted as well. There were two brands, with a focus on breast asymmetry, that have been contacted regarding this matter.

Since the interviewees were working in different parts of the bra industry, two interview guides have been set up. The two interview guides made sure that the right information could be gathered from the experts. A more detailed description of the differences between the interview guides is presented in chapter 3.2.4. Description of the content of the survey.

Table 15, which can be found in appendix XI, shows which interviewee number is connected to which brand. In addition, the dates on which the interviews were held, and the interview guides that have been used during the interview, are included.

Once interviews with experts, from different parts of the intimate apparel industry, were conducted, it was possible to get insight information about the different aspects of the product development process.

### 3.3.3. Trustworthiness, authenticity and ethical issues

By conducting interviews, valuable qualitative data was gathered, in order to be able to identify whether or not lingerie brands had guidelines that they applied during the product development process of bras. Also information about the current fitting processes of different lingerie brands was collected. There were and are two primary criteria for then assessing qualitative data; trustworthiness and authenticity (Bryman, 2012). Also, ethical issues were important during the course of the interviews.

Trustworthiness is made up of four criteria. These criteria are credibility, transferability, dependability and confirmability, and are discussed below.

Credibility requires a clear link between the findings of the research and the reality, in order to demonstrate the truth of the research study’s findings. The establishment of the credibility of findings entails ensuring that research is carried out according to the canons of good practice. The interviews in this research were carried out according to good practice, since the interviewees were aware of the goals, and permission to record the interviews and to use the gathered data was asked.
Transferability is important, since this research studied a group of brands that share certain characteristics. Qualitative findings tend to be oriented to the contextual uniqueness. In order to prevent this from happening, as many brands as possible have been interviewed. Besides that, the main goal of the interviews was to get a general understanding of practices at that time within the product development of bras and to get an understanding how fittings were performed. With extensive accuracy all the details of the interviews were noted.

Dependability is third criteria of trustworthiness that was important during this research. To establish a trustworthy research, complete records of all the phases of the research process were kept. This includes records of interviews, notes that were made during the interviews and a good overview of how the data analysis has been performed.

Confirmability should make clear that no personal values or theoretical tendencies of the researchers are influencing the way the research has been conducted or the way the findings arose from the research. Research should be conducted in an objective way. Therefore, two researchers were involved to minimise subjectivism.

Authenticity is an addition to trustworthiness, which is concerned with the wider impact of the research. The criteria of authenticity are, for example, fairness or educative authenticity (Bryman & Bell, 2015). A research should consider different viewpoints of multiple stakeholder. Furthermore, it should help the members to then reflect and take action to change their circumstances. In this research fairness was followed, since several experts from different parts of the intimate apparel industry were interviewed.

Ethical issues during the course of interviews are mainly concerned with the way in which how people are treated on whom the research is conducted. These issues involve harm to participants, lack of informed consent, invasion of privacy and deception. During this research the ethical issues were taken into account by making sure that the participants did not face any physical or mental harm and by giving the participants the opportunity to refuse to cooperate. Also, the privacy of the participants was taken into consideration by not mentioning any names in the research. Deception was avoided by giving the participants a clear introduction of the research and the aim of the interviews.

3.3.4. Description of the content of the interview guides

Two interview guides, as attached in appendix VIII, were set up to meet the different requirements of the different stakeholders. The first interview guide, interview guide II – A, which can be found in appendix VIII.A, was addressed to product developers and suppliers working for commercial lingerie brands. As these companies were not offering bras for asymmetrical breasts, the questions in the guideline circled around the topic of general product development and the perceived future of the bra product development.

To go more into detail, the first guideline was starting with the overall topic ‘Product development’. Here, various questions dealing with guidelines and fittings procedures of the companies were raised. These questions were the gate opener to understand how the brands were dealing with the product creation process and where they put the focus during fit and wear tests.
In the second part of first interview guide, questions regarding asymmetrical breasts were gathered. If the companies were offering products or whether the developer and supplier were seeing potential in bras for women with breast asymmetry, was asked in this section.

In the third part, the interview guide guided towards the innovation drive of the company. Hereby questions about the current and future trends of bras were asked. The guideline concluded with the future outlook of the interviewees, for example, if they think their job was going to change in the future.

Interview guide B, which can be found in appendix VIII.B, has been set up for experts in the bra industry who developed bras for women with breast asymmetry already. This interview guide had the same base as the first interview guide. However, the base was adapted to compile valuable data about the founders’ motivation to build the brand. Subsequently, a chapter about the brand development, the collection and the reason to found the company was added. The development guideline and manuals questions were reduced, however, the fitting questions were intensified to get more insight into the development of asymmetrical bras.

The results, derived with the help of these guidelines, are presented in Chapter 4: Results and furthermore, discussed in Chapter 5: Discussion.
Chapter 4: Results

This chapter presents the results gathered through the survey and interviews. These two parts of the results are separated for a better overview, but follow the same structure. The results are then discussed in context of each other in Chapter 5: Discussion.

Both subchapters are divided into the following categories: information about the participants, bra development, bra fitting and evaluation, sizing systems, impact of asymmetrical breasts on either the women or the development, the future of product development. Additionally, the survey results include data about breast asymmetry in general and buying behaviour, whereas the interview results section includes product options for asymmetrical breasts.

4.1. Survey

As a result of the literature review about breast asymmetry and the preparation interview, a survey was drawn up to get an overview of what female consumers find important in regards to bras. The survey also provided more information about the number of women that has a degree of breast asymmetry. The introduction and conclusion of the survey can be found in appendix V. The complete survey can be found in appendix VI.

The focus of the survey laid on women with a degree of breast asymmetry. Asymmetrical breasts are, in the survey, defined as breasts which differ in volume, shape, position of the nipple and/or density.

As previously stated in chapter 3.2. Survey, the survey was made with SurveyMonkey and was distributed through various social media. The data gathering started on the 10th of April 2019 and closed at the 1st of May 2019. In total, 593 respondents completed the survey. However, 759 respondents started with filling in the survey.

In the paragraphs below, the results of every single question of the survey will be discussed. For some questions, graphs or tables are used to clarify the answers and to make them visual. The results of this chapter are divided in different topics of the survey: personal data of the respondents, bra development, bra fitting and evaluation, sizing systems and standards for bras, figures about breast asymmetry, the impact of asymmetrical breasts on women, the buying habit of women regarding bras, and the future of product development of bras.

4.1.1. Personal data respondents

The initial question: ‘What is your gender?’ has been asked to make sure that only female respondents fill in the questions about the fit of bras and breast asymmetry. The results of the survey shows, that this first question was answered by 759 respondents. 19 of these respondents identified themselves as ‘not female’.

The second question that was asked was: ‘To which age category do you belong?’ The majority of the respondents fall into the age category of 21 to 25 years, as can be seen in Figure 17. This is almost 25 percent of the total. This was followed by the age category 26 to 30 years, 21.3 percent, the age category of 31 to 35 years, 13.2 percent and the age category 36 to 40 years, 10.5 percent.
Around half of the respondents are 30 years or younger. The other half of the respondents are falling in the age range of 31-35 years and over.

![Figure 17: Results survey question 2](image)

After the first two questions, the survey was stopped for the respondents who had answered, in the first question, that they identified themselves as ‘not female’.

In question 3, the remaining respondents were asked what size they usually wear in tops and shirts. The respondents had the choice between the sizes ≤30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and ≥ 50. The question is answered by 713 female respondents, which means that, besides the 19 ‘not female’ respondents, 27 female respondents stopped the survey. The largest group of respondents, 21.2 percent, said that they usually wear a size 38. This corresponds to 151 respondents. After this, 136 respondents wear size 36 and 12.5 percent, 90 respondents, size 40.

### 4.1.2. Bra development

In question 7, the respondents specified the type of bra that they prefer to wear. Figure 18 shows that the normal padded bra is the preferred bra type. More than half of the respondents, 54.5 percent, choose this option. Hereafter comes the normal unpadded bra, with 34.8 percent, the padded bra with push up, 18.4 percent, and the bralette without wire, 17.3 percent. The least chosen options are the padded bralette without wire, with 10.5 percent, the minimising unpadded bra, with 7.0 percent, and the minimising padded bra, 6.5 percent. For this question the respondents had the option to choose multiple answers. In total, the 603 respondents choose 898 response options.
4.1.3. Bra fitting and evaluation

In the survey, two questions were asked to find out whether the respondents had their body measurements taken in order to be able to determine their correct bra size. The questions concerning this matter are questions 4 and 5.

Question 4 was as follows: ‘Have you ever had your measurements taken in a bra store for a bra fitting?’ The results show that almost half of the respondents, namely 47 percent, never have taken their measurements in store for a bra fitting. This corresponds to 335 out of 713 respondents who filled in this question. 358 respondents state that they have had their measurements taken in a bra store. Of those, 286 respondents said that they had their measurements taken over more than one year ago. The other 92 respondents stated that they had their measurements taken in the last year. This corresponds to 40.1 and 12.9 percent respectively.

Besides taking measurements in store, it is also possible for consumers to take their measurements by themselves. In order to find out whether consumers have ever taken measurements themselves for a bra fitting question 5 has been formulated: ‘Have you ever taken measurements yourself for a bra fitting?’ 45 percent, corresponding with 321 out of 713 respondents, state that they have not taken measurements for a bra fitting themselves. However, 201 respondents mention that they took the measurements in the last year. This equates to 28.2 percent. The other 26.8 percent, 191 respondents, indicate that they have taken measurements themselves over more than one year ago.

In question 8 the respondents have indicated how good their bras are fitting. In Table 1, as shown below, it can be seen that 241 out of 603 respondents, which filled in this question, have
trouble finding a fitting bra. 218 respondents indicate that they always wear the same type of bra. 27.5 percent of the respondents mention that they do not have problems finding a fitting bra. Regarding the results of normal bras 72 respondents mention that they always wear the same bra. Other respondents, 68 out of 603, are able to find bras, but would not describe them as comfortable. 39 respondents, 6.5 percent of the total, indicate that they do not have a single good fitting bra. The results of this question also show that the respondents wear sports bra instead of normal bras, that they do not wear a bra at all, or that they wear custom made bras.

Table 1: Results survey question 8

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not have problems finding a fitting bra</td>
<td>27.5%</td>
</tr>
<tr>
<td>I have trouble finding a fitting bra</td>
<td>39.9%</td>
</tr>
<tr>
<td>I do not have a single good fitting bra</td>
<td>6.5%</td>
</tr>
<tr>
<td>I always wear the same bra</td>
<td>11.9%</td>
</tr>
<tr>
<td>I always wear the same type of bra</td>
<td>36.2%</td>
</tr>
<tr>
<td>I can find bras, but they are not comfortable</td>
<td>11.3%</td>
</tr>
<tr>
<td>I wear custom made bras</td>
<td>0.7%</td>
</tr>
<tr>
<td>I wear sports bras</td>
<td>8.5%</td>
</tr>
<tr>
<td>I do not wear a bra</td>
<td>2.2%</td>
</tr>
<tr>
<td>Total respondents</td>
<td>603</td>
</tr>
</tbody>
</table>

4.1.4. Sizing systems

Question 6 answers the questions what bra size fits the respondents best. Hereby, the respondents had the choice to pick up to three bra sizes. In Table 2, the outcome of the answers of 546 respondents is shown. In total, they picked 742 bra sizes. The size that is picked most often, 41 times, is size 75B.

Table 2: Results survey question 6

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<th>80</th>
<th>85</th>
<th>90</th>
<th>95</th>
<th>100</th>
<th>105</th>
<th>110</th>
<th>&gt; 110</th>
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</thead>
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<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
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<tr>
<td>A</td>
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<td>41</td>
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<td>13</td>
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<td>6</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt; G</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

52 other respondents picked the option; ‘If you do not wear a bra or your solution is not listed, please specify further’, and mentioned different solutions. 29 of those respondents mentioned their size in the sizing systems that are used in the United States and the United Kingdom. Four respondents mention that they do not wear a bra at all. Other respondents, seven in total,
mention that they do not wear normal bras, but a bralette, sports bra or similar instead. The rest of the respondents did not understand the question or had suggestions regarding the question.

4.1.5. Figures about breast asymmetry

From question 10 onwards, more information about figures concerning breast asymmetry is gathered. In question 10: ‘How symmetric are your breasts?’, 599 respondents specify their degree of asymmetry. 34.6 percent, 207 respondents, indicate that they do not see or feel a difference between the two sides of their breasts. This means that 392 respondents, 65.4 percent of the total, do see or feel a difference between the two sides. The degree of difference varies. 306 respondents, more than half of the respondents, state that one side of their breast is slightly bigger or smaller than the other. One side of the breasts is noticeably bigger or smaller than the other in 51 of the 599 cases. This corresponds with 8.5 percent of the total respondents. For 18 respondents is the degree of difference one cup size, while 9 respondents indicate that they have more than one cup difference in size. 8 respondents choose the option: ‘Other’. Two of them mention that the size of their breasts differ during certain periods of their menstruation. The other respondents mention tubular breasts, breast shape or a difference in placement of the breast as the reason of asymmetry. In conclusion it can be said that 13 percent of the respondents has a degree of difference that is noticeable, one cup size, or more than one cup size difference.

The respondents who answered in question 10 that they do not see or feel a difference between the two sides of their breasts are excluded from the rest of the survey.

Question 11: ‘Which side of your breasts is bigger?’, is answered by the remaining 389 respondents. The results of this question show that 232 respondents, a total of almost 60 percent, identify the left side of their breast as bigger. The other 157 respondents, the remaining 40.4 percent of the respondents who answered this question, identify the right side as bigger.

Since breastfeeding might cause a degree of breast asymmetry, question 12 is set up. The questions is as follows: ‘Do you breastfeed at the moment?’. 14 respondents indicate that they are breastfeeding at the moment. This is 3.6 percent of the respondents who filled in this question. 271 respondents mention that they never breastfed before. The remaining 26.7 percent, 104 out of 389 respondents, indicate that they are not breastfeeding at the moment, but that they did breastfeed in the past.

Question 13; ‘Did your breast become asymmetric during the breastfeeding time?’, is answered by the respondents who indicated in question 12 that they are breastfeeding at the moment. However, one respondent, who answered question 12, quit the survey after this question. Of the 13 respondents, 3 mention that their breasts did not become asymmetric during breastfeeding time. This is equal to 23.1 percent. The other 11 respondents indicated that their breasts did become asymmetric during breastfeeding time. 7 respondents mention that their breasts developed in different volumes. 3 respondents indicate that their breasts developed in different shapes. One respondent choose the option: ‘Yes – The nipples moved to a different position’. To conclude this result, the breasts of more than three quarters of the respondents became asymmetric during the breastfeeding time.

The following question was asked at question 14: ‘What is affected by the asymmetry?’. The respondents had the option to choose between the volume, shape, density or position of the nipple. If this did not apply to them, they had the option to choose the option; ‘Other’. Figure 19 shows the answers of the respondents.
387 respondents filled this question in. In total they choose 584 response options. According to the results is volume most of the time affected by breast asymmetry, as 80.8 percent of the respondents mentioned this option as one of the aspects that is affected by asymmetry. Shape and position of the nipple are then listed, by respectively 37.7 and 16.3 percent of the respondents. The option ‘density’ is mentioned 51 times by respondents. This means that 13.2 percent of the respondents choose this option. 11 respondents choose the option: ‘Other’. The vast majority of these respondents indicate that they are not affected by any of these options.

The results of question 15 show, as can be seen in Figure 20, since when respondents have asymmetrical breasts. In total, this question is filled in by 387 respondents. More than half of the respondents indicate puberty as the stage since breast asymmetry arose. 45 respondents indicate that their breast asymmetry developed randomly. The third biggest group of respondents, 10.6 percent, state that they recently noticed that they have a degree of asymmetry.
4.1.6. Impact of breast asymmetry on women

In question 16 respondents are answering the question: ‘Do you try to even out the asymmetry?’. More than 75 percent of the respondents, 291 out of the 387 respondents, indicate that they do not try to even out the asymmetry, but leave it as it is. 20.7 percent of the respondents mention that they do try to even out the breast asymmetry. They are doing this by strapping one side tighter up, 17.8 percent of the total, filling one side of the cup up with pads or inlays, 1.6 percent of the total, or by doing alterations on the bra, 1.3 percent of the total. 3 respondents choose the option; ‘I do not wear a bra’. The 13 respondents who choose the option ‘Other’, mention that they do not try to even out the difference as the asymmetry is almost not visible, and mention that the alteration is depending on the type of clothing that they are wearing.
In questions 23, 373 respondents gave a score on how confident the respondents feel about having asymmetrical breasts. On average, the respondents gave a score of 80 on a scale of 100. The modus of this data is 100 and the median 91.

Question 24 was similar to question 23, although the respondents had to indicate how confident they feel to talk about asymmetrical breasts. The 373 respondents gave a score 80 on a scale of 100 on how confident they feel about talking about asymmetrical breasts. The modus for this question is 100 and the median 98.

Question 25: ‘How are the asymmetrical breasts influencing your clothing choice in regards to casual wear?’, is filled in by 369 respondents. Table 3, which is shown below, gives an indication of how asymmetrical breasts are influencing the clothing choice of the respondents in regards to casual wear.

More than 83 percent of the respondents indicate that their breast asymmetry does not affect their clothing choice. 35 responses are gathered for the option ‘I even out the difference, then it does not influence my choice’. Responses for the options ‘I try to hide the asymmetry by wearing looser clothes’, ‘I try to hide the asymmetry by shifting the focus away from my breast to another part of my body’, ‘I try to cover up the asymmetry’, and ‘I try to avoid garments which show my cleavage’ have been chosen as well. In total are asymmetrical breasts influencing the clothing choice of 16.5 percent of the respondents in regards to casual wear. The actual amounts are visible in the table below.

Table 3: Results survey question 25

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>It does not affect my clothing choice</td>
<td>83.5%</td>
</tr>
<tr>
<td>I even out the difference, then it does not influence my choice</td>
<td>9.9%</td>
</tr>
<tr>
<td>I try to hide the asymmetry by wearing looser clothes</td>
<td>8.9%</td>
</tr>
<tr>
<td>I try to hide the asymmetry by shifting the focus away from my breast to another part of my body</td>
<td>3.3%</td>
</tr>
<tr>
<td>I try to cover up the asymmetry, e.g. wearing a scarf</td>
<td>2.9%</td>
</tr>
<tr>
<td>I try to avoid garments, which show my cleavage</td>
<td>7.1%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>2.7%</td>
</tr>
<tr>
<td>Total respondents: 369</td>
<td></td>
</tr>
</tbody>
</table>

Ten respondents have chosen the option ‘Other’. They state different options to hide their breast asymmetry. These options include wearing patterned tops, avoiding horizontal stripes and wearing the right bra.

Question 26 is similar to question 25, except that question 26 covers formal wear instead of casual wear. The question is as follows: ‘How are the asymmetrical breasts influencing your clothing choice in regards to formal wear.’ The results of this question have been shown in Table 4.
Table 4: Results survey question 26

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>It does not affect my clothing choice</td>
<td>79.9%</td>
</tr>
<tr>
<td>I even out the difference, then it does not influence my choice</td>
<td>9.8%</td>
</tr>
<tr>
<td>I try to hide the asymmetry by wearing looser clothes</td>
<td>7.3%</td>
</tr>
<tr>
<td>I try to hide the asymmetry by shifting the focus away from my breast to another part of my body</td>
<td>4.6%</td>
</tr>
<tr>
<td>I try to cover up the asymmetry, e.g. wearing a scarf</td>
<td>2.4%</td>
</tr>
<tr>
<td>I try to avoid garments, which show my cleavage</td>
<td>7.3%</td>
</tr>
<tr>
<td>I try to avoid occasions, where I have to wear formal wear in general</td>
<td>2.4%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>1.4%</td>
</tr>
<tr>
<td>Total respondents: 369</td>
<td>425</td>
</tr>
</tbody>
</table>

According to the results, based on the responses of 369 respondents, breast asymmetry does not influence the clothing choice of almost 80 percent of the respondents. This means that asymmetrical breasts are influencing more than 20 percent of the respondents in regards to formal wear. The rest of the results are similar to the results of question 25. In total, 9 respondents are trying to avoid occasions where they have to wear formal wear in general.

4.1.7. Buying habit of women regarding bras

According to question 18: ‘Where do you buy your bras?’, 50 percent of the respondents buy their bras only in store. This is equal to 192 out of the 384 respondents, who answered this question. 19.5 percent of the respondents mainly buy their bras in store and sometimes online. 53 respondents indicate that they mostly buy their bras online and sometimes in store. A group of 33 respondents, accounting for 8.6 percent, are buying their bras only online. The group of respondents that buys equally online and in store consists out of 8.1 percent.

As a follow up on question 18, four questions are asked. Question 19 is as follows: ‘Would you like to have better online service to find a fitting bra in general?’, and is filled in by 378 respondents. The results show that 138 respondents do not buy online. This is equal to 36.5 percent. 37.6 percent answered that they wish that there would be a better service online. 52 respondents are happy with the service they got in the past. The last group, 46 of the 378 respondents mention that they do not need any help. Table 5 shows the results of this question.

Table 5: Results survey question 19

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am happy with the service I got in the past</td>
<td>13.7%</td>
</tr>
<tr>
<td>I do not need any help</td>
<td>12.2%</td>
</tr>
<tr>
<td>I wish there would be a better service</td>
<td>37.6%</td>
</tr>
<tr>
<td>I do not buy online</td>
<td>36.5%</td>
</tr>
<tr>
<td>Total respondents: 378</td>
<td>378</td>
</tr>
</tbody>
</table>
Question 20: ‘Would you like to have better online service to find a fitting bra in regards to asymmetrical breasts?’, is filled in by the same 378 respondents. Around the same amount of respondents, 137, indicate that they do not buy online. 90 respondents answered that they wish there would be a better service online in regards to asymmetrical breasts. 63 respondents, who account for 16.7 percent, mention that they do not need any help to find a fitting bra online in regards to asymmetrical breasts. 59 respondents indicate that they do not speak about the asymmetry, while 29 respondents are happy with the service they have gotten in the past. All the results are shown in Table 6.

![Table 6: Results survey question 20](attachment:image)

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am happy with the service I got in the past</td>
<td>7.7% 29</td>
</tr>
<tr>
<td>I do not speak about the asymmetry</td>
<td>15.6% 59</td>
</tr>
<tr>
<td>I do not need any help</td>
<td>16.7% 63</td>
</tr>
<tr>
<td>I wish there would be a better service</td>
<td>23.8% 90</td>
</tr>
<tr>
<td>I do not buy online</td>
<td>36.2% 137</td>
</tr>
<tr>
<td>Total respondents: 378</td>
<td>378</td>
</tr>
</tbody>
</table>

Question 21: ‘Would you like to have better store service to find a fitting bra in general?’, is answered by 378 respondents. 22 of the respondents do not buy bras in the store. Some respondents, 61 of the 378, are indicating that they do not need any help with finding a bra in store. 31.5 percent of the total respondents are happy with the service they got in the past. Almost half of the respondents, 46.6 percent wish there would be a better service in store. An overview of the results of this question is given in

![Table 7: Results survey question 21](attachment:image)

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am happy with the service I got in the past</td>
<td>31.5% 119</td>
</tr>
<tr>
<td>I do not need any help</td>
<td>16.1% 61</td>
</tr>
<tr>
<td>I wish there would be a better service</td>
<td>46.6% 176</td>
</tr>
<tr>
<td>I do not buy in store</td>
<td>5.8% 22</td>
</tr>
<tr>
<td>Total respondents: 378</td>
<td>378</td>
</tr>
</tbody>
</table>

When question 22: ‘Would you like to have better store service to find a fitting bra in regards to asymmetrical breasts?’ is asked, more than a quarter of the respondents mention that they do not speak about the asymmetry. Of the total amount of respondents says 17.2 percent that they are happy with the service they got in the past. However, 28.8 percent of the respondents wishes that there was a better service in store in regards to asymmetrical breasts. 85 respondents mention that they do not need any help to find a fitting bra in store with regards to asymmetrical breasts. The other 5.3 percent, which equals 20 respondents, indicate that they do not buy bras online.
Table 8: Results survey question 22

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am happy with the service I got in the past</td>
<td>17.2%</td>
</tr>
<tr>
<td>I do not speak about the asymmetry</td>
<td>26.2%</td>
</tr>
<tr>
<td>I do not need any help</td>
<td>22.5%</td>
</tr>
<tr>
<td>I wish there would be a better service</td>
<td>28.8%</td>
</tr>
<tr>
<td>I do not buy in store</td>
<td>5.3%</td>
</tr>
<tr>
<td>Total respondents: 378</td>
<td></td>
</tr>
</tbody>
</table>

4.1.8. Future of product development of bras

Question 9: ‘Is there the need to develop better fitting bras?’, is answered by 603 respondents. In total they gave 1,424 answer responses. 13.6 percent of the respondents indicate that there is no need to develop better fitting bras, since they find enough good fitting bras. More than half of the respondents say that there is a need to develop better fitting bras for less money. The options; ‘Yes – I want bras which are suiting my breast shape’ and ‘Yes – I want bras which offer good support’ are both chosen by 37.8 percent of the respondents. Around twenty percent of the respondents want bras with adaptable straps, adaptable cup sizes, adaptable closure tightness or bras which have softer materials. The exact percentages are shown in Table 9. More individual options were mentioned in the option: ‘Other’. The point that was mentioned by several respondents is that they would like to have bras that are breathable and not sweaty. In the end 86.4 percent of the respondents mention that there is the need to develop better fitting bras.

Table 9: Results survey question 9

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes – I want good fitting bras for less money</td>
<td>52.6%</td>
</tr>
<tr>
<td>Yes – I want bras which have adaptable straps</td>
<td>22.6%</td>
</tr>
<tr>
<td>Yes – I want bras which have adaptable cup sizes</td>
<td>19.7%</td>
</tr>
<tr>
<td>Yes – I want bras which have adaptable closure tightness</td>
<td>23.9%</td>
</tr>
<tr>
<td>Yes – I want bras which have softer materials</td>
<td>22.1%</td>
</tr>
<tr>
<td>Yes – I want bras which are suiting my breast shape</td>
<td>37.8%</td>
</tr>
<tr>
<td>Yes – I want bras which offer good support</td>
<td>37.8%</td>
</tr>
<tr>
<td>No – I find enough good fitting bras</td>
<td>13.6%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>6.1%</td>
</tr>
<tr>
<td>Total respondents: 603</td>
<td></td>
</tr>
</tbody>
</table>

Question 17: ‘Is there the need to come up with innovations in regards to asymmetry?’, is answered by 384 respondents. In total, 568 answer responses are gathered. The majority of the respondents, almost 60 percent, mention that the asymmetry does not affect their bra choice. 37 percent on the other hand, think that lingerie companies should develop better adaptable bras. Almost one out of the five people indicate that lingerie companies should develop cheaper bras for asymmetry. According to 66 respondents, 17.2 percent, there should be more bras with two different cup sizes. Almost 13.3 percent of the total respondents say that they found a solution that works for them.
According to question 27: ‘Would you like to see asymmetric breasts in commercials and/or advertisements?’, does more than half of the respondents like to see more imperfections in commercials and/or advertisements. 4.6 percent of the respondents say that they would not like to see asymmetric breasts in commercials and/or advertisements as they are happy with the current advertisements. 157 of the 369 respondents, 42.6 percent, do not mind whether or not there are asymmetrical breasts in commercials or advertisements.

4.2. Interviews

The results of the eight interviews are topic wise summarised in this subchapter, in order to originate the base for the discussion in Chapter 5: Discussion. The corresponding methodology for this chapter is presented in Chapter 3.3. Interview. The answers and information from the interviewees were coded and grouped into one of the following categories: personal information, bra development, bra fitting and evaluation, sizing systems and standards, options for breast asymmetry, the impact of asymmetrical breasts on the product development and the future of the product development.

4.2.1. Personal data interviewees

Five of the eight interviewees had each over 18 years of experience in the product development and manufacturing business. Another participant had the least experience and was working for two years in the bra industry. As they provided knowledge, not only from the brand perspective, but moreover, from the supplier perspective, they offered a broad insight in the current state of bra development practices at that time. All of the interview participants had knowledge, among others, in fitting, costing, sourcing, materials and sizing systems. They were involved from the initial sketch of the product to the sales phase, and were differentiated in different functions.

4.2.2. Bra development

To guarantee a consistent product quality and processes, guidelines and manuals were often set up by the brands and companies. They were stating extensively the requirements of the companies for processes and products. The following different directives were mentioned by the participants: guidelines for packaging, material quality, fitting practices, pattern grading, packaging. Even model casting procedures were listed. One interviewee was referring, that all steps of the development, from the ‘creation of the tech pack till the actual sale of the product’, were regulated. Another one was highlighting, that small details were regulated by the guidelines, for example how the bras should be packed for the shipping. These guidelines always needed to be followed by all employees and involved actors, and were, concluding by the interviewees, essential for the brand. ‘The brand manuals are, not only legally, really important for our day to day business and always need to be followed.’, one interviewee was reporting.

There were either two or four collections presented per year for five interviewed lingerie brands. Once all specifications have been created, a product sample got ordered from the supplier. One of our interviewees was working on the supplier side in Bangladesh and was stating that they have to follow the provided pattern and technical requirements: ‘We have to follow the tech packs and measurements for the pattern. We are not allowed to change it a millimetre.’. Consequently, he was only allowed to propose changes, not to actually deviate from the pattern or specifications.
The product development process normally started with the design of a bra, which was based on a base fit. This base fit got ‘adapted to meet the requirements of the new bra’. Four interviewees, each employed at big European lingerie brands, were similarly describing the whole process. First, the block pattern got selected. ‘We can choose from a variety of different base fits, which then get adapted.’, one interviewee was stating. The developer chose, for example, a basic plunge, full coverage or push up bra and then built up the kit. Thereby, wire, cups, trims and materials were selected and composed together. The same cups were used in different bras, in order to create a consistent product portfolio, was stated during the interviews: ‘The consumer is used to a certain fit and would like to find it the next season again.’. Therefore, the same cups were used in multiple seasons. Another option to start the development process was to select a well-fitting and selling bra and modify it, the brand experts explained: ‘We take a good selling bra and update the design for the new season. This creates consistency.’. The design, colours, materials and trims were exchanged, which created a new bra with the same fit.

Some interviewees were advising to use different cup shapes for different breast shapes. ‘Not all bra shapes are fitting the same breast form.’, got stated. Some bra shapes, as plunge or balconette, are better fitting for some breast shapes than other. Contrastingly, it got stated by two more fashionable brands, that they try to develop their bra in a way that they are using the same cup shape for all different breast sizes.

4.2.3. Bra fitting and evaluation

Once the first sample, the prototype, arrived, the product developer was involved in the fitting process. Six of the interview participants confirmed the industry standard of the fitting size as a 75B in the European bra sizing system. One brand expert added: ‘We never questioned the fitting size of 75B if it actually is the most worn size.’. Therefore, some brands were adding additional fitting sizes as, for example, an 80D or an 80E cup.

‘The supplier reviews the fit on a dummy before the shipping.’, was mentioned. However, the actual fitting on a model happened in-house on the brand side. The fitting model got booked according to the fitted bra size, therefore, mainly a fit model with a 75B cup size. The interviewees from the lingerie brands were stating, that the fittings happen weekly, sometime even twice a week. If something needed change, a new improved bra got ordered and fitted again. Concluding, some brands were receiving many fit samples, until the style got approved for production.

The focus during the development should always lay on the comfort of the bra, all interviewees were explicitly highlighting in consent. The quote ‘The comfort of the bra is the most important part for the development of a bra.’, was repeated several times by different participants. This was mirrored moreover in the fittings of the garment. To ensure the comfort of the garment, key factors were defined. First of all, the under band of the bra needed to strap around the body firmly without cutting in. Secondly, the cups needed to hug the breast, so that no breast tissue got spilled out or pressured. Thirdly, the straps should have run over the shoulder without sliding down the shoulder and furthermore, not have rubbed on the skin. These three main steps were evaluated by viewing the bra from the front, side and back. The bra needed to be overall balanced and provide support. One brand expert summarised: ‘The bra just needs to fit overall, no squeezing or cutting in.’. An interviewee put moreover emphasises on the opinion of the fitting model: ‘We need to ask the model: Does she feel comfortable? Would she buy the bra? Is the bra properly fitting? This reveals already a lot about the fit.’.
For another brand, the overall consistency in the different products were of high importance. Therefore, they were always using the same few cup shapes and only changing the outlook of the bra. One brand expert stated: ‘Customer should be able to go to the store and should be able to buy the same size they are used to and get the same fit again.’. During fittings, the representing employee of this brand was reporting, a fitting dummy gets marked with the most important bra positions. Future developments should fit on this dummy in the exact same positions, otherwise the bra needed adaptations. For the mentioned consistency and comfort, well-constructed patterns were crucial as well as a good material selection. It was stated as follows: ‘We select the materials in terms of comfort. They need to be soft and elastic to satisfy the consumer.’.

The patterns were mainly provided by the brands itself and were created in-house. The interviewees from the brands were all working with base patterns, which were going to be updated for the new developments. The supplier sometimes supported the pattern creation process with recommendations and if required, adaptions of the pattern. He added: ‘We get the base patterns from the brands and only adapt if we are allowed to.’.

One fitting specialist drew special attention to the customer fitting: ‘A bra can be perfectly constructed, yet it would not fit for a different sized breast.’. Therefore, women should get measured every half a year to year in a store to determine the right cup size, she advised. Only a proper fit in a store guarantees a good fit was summarized.

4.2.4. Sizing systems

Another point, which got highlighted in the product development of bras, is the right chosen sizing systems for the selected market. As consumers are used to their sizing system, they might find it ‘confusing to use a different sizing system’, the interviewees were reporting. One of the interview participants worked for the American, European and Asian market and reported the huge differences between these markets. The sizing systems, as well as the fit, and especially the comfort requirements, are different for every country, she explained. From her experience, the Asian consumer demands a tight fitting bra, whereas the European or American customer buys more loose fitting bras and bralettes. Moreover; ‘The Asian and American bras need to be more firm in order to hide the nipple contour.’, she stated. ‘The European markets have not been as demanding in this field and put more emphasis on the overall comfort.’, she explained furthermore. The interviews revealed that these different requirements are one of the reasons why the bra industry is so highly complex and international trade is complicated. ‘You can not go with a European bra on the Asian market or the other way around. The bras will not fit.’, one bra expert stated.

4.2.5. Options for breast asymmetry

The interviewed commercial lingerie brands were not offering any bras for asymmetrical breasts. However, the product developers of these companies were talking about options for a low degree of asymmetry. Therefore, new technologies for bra materials, such as stretchable cup fabrics, and memory foam offer potential solutions for comfort, the brand experts concluded. The stretchable fabric would be more stretched over the bigger breast and less stretched over the slimmer breast, they explained in accordance to each other. In addition, this would create comfort, but nonetheless, no symmetrical look, which can be desired by the affected women. Memory foam could adapt to a certain degree to different sized breasts, although, it does not offer a solution when the size difference is a cup or more, the experts
stated. ‘We can use memory foam to even out smaller differences, but if a woman has a medical issue, these materials are not able to provide the needed support.’, one interviewee reported.

Another argument from two experts was, even though these options might offer good solutions for breast asymmetry, they do not get communicated to the customer in the store. The materials do even out such slight differences, but the products are not labelled or branded for their adaptability. One expert stated; ‘We do not label products for asymmetrical breasts, but the store personal can help select stretchable options.’.

4.2.6. Impact of breast asymmetry on the product development

The reason why the big commercial lingerie brands were not offering bras for women with breast asymmetry in their product portfolio was based on four assumptions. Firstly, the developer of the brands did not see the demand from the market. Secondly, it has not been possible to customise to such high level. Thirdly, the brands were not seeing the potential commerciality of these products. And lastly, the interviewees reported, that current options as bra inlays, so called cookies and pads, are sufficient.

One developer stated, that her brand is only producing for the ‘average women’ and not for outlier on the bra size spectrum. ‘We cannot serve all women from a commercial point of view, we have to focus on the average variety.’. Furthermore, the brand did not get the request to put such a special bra in their portfolio. Even if the brand wanted to serve this niche market, the interviewee explained, they would not fulfil the minimum production volumes. Moreover, the brand would not gain enough profit in order to sustain these ‘medical’ bras. The supplier in Bangladesh reported that once a lingerie brand was involved in the development of bras for women with asymmetrical breasts: ‘The customer wanted to develop such a bra, but they did not proceed to the production stage.’. One interviewee was drastically explaining, that ‘you don’t make money out of it’ and anyways ‘cannot please everyone’.

In contrast, the founder of a lingerie brand for women with breast asymmetry, was describing the importance of her bras for affected women. Her motivation was not laying in the commercial value of the product, but rather on the social impact. She was producing the special bras to give women ‘confidence and comfort’. One of the reasons her lingerie brand is needed is, because current solutions as pads are insufficient, she explained. She stated: ‘These pads can slip out of position and start smelling or can be uncomfortable.’. So her conclusion was that ‘every breast needs its own cup’ and that ‘being comfortable in your own cup and that the bra stays all day where it should be’ is important.

Another point she added was, that it does not require customisation, just a good product development to conform to consumer requirements. Her brand is offering the usual bra sizes, just with a modified cup on either the left or the right side, she explained. Moreover, the cups are cushioned evenly in the whole cup, not as a push up bra only in the bottom. This system offers a solution for breast cancer patients as well, as the skin and scars do not get as stretched and the cup lays comfortably on the skin, got stated. She summarized: ‘At the moment, we are closing the testing phase, so the bras are not on the market yet. We want to make the perfect bra and then we will send out the product.’.

The pre-orders were showing, that 65 percent of the consumers have a larger breast on the left side, as they ordered a modified cup for the right side, the smaller breast side. The commerciality of this product for bigger fashionable lingerie brands is unpredictable, the
Interviewee was stating. On the one hand she got highly motivating feedback from the market and affected women. Female empowerment has been on the rise and the society has been demanding diversity. Her whole brand stands for these values, she highlighted. She explained furthermore that there is a general demand for this type of product, which the big brands could exploit. On the other hand, she believed, this kind of product does not match with the portfolio of bigger brands. These brands have been targeting the average women, mainly within the current beauty standards of symmetrical breasts and shapes. If she is successful with the brand, she might get contacted from the commercial brands, she was predicting.

4.2.7. Future of product development of bras

The opinion about the future of the bra development was divided among the interviewed candidates. Half of the interviewees saw great development potential and a rapid change towards technology and new materials. The other half predicted, that the main parts of the product development job, as fittings, will stay the same in the future.

One interviewee identified the three promising trends as ‘sensibility, disruption and evolution’. Thereby, sensibility is describing the trend of gained awareness of women for themselves and the environment, the expert explained. ‘To be sensible for the impact you can have through your choices, requires the brands to adapt to more sustainable products and processes.’, was stated. This has been especially important ever since, as the lingerie products are laying directly on the skin and are required to be toxic free and harmless.

The trend of disruption circles around the new technologies, got reported. Three dimensional fittings with avatars, the replacement of pattern grading through algorithms or computations for breast movement and the resulting more specified requirements for bras, were named here by the participants. One product developer described his fears: ‘One day most parts of our job will be taken over by computers, I believe. Our job profile will change completely. But it definitely offers some great potential as well.’.

The third topic got identified as the evolution. The interviewee explained it as ‘how to make a product better’. Evolution was interpreted as the continuous process and development of current practices and products. Mainly to name the new development of better fabrics, which are more breathable, absorbent or have other better properties. One interviewee was mentioning the involvement of nanomaterials, which offers new perspectives for high functional quality fabrics. Furthermore, the replacement of metal wires in bras by better solutions, such as memory wires, was discussed by the participants.

The representative of one of the bigger lingerie brands was stating, that they are ‘fashion, not function’ and therefore not actively participating in innovative solutions. Nonetheless, they would adapt innovations if it showed success on the market. Other participants, however, were contrastingly highlighting, that only innovative brands will succeed in the long run.
Chapter 5: Discussion

The following chapter is presenting and analysing the results of the survey and the interviews in context of the literature review from Chapter 2: Literature review. The analysis is divided in several sub chapters, equivalent as in Chapter 4: Results, to create a leading structure. This chapter is starting with the current bra development, including sizing and fitting, to then transition into the breast asymmetry part. The last sub chapter concludes with the potential opportunities for the future bra development, including the discussion of the information gathered from the survey, interviews and literature review.

5.1. Bra development

The bra development, as it is currently organised by the lingerie brands, is as described in the literature review. The development processes in the different companies is quite uniform and guided. The participants of the interviews described the same development procedures. Starting with a base pattern, selecting materials and trims, sending the tech sheet to the supplier and getting a sample in return. The received samples will be fitted and evaluated. Selecting the right fabrics and trims are crucial parts of the development process. The interviewees were reporting, that guidelines are helping to create brand uniformity.

In regards to the actual development of bras, the interviewees were stating, that the same cups are used in different seasons to create consistency. This is mirrored in the bra choices of the customer. Over 36 percent of women mostly choose the same bra type over and over again, with around 55 percent selecting the normal padded bra without any minimising or push up effects.

The interviewed bra experts of the different brands are either stating they use different cups for different shapes or the same cup for all different breast shapes. In context of the literature review, which is stating that there are completely different breast shapes (Ashdown & Na, 2008), the ‘one cup for all’ strategy could lead to discomfort and ill-fitting bras. This is supported by the results of the survey: only 27.5 percent of women report that they can find a fitting bra, resulting from the answers of 740 women.

The importance of the under bust band, as highlighted in the theory (Shin, 2014), is confirmed by the interviewees. Especially, that the straps should not slide down the shoulder and the cups should lay properly on the skin without cutting in, is mentioned by the participants, as well as in the literature of Chen, et al. (2011).

For the development, all interviewees are quoting consistently about the importance of comfort. The main focus during the development stage, and especially during fittings, lays on the comfort of the wearer. This statement is recognised by the literature of Yick, et al. (2016) and seems to be the main point of importance for women. Over 85 percent of women from the presented survey see the potential to develop better fitting bras. Not only softer materials are demanded, but furthermore, more adaptable solutions in straps or cup sizes. Moreover, the price point is an important factor for women. Over half of the women wish for bras, which fit well, to be cheaper. Additionally, the results from the interviews are also showing, that comfort, fit and quality are increasing with the price and lessen for the cheaper price bras.
Regarding the innovations in the current product development, the participants were confirming the technologies listed in the literature review. Scanning technologies are used mainly for research and custom made bras (Shin, 2014). Knitting technology, and in particular seamless knitting, is a highly supported innovation by most participating brands, as it provides the requested comfort for the wearer (Zheng, 2006). Memory foam and soft elastic materials are named in context for options for slightly asymmetrical breasts and a higher comfort factor, and are discussed in subchapter 5.7. Impact of breast asymmetry on the product development of bras.

For the bra development processes, the results from the data gathering methods are aligned with the literature review. Processes, the actual development of bras, and innovative solutions are in accordance to each other.

5.2. Bra fitting and evaluation

The literature review showed that between 70 percent and up to 90 percent of women wear a wrong sized bra, which can be reinforced by this research. Firstly, this statement can be supported by the confirmation of survey participating women, that they have trouble finding a fitting bra in general, as 40 percent of the respondents indicate. Some women report that they do not even have a single good fitting bra, measured by their own evaluation. To avoid wearing wrong sized bras and to be sure to wear a well-fitting bra, the respondents sometimes choose to always wear the same type of bra. Over 36 percent is reporting this practice. Secondly, the statement can be supported by the fitting practice of the women. Only 12 percent of women got themselves measured for a good fitting bra, as advised by bra fitting experts. More women measured themselves; 28 percent. However, the statement to be able to find a good fitting bra if women measure themselves, might be distorted as stated in the literature review (Zheng, 2006). Due to different measurement methods, the result of the measurements might not be according to measurement guidelines and therefore not resulting in the right fitting bra. A proper fitting and measurement advisory by bra store experts should have a positive impact on the satisfaction score of women regarding their bra fit, as will be discussed in subchapter 5.6. Buying habit of women regarding bras.

The industry standard for bra fittings is unofficially declared as a 75B as this is the most common bra size, as described by the interviewees. This result can be confirmed by the performed research study. The survey is showing that 41 women selected this specific size as their best fitting size, and this bra is therefore the most common among the survey group.

The previous literature review showed that many women do not wear a good fitting bra and that women are mainly not satisfied with their bras (Wood, et al., 2008). This research can confirm these statements with new additional facts. Specifically, the rate of women who gets measured for a good fitting bra provide new data. This study shows the high number of women, who are not satisfied with their fitting, as well as the high number of women, who do not get fitted for a good bra. The possibility of these two variables being interconnected is high. In what specific way these two factors are related, this study cannot declare.
5.3. Sizing systems

As stated in the literature review (Zheng & Yu, 2007) and confirmed by the interviewees, the sizing systems for bras can lead to confusion. Within Europe there are different sizing systems, however, globally the number increases even more. The sizing systems are getting even more complicated in practice as the measurement guidelines differ. Women mainly know their size in specific sizing systems, evaluated through a specific measure method, as found out through the survey. To go more into detail, the survey is validating the confusion among the participants of the survey: many women were not able to translate their size in the UK sizing system and used the comment field instead. Added American sizes were most common in the comment field.

The literature review already states the challenge of the different sizing systems, even within Europe (Zheng & Yu, 2007). One interviewee explained the difficulties to join the sizing systems to one uniform system. As brands want to guarantee a consistent fit, they do not want to confuse their customer with a new sizing system and therewith a potential loose of sales. A transition would probably only be possible if the store service would offer more support. Most women still buy in store and the sales representatives are a key factor for a successful purchase, as stated by the interviewees.

The results from the interview and the survey, in context of the literature review, draw a uniform picture. The sizing system, as currently executed, leads to confusion and might lead to wrong bra choices.

5.4. Figures about breast asymmetry

In the following subheadings, the different figures about breast asymmetry will be discussed. This involves statistics about breast asymmetry, the side of breast asymmetry and the aspects that are affected by breast asymmetry.

5.4.1. Statistics breast asymmetry

The literature review that has been carried out showed that there are many different statistics available about the percentage of women that have a degree of asymmetry in their breasts. According to Rohrich et al. (2003) 88 percent of women have some degree of asymmetry in their breasts, while Dr. Kirtly Parker Jones mentions that at least ninety percent of women have a difference in volume of 15 to 20 percent between their breasts (University of Utah, 2018). The outcome of the study of Kayar & Çilengiroğlu (2015) showed that 65.92 percent of the women had a difference of > 25mL in breast volume and over 38 percent of the women a difference of > 50mL. Other research states that breast asymmetry affects more than half of all women (Anthony, 2017).

The results from the survey indicated that 65.4 percent of the respondents see or feel that they have a degree of asymmetry between the two sides of their breasts. This result falls within the range of 50 to 90 percent of women that have asymmetry, as indicated by various researchers in the literature review. The result of women who participated in the survey, and indicate that they have a degree of asymmetry in their breasts, is on the low side in comparison with the results from the studies. However, as previously mentioned by Maliniak (1934), women are
generally unaware of the difference between the volume of the breasts, until the difference becomes visible when they are fully dressed.

As previously mentioned in the literature review, 130 cc equates to a difference of one cup size for bras (King, et al., 2017). This means that the difference of >25mL in breast volume, that Kayar & Çilengiroğlu (2015) describe, accounts for one fifth of a cup difference. A discrepancy of around 25mL is a difference in volume that is slightly visible to the respondents of the survey. The results of the survey, 64.1 percent, corresponds with the percentage mentioned by Kayar & Çilengiroğlu (2015). However, the difference of > 50mL between the breasts, mentioned by the respondents, was 13 percent, while Kayar & Çilengiroğlu (2015) indicate that over 38 percent of the women have this degree of discrepancy. The discrepancy of > 50 mL is compared with the differences that are mentioned as noticeably or more than noticeably.

5.4.2. Side of breast asymmetry

Research has been conducted by several researchers with the aim of finding out whether there is actually a significant difference between the volume of the left and right breast. Manning, et al. (1997) found a small positive average, meaning that the left breast is on average slightly larger. However, the results of this study were not significant. Analysis of the volumes and volumetric differences between breasts, by Loughry, et al. (2004), did also not state that one side of the breast dominated in size.

Although this research did not research the significant difference between the volume of the left and right breast, it did research the side of the asymmetry. As presented in the results, 60 percent of the respondents indicated that their left breast is larger. The other 40 percent of the respondents indicated that the right side of their breasts is larger. Although the significance has not been researched, there is a noticeably difference between the amount of respondents who indicate that they have a bigger breast on the left side in comparison with respondents who indicate that their right breast is bigger.

This result is supported by the literature of Gray (1974) and Schaeffer (1914), who both state that the left mamma is generally a little or slightly larger than the right breast. However, Gray and Schaeffer do not mention the data on which they based this statement.

Moreover, the result from the survey is further supported by the forecasts of the brand that produces bras for women with breast asymmetry. The founder reported that 65 percent of the pre-ordered bras have a filling on the right side. This means the smaller side is the right side and therefore, the larger breast is on the left side.

To conclude, the representative survey, the interviews and some of the literature draw a uniform picture of the left breast being the larger one.
5.4.3. Aspects affected by breast asymmetry

The results of the survey show that respondents are affected by several aspects in regards to breast asymmetry. The aspects that are affected by breast asymmetry according to the respondents are volume, shape, position of the nipple, and the density of the breast. These aspects are in line with what literature from the Queen Victoria Hospital (2017) has indicated. Also Maliniak (1934) mentioned that the differences can present itself in the placement of the areola, nipples and sometimes in the proportions and ratios of the breasts.

According to Rohrich et al. (2003) has 65 percent of women more than one factor that indicates asymmetry of breasts. The results of the survey also show that some women have more than one factor that indicates asymmetry of breast, however, an exact amount cannot be determined based on the survey. This has to do with the fact that the answer of all the respondents are combined and cannot be researched individually.

5.5. Impact of breast asymmetry on women

The results of the impact of breast asymmetry on women have shown, on the one hand, that more than 75 percent of the respondents do not try to even out the breast asymmetry, but leave it as it is. On the other hand, more than 20 percent does try to even out the breast asymmetry. Some women try to even out the difference between their breasts, while others are trying to hide the breast asymmetry or cover their breasts up. This is also mentioned by the Queen Victoria Hospital (2017), as they indicate that women try to hide or camouflage their breast asymmetry by wearing padded bras, bra inserts, or loose fitted clothing.

The follow-up questions showed that asymmetrical breasts are sometimes even influencing the clothing choice of women. When casual wear is compared with formal wear, women are more often trying to hide their asymmetry then when wearing formal wear. Also, some women try to avoid occasions where they have to wear formal wear in general.

In the survey, women gave a score of 80, on a scale of 100, on how confident they feel about having asymmetrical breasts. The same applied to how confident women feel to talk about asymmetrical breasts. As Hueston (1968) already indicated, depends the mental effect of breast asymmetry on the adaptability of the respondent. In the end, breast asymmetry can affect the well-being of women, since breasts are a symbol of femininity and they provide sexual confidence (Chan, et al., 2011).

Women who do not fit into a regular bra might feel that there is something wrong with their body, as indicated by Alexander, et al. (2005). The survey showed that over 50 percent of affected women would like to see more imperfections, and in particular breast asymmetry, in the media and commercials. The combined meaning of this information could be that women feel more accepted with their body’s when imperfections, such as breast asymmetry, are shown on social media and in commercials.

5.6. Buying habit of women regarding bras

As a result from the survey it appears that almost 70 percent of the women buy their bras mainly, or only, in store. The opinions on the store service differ when it is about buying a bra in general and in regards to asymmetry. Lingerie brands are trying to provide the customer with the best
help possible in store. One of the interviewees even mentioned that the staff in store gets special education in order to help women with finding the right bra size and bra shape. Still, the results show that almost half of the respondents wish there would be a better service in store, when buying a bra in general.

16 percent of the women indicate that they do not need any help in store in order to find the right bra size or shape in general. This accounts for 22 percent of the women in regards to asymmetrical breasts. At the same time stated Wood, et al., (2008) that 80 percent of the women are not wearing the recommended bra size for their shape and volume, while Chen, et al. (2011) state that a minimum of 90 percent of women are wearing the wrong bra size. Another important element to remember is that consumers need to be measured every six months, according to the interviews. It is difficult for consumers to measure themselves, since the measurement technique can vary. An example is finding the exact measurement position and tightness of the under bust band. Besides that, also breathing and posture have an effect on the measurement procedure (Zheng, 2006).

During the research it became clear that commercial lingerie brands are not informing their consumers about the already existing possibilities of the commercial available bras which are able to level out slight breast asymmetry. When consumers are informed in the right way, they might feel more confident to talk about the asymmetry. This may lead to more consumers who are asking for help and thereby probably a higher satisfaction of store service.

Women like to see more imperfections in commercials and/or advertisements. Breast asymmetry can be one of the examples of imperfections among women. Showing breast asymmetry in commercials and/or advertisement will create an impression that it is not unusual to have asymmetrical breasts, but that there are many other women suffering from the same constraint.

5.7. Impact of breast asymmetry on the product development of bras

At the moment, bigger commercial companies do not sell specific products for breast asymmetry. Nonetheless, they have options in their portfolio which are already suitable for breast asymmetry, due to the adaptable properties of the materials. For instance, stretchable materials and memory foam even out small differences and guarantee a higher comfort for the wearer, the interviewees are stating. Also Shin (2014) mentions these technologies that can be used to overcome the asymmetry challenges. However, this does not seem recognized by women who buy bras. From all asymmetry affected women, every fourth woman wishes that the lingerie companies would develop solutions for asymmetrical breasts. The importance of developing such bras is becoming visible by the fact that 65% of women are affected by asymmetrical breasts. However, it is to mention that most women, 75 percent of the respondents, who have asymmetry do not try to even out the asymmetry. Moreover, for almost 60 percent it does not affect their bra or clothing choices in particular. In the comment field, some women explained that, as long as the breast looks symmetrical through a good fitting bra or inlays, the asymmetry does not affect them. This seems valid for a low degree of asymmetry.

For higher asymmetries, current standard solutions are cookies and inlays, stated by the bra fashion labels. Nonetheless, there is one bra company among the interviewees, Bravaria, which
is working on a bra especially for women with asymmetrical breasts. This brand is following the wish of women, to adapt to their special needs in a bra. The result from the survey states that 19.7 percent of the respondents are wishing for adaptable cups, which is currently only available through special brands as Bravaria or custom made services.

Commercial lingerie brands do not provide bras that are specifically meant for women with asymmetrical breasts in their product portfolio at the moment. The interviewees mention a few assumptions why the brands do not offer these types of bras.

The reason mentioned by the interviewees is that the demand from the market is not known. However, various studies, as can be found in the literature review, have shown that breast asymmetry is not uncommon. As mentioned by Maliniak (1934), the impression is created that it is rare to have breast asymmetry.

The future of the bra development, as seen by the interviewees, is technology focused and is therefore indirectly offering better solutions for slightly asymmetrical breasts. The more stretchable and more functional the materials are developed, the higher the potential to even out differences of breast asymmetry.
Chapter 6: Conclusion

The following chapter is presenting the conclusions of the conducted research. This chapter is divided in several headings. First the conclusions of the research are presented. This is done by dividing the heading ‘conclusion’ in four sub paragraphs, of which each paragraph gives an answer to the research questions, which were set up at the beginning of this research. In the second heading, ‘recommendations’, recommendations for lingerie brands are noted. The heading ‘future research’, dives deeper in the possible topics for future research. The last heading, ‘limitations’, discusses the limitations of the conducted research.

6.1. Conclusion

This study is conducted to gather new insightful data about the current influence of breast asymmetry on the product development of bras. Furthermore, it investigated if there is a need to change or adjust the future product development. The results, which are discussed in Chapter 5: Discussion, are drawing a holistic picture of the current state and laying the base for the following conclusion. To answer the different research questions, the results from the survey, the interviews and the literature review need to be taken into consideration. As explained in chapter 1.4. Research questions, the first two questions led the quantitative part of this research. The last two questions guided the qualitative part, whereas the forth question takes the results from the survey into account for the conclusion.

6.1.1. Effects of breast asymmetry on women

The first research question; ‘How are women affected by breast asymmetry?’, is one of the two leading research questions for the quantitative part of this study. In order to conclude this research, the results from the survey are of main importance.

In total, 65.4 percent of the respondents see or feel that they have a degree of asymmetry between the two sides of their breasts. Of these respondents, 60 percent indicates that their left breast is larger in comparison with their right breast. 40 percent, on the other hand, indicates the right side of their breasts as larger.

The outcome of the survey shows that respondents are affected by several aspects in regards to breast asymmetry. The aspects that are affected by breast asymmetry are volume, shape, position of the nipple, and the density of the breasts. Some women have more than one factor that indicates asymmetry of breasts, however, an exact percentage cannot be determined by the answers of the survey.

6.1.2. Effects of breast asymmetry on women in context of bras

The second research question got also constructed for the quantitative part of the research. To answer and conclude the research question; ‘What are the effects of breast asymmetry on women in context of their bra and clothing choices?’, mainly the results from the survey are taken into consideration.

When it comes to breast asymmetry, 75 percent of affected women are indicating that they do not try to even out the breast asymmetry, but leave it as it is. They do not do any alteration on the bra, but choose a regular model. However, more than 20 percent of the affected women does
try to even out the breast asymmetry. They do this by strapping one side tighter up, by using inserts of inlays, or by doing alterations on the bra. Therefore, innovations, such as adaptable bras for women with breast asymmetry, are welcome.

The bra selection, for women with breast asymmetry, does not play such a big role when it comes to the clothing impact. 83 percent of the respondents indicate in fact that their breast asymmetry does not affect their clothing choice. However, some women try to cover up their cleavage or avoid garments with a cleavage. The average confidence level of women with asymmetry is quite high. Many women only have a small difference and might be less impacted by the asymmetry as women with a high asymmetry.

6.1.3. Current product development process of bras

To answer the third research question; ‘What is the current product development process of bras?’, the results from the interviewees are considered.

In context of the aim of this research, it is to say that the current product development of commercial bras is not specifically including requirements for asymmetrical breasts. However, to specifically answer the research question and to identify adjustment potential for breast asymmetry in the product development, the current state needs to be described. Most companies work with block pattern and base fits, which get adjusted for the new bra styles. They are using adaptable materials in order to guarantee a highly requested comfort. The lingerie brands are working together with suppliers on the production side. These suppliers do not have a big impact on the style creation and are not allowed to do any changes without permission. The brands have the potential to adjust the product development, the suppliers have to follow.

Only the start up for bras for women with breast asymmetry does specific alterations in the bra development to adapt to the asymmetry. They are following the described product development steps, however adding a last phase to add the padding in the bra.

6.1.4. Need of adjustment of the future product development of bras

The research question; ‘Is there a need to change or adjust the future product development of bras in regards to breast asymmetry?’, is helping to lead the qualitative part of this mixed methods research. Moreover, it combines the results from the previous research questions and an overall conclusion to this research.

The current product development should be able adapt to the slight asymmetry, without much effort, as it is already starting to exploit their potential indirectly. For slight breast asymmetry, which affects half of all women, better adaptable materials, such as more stretchable fabrics and better memory foams, provide solutions. The side on which a breast is larger or smaller, does not need to be taken into account for the bra development as both cups can even out a difference with the newly developed materials. These materials have a high potential to balance these slight differences and create the thoroughly requested comfort. Lingerie companies already offer such adaptable materials, but nonetheless, are not communicating this to the customer. This study reveals a high potential for lingerie companies to involve the slight asymmetry in their product development. To be more specific, the brands mainly need to adapt their branding and need to communicate the possible application of stretchable and padded bras for asymmetrical breasts internal and external. This is validated through the high number of
women who would like to see more imperfections in the media. Over half of the women who have a degree of asymmetry would like to see asymmetrical breasts in advertisements as well.

For the high degree of asymmetry, as it is the case for around 13 percent of women, the levelling materials do not offer enough support and comfort. Commercial lingerie brands are not aware of this high number of affected women and do therefore not see the potential to develop adaptable bras. Smaller start-ups serve this declared niche market at the moment. This study reveals potential to introduce bras for women with breast asymmetry for bigger brands as well, if some requirements are fulfilled. First of all, it is the question if this product type matches the product portfolio and brand values of the company. If the product is matching the brand’s portfolio and values, there is only one big challenge to face for an introduction. The bra for women with asymmetry needs a production breakdown. The construction process of the bra needs to be simplified in order to reduce the different bra styles. As the side of the larger and smaller breast influence the construction of the bra, the offered sizes increase rapidly. The bra should be able to adapt to different volumes and shapes, without going into the direction of customisation. Brands need to be able to reach minimum quantity orders and low production costs. Only if these challenges are solved, an introduction of this type of bra can be successful.

To understand the impact, which a change in the product development process would have, the number of affected women needs to be considered. A change in the product development process, which considers asymmetry, as well as better fitting practices and sizing systems, would impact the fashion world deeply. This research revealed that only 27 percent of women are able to find a good fitting bra in general. This is, on the one hand, related to the asymmetry, as 65 percent of the women who participated in the survey have a degree of asymmetry. Within this group, 25 percent needs solutions to adapt their bra to meet their needs. This makes around 16 percent of all women, who indicate that they are interested in adaptable bras. On the other hand, the current sizing systems, rare measurement practices and ´one cup fits all shapes´ policies are worsen the fitting process for women.

Every breast shape is different and this creates challenges for lingerie companies. However, some companies, such as Bravaria, are already setting good examples by offering bras for women with breast asymmetry. Other companies are offering a big range of sizes, such as Thirdlove, which proves the general feasibility to optimize the product development process.

For the future, scanning technologies, new materials and knitting technologies will probably lead to a better development of bras for women with breast asymmetry and bras in general. Even though these technologies are going into the direction of customisation, it offers a new perspective. In the future, customisation might be more affordable and thereby help creating bras for women with a degree of breast asymmetry.

6.2. Recommendations

Lingerie companies should be able to adjust the current product development in order to include the large group of affected women. This chapter will give a short recommendation about the options for lingerie brands, which are feasible from a product developer point of view.

For the low degree of asymmetry, the brands can change their product labelling and advertisement. Since suitable products, such as memory foam and stretchable materials, are already available on the market, companies are able to engage in this degree of asymmetry. The
labelling can help affected women with finding suitable bras easily. Furthermore, advertisements can help the brand to access a new market without much effort.

For the higher degree asymmetry, there is capability to adapt the processes. However, an introduction comes in combination with high timely and costly efforts. The brands need to evaluate if this type of product matches their portfolio and brand values. For brands who value diversity and different body types, an investment can be successful. It is recommended to brands to focus on normal padded bras, when a high degree of asymmetry is taken into account. This is because of the outcome that the normal padded bra is preferred by 55 percent of women and is therewith the most demanded bra type.

6.3. Future research

As mentioned before, this study exposes the widely common breast asymmetry and its effect on the product development of bras. Hereby, this study is divided into two parts. The first part considers breast asymmetry and the effects on women and the fashion industry. The second part of this research focuses on the product development side of bras. Both of these parts are combined in order to investigate if and how breast asymmetry influences the product development of bras. New data is gathered, which is highly valuable as this topic is not considered for research previously. This research provides the foundation for future research in several fields, which will be briefly discussed below.

6.3.1. Future research in the field of fashion

For future research in the field of fashion, the technical side of the product development of bras needs exploration. At this moment, according to the interviews that have been performed during this research, all bras are developed in a similar way. However, it is not known how a bra for women with breast asymmetry would look ultimately and in which areas the product development is affected. Furthermore, there might be several ways to develop such a bra. This means that research can be performed on how a bra for women with breast asymmetry can be developed, in order to support the breasts sufficiently. A good starting point for this research topic is qualitative research, in the form of interviews, to find out what is necessary to support the breasts sufficiently.

Also, there is hardly any literature available that studies the combination of breast asymmetry and the product development of clothing in general. The fashion industry develops and produces only symmetrical clothing, not only in the area of intimate apparel. This means that there is more space to investigate if, and how, breast asymmetry influences the product development of outerwear. Examples of outerwear are dresses, shirts, and jackets. By using quantitative methods, it is possible to find out whether there is the need to consider breast asymmetry in outerwear.

Other research topics which are worth investigating are the future technologies mentioned in this study. Especially scanning technologies offer a perspective to understand different breast shapes better. This could lead to better pattern making and therefore to a better fit. Future research could raise the question if these technologies offer solutions for women with breast asymmetry and especially in what way. Also for this research topic are interviews a good methodology.
6.3.2. Future research in the medical field

Future research, on the medical side of breast asymmetry, should dive deeper on the support that bras give. So far, there is no study that investigates the physical effects of breast asymmetry on women. Also, there is no research that analyses the relationship between breast asymmetry and the physical effects on women. Research that investigates the combination of breast asymmetry and the physical effects on women would provide valuable knowledge, as it is now not known how these aspects influence the health of women. In a later stadium, research can be done on the question if bras made for women with a high degree of breast asymmetry reduce the physical effects on women, caused by breast asymmetry. However, this type of research would take a long time, since the participants need to be observed, measured and questioned over a longer time span.

Another research topic, which is relevant to research, is the difference in volume between the two sides of the breasts. The survey, that has been performed for this research, gathered subjective information about the degree of asymmetry between the two sides of the breasts. This means that no actual volumes of breasts have been measured. By measuring the volumes of the breasts, with for instance scanning technologies, more value and objective results on the degree of asymmetry can be gathered.

6.3.3. Future research in the field of business

After more research is performed on the need of bras that consider breast asymmetry, the business side of this topic can be investigated. The first topic for future research in the field of business is a study regarding the financial expenditures of the development of a bra for women with breast asymmetry. For lingerie companies it is important to know whether or not their investment in the product development of this type of bra will eventually be recouped. Without this information, companies probably will not invest in bras for women with breast asymmetry. Important numbers and figures need to be analysed in order to come to a final conclusion.

Also, it is important to research for which lingerie brand a market launch of bras for women with breast asymmetry would be successful. Since it is hard to predict the need for a bra for women with breast asymmetry, it is not possible to make any statements about the financial future of this type of bra. However, it is important to investigate this matter, since these brands want to know whether or not an introduction of this type of bra is commercially feasible. It is important to analyse for which brands these special bra fits the rest of the product portfolio. As mentioned before, brands are commercially oriented and want to make a return on investments. A market analysis and testing this type of product on a test market could provide more information about whether or not to expand the portfolio.

6.4. Limitations

The limitations of this research derive mainly from the lack of existing literature. Since only a limited amount of literature is present, the results cannot be compared with a high variety of sources. The theory regarding breast asymmetry is only available in context of the medical problem. Furthermore, the literature and studies are sometimes outdated. One of the main sources in regards to breast asymmetry originates from 1934, Maliniak, which is why it cannot be guaranteed that the literature is still up to date.
Beside the literature, there are limitations in the survey and interviews. Although the survey is filled out by a large group of respondents, it is not possible to draw strong conclusions from the results. The same counts for the results of the interview. As the interviewees have the most detailed insight, they are the key factor for high quality data. The eight interviews give a good overview, but cannot sufficiently cover all different brands with their different practices.

Moreover, the research results of the interviews might be influenced by the confidentiality restrictions of the interviewees. If brands are involved in asymmetrical breast research or not cannot be cleared without ambiguity. The bra fashion brands are stating that it is not an option to include the asymmetry in their research. However, the participants might be restricted from revealing innovative secret brand ideas and practices.

A minor limitation can be found in one of the survey questions. Only women who are currently breastfeeding are asked for an asymmetry development during the breastfeeding time. The ones who breastfed in the past are not asked, as their reliability might be restricted. This creates only a small group who can share information about their breast development during pregnancy and therefore these results are not generalizable.

Another limitation that needs to be addressed is the survey result, that the bra cup size 75B is the most common among women. This statement might be distorted, as some women did not know what to fill in and might have randomly selected a bra size.
Literature list


I. Appendix: Interview I ‘Introduction and closure’

Introduction:

Hello, thank you very much for allowing us to interview you. We are students of The Swedish School of Textiles, and are currently writing our thesis for the master Textile Management. If you give us permission, the interview will be recorded from now on. All personal data will remain anonymous and will be handled confidentially.

At the moment we are writing our master thesis. For this thesis, we are doing research on the effects of asymmetrical breast on the product development of bras. We would like to send out a questionnaire about the effects of asymmetrical breasts on woman, but in order to make a good questionnaire it is very important that we understand and know all factors that we have not taken in consideration yet. We hope to get a good overview of the different aspects by interviewing you.

By recording the interview, it can be played back and the results can be coded, to make a questionnaire that will be send out to as many woman as possible. The form of this interview will be unstructured. This means that we have a list with topics that we want to discuss, but mainly we would like to receive your input to get as much information as possible.

The duration of this interview will probably be around 15 minutes. Do you have any questions so far? Then we would like to start now.

Closure:

Do you have any further questions, remarks or additions? Then this is the end of the interview. We will turn the recorder off now. Thank you so much for doing this interview with us and for your cooperation.
## II. Appendix: Interview I ‘Topic list’

**Table 10: Interview I – Topic list**

<table>
<thead>
<tr>
<th>Topics</th>
<th>Sample questions (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast asymmetry</td>
<td>• What kind of breast asymmetry do you have?</td>
</tr>
<tr>
<td></td>
<td>• On which side do you have breast asymmetry?</td>
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<tr>
<td></td>
<td>• What cup difference do you have?</td>
</tr>
<tr>
<td></td>
<td>• Do you try to hide the asymmetry in any way?</td>
</tr>
<tr>
<td>Limitations</td>
<td>• Do you have any limitations because of the breast asymmetry?</td>
</tr>
<tr>
<td></td>
<td>• What kind of limitations do you have because of breast asymmetry?</td>
</tr>
<tr>
<td></td>
<td>• Are there any limitations concerning physical exercise?</td>
</tr>
<tr>
<td>Bra</td>
<td>• Do you wear a bra?</td>
</tr>
<tr>
<td></td>
<td>• How difficult is it to find a good fitting bra?</td>
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<tr>
<td></td>
<td>• How do you adapt the bra?</td>
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<tr>
<td></td>
<td>• What are the reasons not to wear a bra?</td>
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<tr>
<td></td>
<td>• What kind of bras do you wear?</td>
</tr>
<tr>
<td>Bra development</td>
<td>• Do you think there is a need to develop better fitting bras?</td>
</tr>
<tr>
<td></td>
<td>• What should be considered when developing better fitting bras?</td>
</tr>
<tr>
<td></td>
<td>• Can you give some input on what should be considered when developing new bras?</td>
</tr>
<tr>
<td>Taboo</td>
<td>Description</td>
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<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td></td>
<td>Do you think that breast asymmetry is a taboo to talk about?</td>
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<tr>
<td></td>
<td>How do people react on breast asymmetry?</td>
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<tr>
<td></td>
<td>How does it make you feel when people say something about breast asymmetry?</td>
</tr>
</tbody>
</table>
### Appendix: Interview I ‘Axial coding’

Table 11: *Interview I – Axial coding*

<table>
<thead>
<tr>
<th>Axial coding</th>
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</thead>
<tbody>
<tr>
<td><strong>Wearing bras:</strong></td>
</tr>
<tr>
<td>Reasons to wear a bra</td>
</tr>
<tr>
<td>Not wearing bra</td>
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<tr>
<td>Taboo of not wearing a bra</td>
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<tr>
<td><strong>Fit of bras:</strong></td>
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<tr>
<td>Difficult to find right fit</td>
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<tr>
<td>Different shapes of bras</td>
</tr>
<tr>
<td>Body measurements</td>
</tr>
<tr>
<td>Alterations</td>
</tr>
<tr>
<td><strong>Breast asymmetry:</strong></td>
</tr>
<tr>
<td>Different sizes of cups</td>
</tr>
<tr>
<td>Position and size of the areola</td>
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<tr>
<td>Heavy breasts</td>
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<tr>
<td>Development</td>
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<tr>
<td>Hiding asymmetry</td>
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<tr>
<td>Confidence</td>
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<tr>
<td>Health</td>
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<tr>
<td><strong>Fitting of bra:</strong></td>
</tr>
<tr>
<td>Body measurements</td>
</tr>
<tr>
<td>Different shapes of breasts</td>
</tr>
<tr>
<td>Help of experts</td>
</tr>
<tr>
<td>No help of experts</td>
</tr>
<tr>
<td>Customization of bra</td>
</tr>
<tr>
<td><strong>Taboo:</strong></td>
</tr>
<tr>
<td>Not wearing a bra</td>
</tr>
<tr>
<td>Having different shapes</td>
</tr>
<tr>
<td>Having different sizes</td>
</tr>
<tr>
<td>Reaction of society</td>
</tr>
<tr>
<td>Change in fashion industry</td>
</tr>
</tbody>
</table>
IV. Appendix: Interview I ‘Selective coding’

![Diagram](image.png)

Figure 21: Interview I – Selective coding
V. **Appendix: Survey I ‘Introduction and closure’**

**Introduction:**

This survey is part of the master thesis of Sanne Jansen and Alina Milbradt in the field of ‘Textile Management’ at the University of Borås.

This survey is specifically directed to women of all ages. The survey asks for your opinion and experience and is completely anonymous. The survey will take around 5 to 10 minutes.

The fashion world is becoming more inclusive the recent years by representing a bigger variety of different shapes and skin colours. Nevertheless, the fashion industry is barely covering anything that is not defined by the standard norms. Medical studies show, that 88 percent of women have asymmetrical breasts, with 65 percent having a difference in the size of their two breasts. This survey studies the impact of the asymmetry on the fashion industry and specifically the product development. Furthermore, it will help to understand if the asymmetry can be directly connected to fitting problems.

Asymmetric breasts are defined as breasts which differ in volume, shape, position of the nipple and/or density.

If you have any questions, please do not hesitate to contact us:
breastasymmetryresearch@gmail.com

End date: 1st of May 2019

Thank you a lot for contributing!

**Closure:**

Thank you very much for contributing! Your answers are saved!

If you wish to receive the published study, please contact:
breastasymmetryresearch@gmail.com
VI. Appendix: Survey I ‘Questions’

Q1: What is your gender?

1. Female
2. Not female → If selected, survey ends here

Q2: To which age category do you belong?

1. Under 16
2. 16 – 20 years
3. 21 – 25 years
4. 26 – 30 years
5. 31 – 35 years
6. 36 – 40 years
7. 41 – 45 years
8. 46 – 50 years
9. 51 – 55 years
10. 56 – 60 years
11. 61 – 65 years
12. 66 – 70 years
13. 71 – 75 years
14. 76 – 80 years
15. 81 – 85 years
16. Over 85

Q3: What size do you usually wear in tops and shirts?

1. 30
2. 32
3. 34
4. 36
5. 38
6. 40
7. 42
8. 44
9. 46
10. 48
11. ≥ 50

Q4: Have you ever had your measurements taken in a bra store, for a bra fitting?

1. Yes – More than 1 year ago
2. Yes – In the last year
3. No
Q5: Have you ever taken measurements yourself for a bra fitting?

1. Yes – I measured myself over one year ago
2. Yes – I measured myself the last year
3. No

Q6: What bra size fits best?

→ Between one and three answers possible

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<tr>
<th></th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
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</table>

1. Make a selection out of the table
2. If you do not wear a bra or your solution is not listed, please specify further

Q7: Which bra type do you prefer?

→ Multiple answers possible

1. Padded bra – Push-Up
2. Padded bra – Normal
3. Padded bra – Minimising
4. Unpadded bra – Normal
5. Unpadded bra – Minimising
6. Bralette (without wire)
7. Padded bralette (without wire)
Q8: How good are your bras fitting?

→ Maximum of two answers possible

1. I do not have problems finding a fitting bra
2. I have trouble finding a fitting bra
3. I do not have a single good fitting bra
4. I always wear the same bra
5. I always wear the same type of bra
6. I can find bras, but they are not comfortable
7. I wear custom made bras
8. I wear sports bras
9. I do not wear a bra

Q9: Is there a need to develop better fitting bras?

→ Multiple answers possible

1. Yes – I want good fitting bras for less money
2. Yes – I want bras which have adaptable straps
3. Yes – I want adaptable cup sizes
4. Yes – I want bras which have adaptable closure tightness
5. Yes – I want bras with softer materials
6. Yes – I want bras which are suiting my breast shape
7. Yes – I want bras which offer good support
8. No – I find enough good fitting bras
9. Other → If selected, answer needs to be specified

Q10: How symmetric are your breasts?

1. I do not see or feel a difference between the two sides → If selected, survey ends here
2. One side is slightly bigger/smaller than the other
3. One side is noticeably bigger/smaller than the other
4. I have a cup size difference
5. I have more than a cup size difference
6. Other → If selected, answer needs to be specified

Q11: Which side of your breasts is bigger?

1. Left side
2. Right side

Q12: Do you breastfeed at the moment?

1. Yes → If selected, participants get to fill in Q13
2. No – I never breastfed before → If selected, participants get to fill in Q14
3. No – But I breastfed in the past → If selected, participants get to fill in Q14
Q13: Did your breasts become asymmetric during the breastfeeding time?

1. Yes – They developed in different shapes
2. Yes – They developed in different volumes
3. Yes – The nipples moved to a different position
4. No – They did not become asymmetric

Q14: What is affected by the asymmetry?

→ Multiple answers possible

1. Volume
2. Shape
3. Density
4. Position of the nipple
5. Other → If selected, answer needs to be specified

Q15: Since when do you have asymmetrical breasts:

1. Since birth
2. Since puberty
3. Since pregnancy
4. Since breastfeeding
5. Since menopause
6. I have medical reasons (e.g. operation, illness)
7. They randomly developed
8. I recently noticed
9. Other → If selected, answer needs to be specified

Q16: Do you try to even out the asymmetry?

1. Yes – I fill up one cup side with pads/inlays/etc.
2. Yes – I strap one side tighter up
3. Yes – I do alterations on the bra
4. No – I leave it as it is
5. I do not wear a bra
6. I have custom made bras
7. Other → If selected, answer needs to be specified

Q17: Is there the need to come up with innovations in regards to asymmetry?

→ Multiple answers possible

1. The asymmetry does not affect my bra choice
2. Bra companies should develop better adaptable bras
3. Bra companies should develop cheaper bras for asymmetry
4. There should be more bras with two different cup sizes
5. I found solutions that work for me
6. Other → If selected, answer needs to be specified
Q18: Where do you buy your bras?

1. Only online
2. Mostly online, sometimes in store
3. Equally online and in store
4. Mainly in store, sometimes online
5. Only in store

Q19: Would you like to have better online service to find a fitting bra in general?

1. I am happy with the service I got in the past
2. I do not need any help
3. I wish there would be better service
4. I do not buy online

Q20: Would you like to have better online service to find a fitting bra in regards to asymmetrical breasts?

1. I am happy with the service I got in the past
2. I do not speak about the asymmetry
3. I do not need any help
4. I wish there would be better service
5. I do not buy online

Q21: Would you like to have better store service to find a fitting bra in general?

1. I am happy with the service I got in the past
2. I do not need any help
3. I wish there would be better service
4. I do not buy in store

Q22: Would you like to have better online service to find a fitting bra in regards to asymmetrical breasts?

1. I am happy with the service I got in the past
2. I do not speak about the asymmetry
3. I do not need any help
4. I wish there would be better service
5. I do not buy in store

Q23: How confident do you feel about having asymmetrical breasts?

Q24: How confident do you feel to talk about asymmetrical breasts?
Q25: How are the asymmetrical breast influencing your clothing choice in regards to casual wear?

→ Multiple answers possible

1. It does not affect my clothing choice
2. I even out the difference, then it does not influence my clothing choice
3. I try to hide the asymmetry by wearing looser clothes
4. I try to hide the asymmetry by shifting the focus away from my breast to another part of my body
5. I try to cover up the asymmetry, e.g. wearing a scarf
6. I try to avoid garments, which show my cleavage
7. Other → If selected, answer needs to be specified

Q26: How are the asymmetrical breast influencing you clothing choice in regards to formal wear?

→ Multiple answers possible

1. It does not affect my clothing choice
2. I even out the difference, then it does not influence my clothing choice
3. I try to hide the asymmetry by wearing looser clothes
4. I try to hide the asymmetry by shifting the focus away from my breast to another part of my body
5. I try to cover up the asymmetry, e.g. wearing a scarf
6. I try to avoid garments, which show my cleavage
7. I try to avoid occasions, where I have to wear formal wear in general
8. Other → If selected, answer needs to be specified

27. Would you like to see asymmetric breast in commercials/advertisements?

1. Yes – I would like to see more imperfections
2. No – I am happy with the current advertisements
3. I do not mind

Q28: If you have any questions/remarks or notes, please let us know below
VII. Appendix: Interview II ‘Introduction and closure’

Introduction:

Thank you for having this interview with us. We are Sanne Jansen and Alina Millbradt, and we are writing our master thesis, for the master Textile Management, at the University of Borås, Sweden.

Our research is about breast asymmetry, the effects of breast asymmetry on woman and the fashion industry, and the question whether or not it is necessary to change or adjust the future product development of bras.

In order to conduct our research, we would like to get some insight information on the current product development process of bras; what is done now for woman with breast asymmetry and how product developers think that the future product development process probably will look like. We would also like to get some information to understand how asymmetry can be directly connected to current fitting problems.

With this interview we hope that we can get more information about the topic. In order to get the right information, we set up an interview guide, but please feel free to tell us everything that you feel can be of any importance for our research.

We would like to get your permission to record this interview and to use your name and the obtained data in the report. The interview will be recorded from now on.

We want to thank you, once again, for your participation!

Closure:

Do you have any other questions or comments? We will turn off the recorder now. We want to thank you for your cooperation and we will send you the final report once finished.
### VIII. Appendix: Interview II ‘Interview guide’

#### A. Interview guide II – A

<table>
<thead>
<tr>
<th>Variables</th>
<th>Indicators</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>General information</td>
<td>Personal data</td>
<td>• Can you introduce yourself?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What position are you fulfilling within the company?</td>
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<td></td>
<td></td>
<td>• How long are you working for the company?</td>
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<tr>
<td>Product development</td>
<td>Guidelines</td>
<td>• Are there guidelines regarding product development?</td>
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<td></td>
<td></td>
<td>• What do these guidelines include?</td>
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<td></td>
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<td>• For what age range does the brand produce?</td>
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<td></td>
<td>Fittings</td>
<td>• Is the brand doing fittings?</td>
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<td></td>
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<td>• How often do the fittings take place?</td>
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<td>• What is the focus point of attention during the fittings?</td>
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<td></td>
<td>• What is the sample size?</td>
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<td>• On what kind of data is the sample size based?</td>
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<tr>
<td></td>
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<td>• Does the brand fit on other, for instance bigger sizes?</td>
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<td>• How does the brand define a good fit of a bra?</td>
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<td>• Who makes the patterns?</td>
</tr>
<tr>
<td>Asymmetrical breasts</td>
<td>Products</td>
<td>Does the brand offer products to women with asymmetrical breasts?</td>
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<td>Is there the request from the market to develop bras for women with asymmetrical breasts?</td>
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<td>Has any research been carried out into how these needs can be fulfilled?</td>
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<tr>
<td></td>
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<td>Do you think that current fitting problems can be directly connected to breast asymmetry?</td>
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<tr>
<td>Innovations</td>
<td></td>
<td>Does the brand have an innovations department?</td>
</tr>
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<td></td>
<td></td>
<td>Does the brand research about asymmetrical breasts?</td>
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<td></td>
<td>Do you think there should be more innovations?</td>
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<td>Do you think there should be bras for more shapes and colours?</td>
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<td>Future</td>
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<td>How does the brand think that the future of product development looks like?</td>
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<td>Do you offer customisations?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can you please summarize what you think is the future product development of bras?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you think your job will change the next 5-10 years?</td>
</tr>
</tbody>
</table>
## B. Interview guide II – B

<table>
<thead>
<tr>
<th>Variables</th>
<th>Indicators</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>• Motivation</td>
<td>• What was the reason for starting up this company?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What are the core problems of affected women?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What do you think you can help the affected women with?</td>
</tr>
<tr>
<td></td>
<td>• Collection</td>
<td>• What kind of bras does the brand offer?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Does the brand offer seasonal products?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For what age range does the brand produce?</td>
</tr>
<tr>
<td>Product development</td>
<td>• Guidelines</td>
<td>• Are there guidelines/manual that you created regarding the product development at your company?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What do these guidelines include?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• With what suppliers do you work together?</td>
</tr>
<tr>
<td></td>
<td>• Fittings</td>
<td>• Is the brand doing fittings?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How often do the fittings take place?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• With who does the brand fittings?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What is the focus point of attention during the fittings?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How does the brand define a good fit of a bra?</td>
</tr>
<tr>
<td>Asymmetrical breasts</td>
<td>Products</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>• What is the sample size?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• On what kind of data is the sample size based?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Does the brand fit on other, for instance bigger, sizes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Who makes the patterns?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• How do the bras work?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Is there any information on how to handle asymmetrical breasts on the market?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Is there a request from the market to develop bras for asymmetrical breasts?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Innovations</td>
<td>• Do you think there should be more innovations on the market in general? E.g different shapes/colours</td>
<td></td>
</tr>
<tr>
<td>• Does the brand offer customisation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• What are the current and future trends?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Future</td>
<td>• How does the brand think that the future of product development looks like?</td>
<td></td>
</tr>
<tr>
<td>• What will change in the future product development?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do you think your job will change the next 5-10 years?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IX. Appendix: Interview II ‘Axial coding’

Table 14: Interview II – Axial coding

<table>
<thead>
<tr>
<th>Axial coding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job description:</strong></td>
</tr>
<tr>
<td>Category Manager Lingerie</td>
</tr>
<tr>
<td>Senior Vice President Business Development</td>
</tr>
<tr>
<td>Founder start-up</td>
</tr>
<tr>
<td>Manager Merchandising</td>
</tr>
<tr>
<td>Head of Technical Product Development</td>
</tr>
<tr>
<td>Project Manager Innovation</td>
</tr>
<tr>
<td>Pattern Maker</td>
</tr>
<tr>
<td>Founder intimate apparel brand</td>
</tr>
<tr>
<td>Product Developer</td>
</tr>
</tbody>
</table>

**Work experience in the field of bodywear:**
18 years
30 years
2 years
35 years
11 years
36 years
9 years
12 years

**Guidelines regarding product development:**
Manuals for packaging, quality and delivery
Manuals and guidelines are everywhere different
Manual for chemicals, packaging and product development
Product based on technical package
No specific guidelines
Manuals for all aspects of the development
Necessary, because of size company
Guidelines for quality and fit

**Target group:**
Age 25 – 30 to age 65 – 70
Depending on budget
Women with breast asymmetry
24 – 50 years old
18 – 85 years old
Different segments for different ages
**Fittings:**
Yes, weekly on fitting models
Yes, twice a week on fitting models
Yes, sending bras to women with breast asymmetry
Yes, on dummy
Yes, multiple fittings a day
Yes, almost every day

**Focus of fittings:**
Comfort
Support
Look
Feel
Front, side and back
Centre front, wire around the breast root
Straps not coming off
Back side straight, without hiking up
Strap position
Women do not feel the bra
One bra needs to fit different shapes of breasts
Silhouette of women
Support
Fit
Under bust band
Cup
Underwire
Centre front
Straps

**Sample size:**
75B (3)
80D
80E
Size set
75D

**Cups:**
Same cups used in different bras
Plunge
Demi
Full coverage
Push up
Wire – no wire
Plunge
Balcony
Pattern:
Internally
Recommendations regarding changes
Internally, based on block pattern
Internally, based on basic pattern

Request bra for asymmetrical breast from market:
Never got request
Big topic
Yes
Not known
Not really

Offer of products for breast asymmetry:
Indirectly through memory foam
Indirectly through stretchable materials
No specific solution
Difficult and expensive
Bra with different cup sizes
Prototype of bra with different cup sizes
No bras, no change to fit all body shapes
Seamstress in store of independent retailer
Prototype of personalized insert

Innovations department:
No, information from the HQ brand
Yes, enabling platforms
Some companies
Yes, pull everything in
No

Research about breast asymmetry:
No
Big topic, not offered yet
Own research and experience

Inspiration innovation:
Suppliers
Stores
Research
Head quarters
Customers
Innovations:
Materials
New solutions, such as non-wire
Sustainable development flow
Seamless bra
High technology
3D sampling
Customization
Quality and fit
Knitting machines
Scan technologies
New wire
Foam cups

Future trends of product development of bras:
Sensibility
Disruption
Evolution
3D sampling
Sustainability
Computer fit dummy with skin and shapes
Nano materials
No 3D sampling
3D scan of consumer
Digital technologies and human action will melt together
E-commerce
Digitalisation

Future bras:
Smaller band sizes with bigger cups
Non wired bras
Moulding
Nano fibres
New materials
Natural bust shape

Change of job of product developer:
Strong movement because of industry
Reducing human error
Heat mapping
No change, will stay the same
Will not change
Technology and human action will melt together
Digitalisation necessary for keeping knowhow
Changing from year to year
Sizing system:
Customer base and requirements different
Not one worldwide sizing system.
Every country own sizing system
Mentioning sizes on hangtag
X. Appendix: Interview II ‘Selective coding’

Guidelines

Product development

Fittings

Future

Innovation

Products

Breast asymmetry

Figure 22: Interview II – Selective coding
### XI. Appendix: Interview II ‘Overview of interviewees’

**Table 15: Interview II – Overview of interviewee number and corresponding brand**

<table>
<thead>
<tr>
<th>Date</th>
<th>Interviewee number</th>
<th>Brand</th>
<th>Interview guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-04-2019</td>
<td>I</td>
<td>Livera</td>
<td>II – A</td>
</tr>
<tr>
<td>29-04-2019</td>
<td>II</td>
<td>Clover Group</td>
<td>II – A</td>
</tr>
<tr>
<td>30-04-2019</td>
<td>III</td>
<td>Bravaria</td>
<td>II – B</td>
</tr>
<tr>
<td>01-05-2019</td>
<td>IV</td>
<td>Aura Lingerie</td>
<td>II – A</td>
</tr>
<tr>
<td>02-05-2019</td>
<td>V</td>
<td>Hunkemöller</td>
<td>II – A</td>
</tr>
<tr>
<td>13-05-2019</td>
<td>VI</td>
<td>PrimaDonna</td>
<td>II - A</td>
</tr>
<tr>
<td>14-05-2019</td>
<td>VII</td>
<td>TET Lingerie</td>
<td>II - A</td>
</tr>
<tr>
<td>15-05-2019</td>
<td>VIII</td>
<td>Triumph</td>
<td>II - A</td>
</tr>
</tbody>
</table>