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What Style Suits One? Sustainable Commercial Women's Bra Design in Malaysia

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Abstract:

Nowadays, our industry has made it possible for all women to choose their preferred bra from wide brands and styles. However, perfect bra sizing is not just a matter of aesthetics; it also concerns health. Wrong bra size can cause numerous health problems related to posture problems. Commercial women's bra in the market is very generic and cannot vary women's body shapes. Despite several attempts from diverse disciplines, the issues remain unresolved. Bra designs are insufficient to overcome all of the bra's problems. All the physical and physiological issues in the woman's body are generally caused by the poor design of bra components. To obtain women's preferences about bra design variables and understand bra specialization development for women with uneven bra size issues, an interview survey was conducted with 100 female respondents. This research aims to understand the growth of bra specialization for women with uneven bra size problems and build a new specialty bra market in Malaysia. The study used an online survey through Google Form with 29 items being asked. The 29 items were categorized into five parts: Part A – demographics, Part B – symptoms when wearing a bra, Part C – the main problem when buying a new bra, Part D – factors that influence the design of the bra, and Part E – the essential elements to equip in the bra. Part A consisted of 6 items, while Parts B-E consisted of 7, 6, 4, and 6 items. The type of questions formulated for Part A was multiple-choice, while for Parts B-E were dichotomous questions (Yes/No).

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We identified symptoms when wearing a bra, the main problem when buying a new bra, factors that influence the design of the bra, and the essential elements to equip in the bra. The preliminary result provides a valuable source of knowledge for commodity small and mid-size enterprises (SMEs). They should consider using co-design to design the best products for individual customers, minimize the risk of design failure, and encourage customers' satisfaction with the product. The study produces critical aspects of impact and the design elements that will provide further knowledge on the research and development of the Malaysian lingerie industry.

Keywords: bra design, lingerie industry, commercial women.

什么风格适合一个？马来西亚可持续商业女性文胸设计

摘要：

如今，我们的行业使所有女性都可以从各种品牌和款式中选择自己喜欢的文胸。然而，完美的胸罩尺码不不仅是美学问题。它还涉及健康。错误的胸罩尺寸会导致许多与姿势问题相关的健康问题。市场上的商业女性文胸非常通用，无法改变女性的体型。尽管来自不同学科的多次尝试，但问题仍未解决。胸罩设计不足以克服胸罩的所有问题。女性身体的一切生理和生理问题，一般都是由于文胸部件设计不当造成的。为了获得女性对胸罩设计变量的偏好并了解胸罩尺寸不均匀女性的胸罩专业化发展，对100名女性受访者进行了访谈调查。这项研究旨在了解胸罩尺寸不均匀女性的胸罩专业化发展情况，并在马来西亚建立一个新的专业胸罩市场。该研究通过谷歌表格进行在线调查，询问了29个项目。29个项目分为五个部分：一个部分-人口统计数据，乙部分-佩戴胸罩时的症状，C部分-购买新胸罩时的主要问题，D部分-影响胸罩设计的因素，以及E部分-

文胸装备的基本元素。一个部分由6个项目组成，而是部分由7、6、4和6个项目组成。为一个部分制定的问题类型是多项选择，而是部分是二分题（是/否）。我们确定了佩戴胸罩时的症状、购买新胸罩时的主要问题、影响胸罩设计的因素以及佩戴胸罩的基本要素。初步结果为商品中小型企业（中小企业）提供了宝贵的知识来源。他们应该考虑使用协同设计来为个人客户设计最好的产品，将设计失败的风险降到最低，并鼓励客户对产品的满意度。该研究产生了影响的关键方面和设计元素，将为马来西亚内衣行业的研发提供进一步的知识。

关键词：文胸设计、内衣行业、商业女性。

1. Introduction

Bra, for short brassiere, is one of the famous undergarments among women around the world. It may date back to ancient Greece, to wearing a garment to support the breast. By then, brassiere had been adapted and influenced by fashion, culture, and taste. The bra has undergone drastic changes throughout history, full of turns and twists over 600 years of modern history. Bras are closely related to women's history, especially their social status. It is also included in the evolution of fashion and can change the view of a woman's body shape. In other periods, the undergarments covered the breasts, so they would not stand out, emphasizing the back of the body and the hips (Kojundzic et al., 2018). The 1960s reflected an increasing interest in quality and fashion. The bras of motherhood and mastectomy started to explore new respectability. By the mid-twentieth century, the birth of an anti-conformist call to burn the bra, and decidedly risky thongs and push-up bras were sold as everyday wear. For women's brassieres, it supports the breast to keep in shape. For men, it will serve the same function for male genitalia. Nowadays, our industry made it possible for all women

to choose various brands and models that fit their favorite bra or brassieres with their fashion specifications and preferences. A good bra size is not just an aesthetic issue; it is also about wellbeing. Whether it is assumed or not, using the wrong bra will affect our health.

2. An Overview of Lingerie Cases

There is breadth and depth of the debate over whether or not women should wear bras in society. The bra arguably stirs more controversy than any other piece of clothing and has been the focus of various campaigns to desexualize the female body. In 2013, a judge reprimanded the polices for making a woman remove her bra before a breathalyzer test while in a holding cell in Chatham, Ontario, Canada. The cops claimed that action was taken to protect them against using their bras as "ligatures for self-harm or strangulation." As a result of the outrage, a judge changed this policy in 2013 (The Canadian Press, 2016). In a similar case, a female defendant in Osaka was not allowed to wear a bra in 2017 while in custody. Hence, her lawyers lodged an Osaka Bar Association

complaint that denying her the right to wear a bra was a "breach of human rights" (The Asahi Shimbun, 2018). Though some women claim that wearing a bra is a personal choice, it is an academic dress code to avoid distraction and uncomfortable feelings for others (Sophie Harris, 2018). A German court ruled that employers require female employees to wear bras or undershirts at work. An airport security firm argued that requiring bras was essential "to preserve the orderly appearance of employer-provided uniforms" (Lawble, 2018). Recently in Malaysia, a young woman was denied entry into a public library because her 'bra lines' breached the dress code (Asia Newsday, 2020). Hence, it can be submitted that wearing a bra or not can become a human rights issue related to gender-based. Therefore, if employers impose a gender-specific dress code, such as requiring female employees to wear a bra, they do not have a similar requirement for males and cannot justify that, there is a risk that their policy will seem discriminatory.

The lingerie industry in Malaysia is not as great as in other countries. However, most of the famous brands in Malaysia are Triumph, NEUBODI, La Senza, Wacoal, Skiva, Caely, and many more. The lingerie wear study in Malaysia includes: evaluating essential developments in supply-side and demand; comprehensive segmentation of local and foreign products; historic volumes and values; business and brand equity; five-year industry trend forecast; and consumer expansion (World Health Organization, 2013).

The Journal of Female Health Sciences study has determined that Malaysian women's average boob size is smaller than a standard 'A' cup. The study also says that most women in Asia have 'flat' breast shapes (Wong, 2019). The average Malaysian woman wearing a D cup weighs about 250 grams and holds generic bras from band 30-44 with cup choices from A to I, Brand NEUBODI said (Tam, 2019). A survey conducted by Kinohimitsu (2018) found that Malaysian women are ashamed to speak about their bodies, particularly breasts, classified as too big, thin, sluggish, and perky. However, according to the observation in a departmental store in Klang valley, many other retailers follow a similar sales practice by recommending standard bra sizes, which has caused many people to assume that they are a bigger cup size than they are. In an interview, Fatimah from Subang Jaya said a good bra would cause her to sit straight, build a better pose, and enjoy how clothes look better, especially on the front, where the breasts look fuller. She always wears a C cup size, but when she got proper examination and fitted, due to the unequal size breast, the result showed her right size was E. Many women believe they are a smaller cup size than they are. Most lingerie companies target the design of trend and style elements, but functionality is most important.

Part of the brand is available online, and others have their stores. Manufacturers of lingerie in Malaysia equip the United States, Europe, and Canada with

domestic and export markets (Bernama, 2018). According to the women's demands in Malaysia, women tend to increase their spending on this product category as the global sector recovers, resulting in higher growth in the mass market segment than has been seen in the past years. By aligning their lingerie range with fashion stories across women's wear, these mass-market marketers will ensure their buyers will spend on them, using innovation as an opportunity to purchase. Ensuring that the lingerie offering sits in line with the women's ear assortment as a whole would require cross-department solid coordination at larger stores. With the increase of preference for providing more options to consumers, many retail stores in Malaysia, such as hypermarkets, supermarkets, and departmental stores, also carry lingerie wear in their shops. Those factors are positively impacting the women's lingerie market in Malaysia. However, due to the Covid-19 outbreak, there was a significant drop in sales across various industries, including the lingerie market in Malaysia.

2.1. The Research Gap

Many literature reviews identified the research gap. Although commercial bras have been developed for more than 100 years, there are still problems with discomfort, poor fitting, and poor support. The inadequate construction of bra components usually causes physical and physiological issues due to the poor design of bra components, e.g., discomfort from tight shoulder straps, pain rashes arising from stiff underwires, and irritation by bra cup seams (Chan et al., 2001). Women who have problems with breast size may suffer from social anxiety, low comfort level, difficulty in their self-esteem, and thinking about what their outstanding breasts cause shame. Wrong bra size can cause numerous health problems related to the arms, neck, back, and head pain, leading to posture problems (Ariffin, 2018). Wearing a tight bra might even suffer from breathing problems, and wearing the wrong bra may also lead to breast cancer (Duru & Şahin, 2020). Zhang et al. (2021) have systematically addressed the associations between bra design features and related problems such as bulging, underband, elongation rigidity of wing fabric, the rigidity of the top of the elastic underband, rigidity of bottom elastic band, and tension of the underband. According to Joanna Wakefield-Scurr (2018), Professor of Biomechanics at the University of Portsmouth, wearing a wrong size bra is not just painful but can exacerbate a host of health issues. A quality brassiere will feel and fit as well as it looks. Breast asymmetry is when breasts vary in size, shape, or position, which is very common (Craven, 2019). Most of the generated brassiere is expensive for the market (Schlossberg, 2016). Although many scholars have addressed many gaps, the research or little published information on bra design issues and their influence factors in Malaysia is still new. Given the lack of this gap, the purpose of this paper was to find the critical aspects of impact and the design

elements that will provide further knowledge on the research and development of the Malaysian lingerie industry.

3. Methodology

This preliminary study focuses on four main objectives which are (1) to identify symptoms when wearing a bra, (2) to identify the main problem when buying a new bra, (3) to identify factors that influence the design of the bra, and (4) to identify the essential elements to equip in the bra. Therefore, this section discussed the methodology applied to the research instrument, study respondents, data collection, and data analysis.

3.1. Research Instrument

The study used an online survey through Google Form with 29 items being asked. The 29 items were categorized into five parts: Part A – demographics, Part B – symptoms when wearing a bra, Part C – the main problem when buying a new bra, Part D – factors that influence the design of the bra, and Part E – the essential elements to equip in the bra. Part A consisted of 6 items, while Parts B-E consisted of 7, 6, 4, and 6 items. The type of questions formulated for Part A was multiple-choice, while for Parts B-E were dichotomous questions (Yes/No).

3.2. Respondents of the Study

The respondents of the study consisted of 100 women in Klang Valley. They were also all subjected to desires regarding purchasing the bra. To some extent, they could identify symptoms and problems that may arise while buying a bra, recognize factors that influence bra design, and identify the essential elements to equip in the bra.

3.3. Data Collection and Data Analysis

This study used primary data by conducting surveys to assess women's desires regarding purchasing a bra and investigating the typical bra components likely to cause discomfort. Besides that, this research aims to understand the growth of bra specialization for women with uneven bra size problems and build a new specialty bra market in Malaysia. An online questionnaire was administered using convenience sampling. Convenience sampling is a nonprobability sampling in which respondents have an uneven chance of being selected by a random selection procedure. This study's results provided summaries and conclusions about the sample involved, but the results cannot be used to infer the whole population. Data collected in Google Forms was screened and transferred to SPSS version 26 for analysis. The study used descriptive statistics to attain its objectives of this study.

4. Findings and Discussion

This section discusses the findings of the objectives of the study. First, it is divided into the demographics

of the respondents followed by the four main goals, respectively.

4.1. Demographics

Several demographic variables have been chosen, namely age, marital status, occupation, breast anatomy, and bra. The results of the respondents demographic in Table 1 showed over half of the 100 women respondents, which comprised 55%, were in the age range 19-25 years old, followed by 33 cents were 26-35 years old, 4 percent were 36-40 years old, and 8 percent were above 40 years old. Furthermore, by looking at their marital status, 56 percent of the respondents were single, while 44 percent were married. Regarding the segment of anatomy breast, results show that 52 percent of respondents have normal breasts, followed by 30 per cents have sagging, and 18 percent have unbalanced breasts. In contrast, 76 percent of the respondents said they are unsure whether they are wearing the correct bra size. Furthermore, most of the respondents (98%) agreed that the product's design affects the decision to buy the product.

Table 1. Demographic profiles of the respondents

Variable	Category	Percentage
Age	19-25	55.0
	26-35	33.0
	36-40	4.0
	Above 40	8.0
Marital status	Married	44.0
	Single	56.0
	Government	21.0
Occupation	Private	63.0
	Others	16.0
	Unbalanced	18.0
Breast anatomy	Sagging	30.0
	Normal	52.0
Are you wearing the right bra?	Yes	20.0
	No	4.0
	Not sure	76.0
Does the design of the product affect the decision to buy the product?	No	2.0
	Yes	98.0

4.1.1. Symptoms When Wearing a Bra

Based on this study's first objective to identify symptoms when wearing a bra, seven items were developed in Part B of the questionnaire. The items were formulated based on the signs when wearing a bra. In addition, this study was tested by measuring the symptoms among women to see their response to symptoms when wearing a bra. The items for this part of the study are listed as follows.

Table 2. Percentage analysis of symptoms when wearing a bra

Items	Response	Percentage
It hurts whether it is from an underwire poking your underarm	No	26
	Yes	74
The straps dig into the shoulder	No	61
	Yes	39
The itchy issue comes from material	No	58
	Yes	42
It fastened on the tightest hook	No	57
	Yes	43
You have underboob	No	64

	Yes	36
It is riding your back	No	60
	Yes	40
Do the straps keep sliding off	No	39
	Yes	61

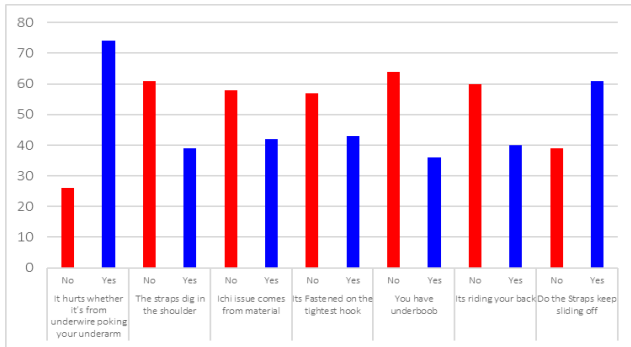


Figure 1. Distribution of symptoms when wearing a bra

The study findings are presented in Table 2 and Figure 1 for symptoms when wearing a bra. It was found that 74 percent of the respondents claimed that they feel hurt, whether it is from an underwire poking underarm. The findings also showed that respondents (61%) disagreed that the straps dig into their shoulders. Furthermore, 85 percent answered 'No' to the itchy issue from the material, and 57 percent answered 'No' to the material fastened on the tightest hook. In addition, 64 percent of the respondents did not have underboob. Sixty percent also answered 'No' if the material was riding their back. Finally, most of them (61%) replied 'Yes' when asked whether the straps kept sliding off.

4.1.2. The Main Problem When Buying a New Bra

To address the study's second objective, which is the main problem when buying a new bra, six items were formulated as listed in Table 3.

Table 3. Percentage analysis of the main problem when buying a new bra

Items	Response	Percentage
Inappropriate bra size	No	35
	Yes	65
Inappropriate bra CUP size	No	39
	Yes	61
Design is not much of choice: less variety	No	41
	Yes	59
Product Quality	No	55
	Yes	45
Unreasonable price	No	36
	Yes	64
Material issue	No	68
	Yes	32

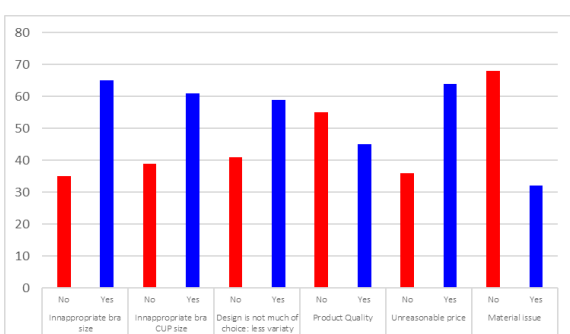


Figure 2. Distribution of the main problem when buying a new bra

Table 3 and Figure 2 show the respondents' views on the main problem when buying a new bra. The analysis found that 65 percent of the respondents agreed, and 61 percent agreed that most of them chose the wrong bra and bra cup sizes, respectively. Furthermore, the study also found that 59 percent of the respondents agreed that the design is less variety and not much choice. In contrast, most of them decided that product quality (55%) and material issues (68%) were not the main problems when buying a new bra. Lastly, 64 percent of respondents answered 'Yes' when asked whether the unreasonable price is the main problem when buying a new bra.

4.1.3. Factors That Influence the Design of the Bra

For addressing the third objective of the study, which is to identify factors that influence the creation of the bra, four items were listed in Table 4.

Table 4. Percentage analysis of factors that influence the design of the bra

Items	Response	Percentage
Affordable price	No	36
	Yes	64
Good Quality	No	42
	Yes	58
Variation of design	No	55
	Yes	45
Brand name	No	68
	Yes	32

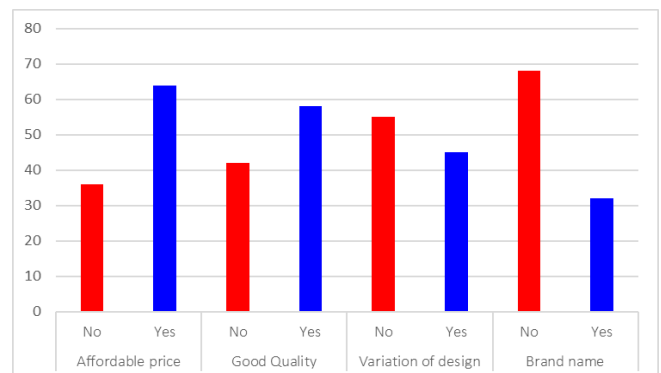


Figure 3. Distribution of factors that influence the design of the bra

The study findings are presented in Table 4 and Figure 3 for factors that influence the design of the bra. It was found that 64 percent and 58 percent of the respondents claimed that affordable price and good quality influence the creation of the bra, respectively. However, 55 percent of respondents disagreed that design variation is a factor that influences the design itself. In addition, 68 percent answered 'No' for the brand name as one of the factors that influence bra design.

4.1.4. The Essential Elements to Equip in the Bra

The fourth objective of the study is to identify the vital elements to equip in the bra; six items were listed in Table 5.

Table 5. Percentage analysis of the essential elements to equip in the bra

Items	Response	Percentage
Comfortable	No	31
	Yes	69
Price	No	36
	Yes	64
Material	No	46
	Yes	54
Sizing	No	40
	Yes	60
Design	No	55
	Yes	45
Colour	No	59
	Yes	41

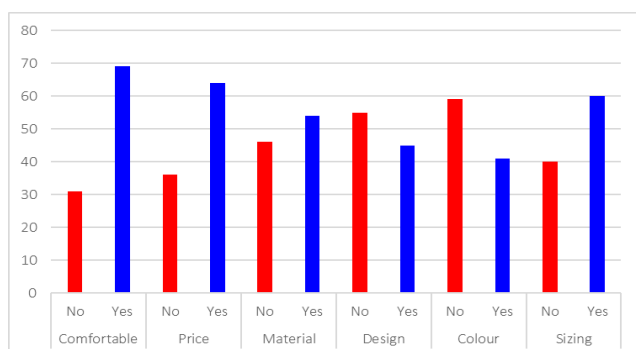


Figure 4. Distribution of the essential elements to equip in the bra

Table 5 and Figure 4 show the respondents' views on the essential elements to equip the bra. From the analysis, it was found that the majority of the respondents agreed that these four factors, comfortable (69%), price (64%), material (54%), and sizing (60%), were the essential elements to equip in bra. However, the study found that the respondents answered 'No' for both design (55%) and color (59%) as the essential elements to equip in bra.

5. Conclusion

As can be seen, there are various preference items selected by each respondent according to their suitability and requirements. Most important, they occur in the design phase. With mass customization and co-design, customers can choose and identify their needs. The bra is manufactured with a customer engagement approach. Customers can buy bras using the concept of co-design in e-commerce. Customers can choose the type of bra and the design of the bra they want at their convenience. Each bra is made for every customer. Every bra design and structure idea is brought to the fore by the women who have overcome this problem. This research aims to understand the growth of bra specialization for women with uneven bra size problems and to build a new specialty bra market in Malaysia. It will be the best courage to change a new design, compound, and essential component needed for brassiere. A suitable bra is to find a great fitting bra that provides optimum support and gives us a more flattering form. To ensure the continuity of this research, there are several areas of study that need to be adjusted according to the predefined parameters. Therefore, it is vital that the research be conducted in

more detail and focused on the scope of the study. The content of this study is focused on mass customization, co-design approach, and development of the undergarment industry. Adopting the mass customization approach can be an option to offer a wide range of products and services that have proven to be effective in the fashion industry. The concept of mass customization has provided an approach to time-based information, location, product information, and manufacturing production. In addition, with the idea of e-commerce, users can choose and customize their design and size to their preferences. This method can develop products and services proactively to individual customer preferences. This can be attributed to the women's bra problem. Hence, it is hoped that this study can produce critical aspects of impact and the design elements that will provide further knowledge on the research and development of the Malaysian lingerie industry.

6. Limitations and Further Study

No study covers all aspects of a research problem. The lack of published information on bra design issues and their influence factors in Malaysia is new. Hence, the purpose of this paper was to find the critical aspects of impact and the design elements that will provide further knowledge on the research and development of the Malaysian lingerie industry.

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Authors' Contributions

The main author contributed 40% of the idea and the completion of the paper. The corresponding author edited and contributed 20% of the works, while the fourth and fifth authors did the data analysis, 30% equally. Finally, the third author contributed 10% of the work.

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