

# Finding Emergency Feminine Product Accessible Station in City Corners

Group 1

## Abstract

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

## 1 Introduction

### 1.1 Background

The main social problem we would like to address in this project is menstrual poverty and stigma about women's menstrual cycle, also known as period. According to the “National Plan for the Development of Children in Poverty Areas” published by the General Office of the State Council of the People's Republic of China, there are about 40 million children (about twice the population of New York) living in special hardship areas. Among this population, about 10% are girls aged 12-16, and thus at minimum 4 million face menstrual poverty. In addition, according to UU Public Welfare's survey of more than 70 schools in poverty areas in 11 provinces and autonomous regions in China, about 5% of girls who have menstruated do not use sanitary napkins. Behind menstrual poverty are gynecological diseases, psychological problems, and the risk of being out of school and employment. According to the sanitary napkin brand MeibuEri's website, 93% of Chinese women suffer from non-essential gynecological diseases, of which 63% are caused by poor-quality sanitary napkins.

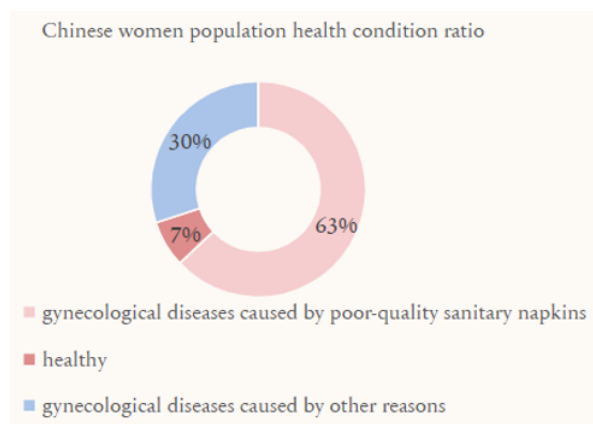


Figure 1.1: According to the sanitary napkin brand MeiBuEri's website, 93% of Chinese women suffer from non-essential gynecological diseases, of which 63% are caused by poor-quality sanitary napkins.

In trying to persuade our school to provide sanitary napkins, we learned that the budget and responsibility for their delivery in our school are not clear. The logistics department needs more usage to install vending machines for daily necessities like sanitary napkins. The Health Safety Environment department said that sanitary napkins were not first aid supplies and should not be provided in first aid boxes or clinics.

In addition, after researching and doing literature reviews of news and reports on related topics, we found that previous attempts to install sharing sanitary napkin self-service boxes in some universities have not been successful. However, personal electronic charging battery banks can be found everywhere in various parks, hotels, and supermarkets. More sanitary napkins are needed in public places.

On the other hand, we noticed that family planning supplies such as condoms are available and distributed free of charge in hospitals and clinics. Why do menstrual physiological products that women need for survival are not distributed free of charge? Let alone its importance in preventing gynecological diseases and psychological problems. In China, the news of the demand for sanitary napkin sales on high-speed trains in 2022 became a hot topic on social media. This phenomenon also reflects the attention and urgency of this topic and this service.

At the same time, the social stigma against menstrual cycles troubles more women. For example, menstruation is still regarded as a shameful thing on many occasions, replaced by euphemism words such as “great aunt” and “that” in conversations. In addition, period products are often deliberately hidden in daily life, such as black plastic bags in convenience stores.

From our previous survey among undergraduate students, 43% of students don't feel comfortable talking about sanitary napkins and periods in public with

some specified reasons below. It's worth highlighting that most of the answers (56%) are related to negative emotions such as shameful, impolite, embarrassing, awkward, and bad. This result shows that period stigma exists in the student population at Hong Kong University of Science and Technology (Guangzhou). In addition, the menstrual shame problem even exists in some of their parents' and previous teachers' communities. This echoes our hypothesis and implies that these women and their descendants will need a longer time to break through their psychological burdens and become independent without social welfare interventions.

## 1.2 Purpose and Vision

It is necessary to make more people aware that sanitary napkins are daily hygiene products like paper towels and call on more people to pay attention to the needs of women. Women should get used to talking about menstrual circles and buying sanitary napkins with dignity and convenience in vending machines in public places.

Build a female-friendly and children-friendly society with humanistic care. The provision of free period items with easy access embodies the fundamental principle of equality and dignity of women and is a fundamental human right.

We will first set up an emergency feminine product accessible station in the female restroom of maker space at our school HKUST Guangzhou. We plan to run the pilot project for one year. Starting from the Guangzhou campus of HKUST in Nansha District, we will then expand to other cities in the greater bay area such as Shenzhen, Hong Kong, and Dongguan.

## 1.3 Scope of the Study

To narrow down our vision in the project scope, we aim to first sell sanitary napkins via emergency feminine product accessible station and then provide free emergency sanitary napkins once a month after securing sponsorship.

In addition to analyzing vending machine IoT systems, our project also has a data visualization map website that locates existing emergency feminine product accessible station. Furthermore, we developed a rating system to evaluate them and plan to develop this into building legislation. This is the educational element to alleviate the stigma against menstrual circles.

Team members from Info Hub built the website and advised on IoT system.

Team member from SEE Thrust advised on potential solar panel usage to replace vending machine battery.

Team members from Society Hub secured vending machine sponsorship, collected data, created website content, drafted survey and policy recommendations.

## 2 Methodology

### 2.1 Data Collection

#### 2.1.1 Field Studies

We visited the shopping mall Taikoo Hui and Landmark in Guangzhou as well as QingHuiYuan in Foshan to conduct field studies regarding the availability, number, location and affordability of emergency feminine product accessible station in their locations.

#### 2.1.2 Weibo database analyses

We searched keywords such as "sanitary pad self-service box" on Weibo to gather data on emergency feminine product accessible station of other school locations in Guangdong province to build the database for visualization map website.

#### 2.1.3 Surveys

We designed a survey to understand the budget preferences and consumption habits related to sanitary pads among the university, involves the following key steps:

**Survey Design.** To assess students' awareness and attitudes towards the availability and affordability of sanitary pads, we create a short survey on Tencent vote and send to both female staff and students in HKUST(GZ), and conduct Stratified Random Sampling to ensure representation from different strata like academic years, and departments.

**Survey Result.** We collected 62 answers in total, with 48% master students, 29% PhD students, 13% bachelor students and 6% university staff. The majority (85%) prefer purchasing sanitary pads through third-party online platforms (e.g., Taobao, JD.com, Pinduoduo). Supermarkets and convenience stores are also popular, with 56% of respondents using these channels. These population who have habits to purchase off-line are our target early adopter customers.

As for the budget preference, there is a huge disparity. A significant portion of respondents (40%) spends between 1-2 RMB per pad. Another substantial group (39%) spends between 2-3 RMB, indicating a habit for moderately priced options. Period

poverty does not seem to be an issue on campus as only 10% spends below 1RMB per pad.

Brand loyalty is high, with 83.87% of respondents considering the brand as an important factor. Top brands include Kao Laurier (42%), Kotex (40%), P&G Whisper (35%), and Sofy (35%). The majority (84%) consider quality (absorption capacity, leak prevention) as the most important factor. This indicates that we better collaborate with these brands to start with instead of developing our own products. If we were to develop our own new products, we need to focus on quality.

Only 6% consider convenience of purchase location as the most important factor. This implies that although we have some enthusiastic buyers, installing multiple stations on campus might be unnecessary.

When asking their willingness to buy in other products at emergency feminine product accessible station, there's an interest in purchasing cleaning products (73%), disposable underwear (56%), and snacks (19%). Some people put "no interest" as the answer indicating that it is also OK to not include other products.

People also showed habit of using tampons and interest in learning and educating about it. Cloth pads is also mentioned as an alternative both due to its affordability and environmental benefit.

## 2.2 Interactive Plot Explanation

Our study utilized a collected dataset detailing the locations of Emergency Sanitary Pad Stations across various city corners. This dataset included key variables such as the type of location (e.g., shopping malls, universities), the district in which the station is located, the number of available stations, and the distance to the nearest metro station. To facilitate our analysis, we converted these data points into geographical coordinates.

### 2.2.1 Data Transformation

In order to address data inconsistencies and enhance the visualization, we undertook several preprocessing steps:

- **Handling Missing Values:** Instances where the number of stations was not reported ('NA' values) were set to zero. This approach ensures continuity and completeness in our analysis.
- **Normalization:** Considering the high variance observed in the number of stations across

different locations, we applied a logarithmic normalization. This transformation not only stabilized the variance but also improved the interpretability of our data in the visual representation.

### 2.2.2 Interactive Map and Scatter Plot Creation

We employed ECharts, a powerful, interactive charting and visualization library, for creating our visualizations. The methodology for developing these interactive plots is described below:

#### 1. Initializing the Containers:

- The interactive map and scatter plot are displayed in separate containers (`mapContainer` and `scatterContainer`) within the webpage. These containers are dynamically sized and aligned for optimal viewing.

#### 2. Loading and Parsing Data:

- Using jQuery, we loaded our dataset from a JSON file. The data was then parsed to create a structured representation, where each station's location was associated with its respective data points such as distance to the metro, quantity, and type.

#### 3. Chart Initialization and Configuration:

- Two ECharts instances were created for the map (`mapChart`) and the scatter plot (`scatterChart`).
- The map visualization utilized a GeoJSON of the relevant city areas to plot the station locations.
- The scatter plot was designed to display the log-normalized number of stations and their distance to the nearest metro station. Different types of locations were color-coded for better differentiation.

#### 4. Data Grouping and Representation:

- The data was grouped by location type to facilitate comparative analysis across different categories.
- Each group's data was represented as a series in the scatter plot, with individual data points reflecting the number of stations and their metro proximity.

#### 5. Interactivity and Responsiveness:

- Click events on the map trigger updates in the scatter plot, showing data corresponding to the selected area.

- The scatter plot dynamically adjusts its display based on the selected map region, providing an interactive experience that allows users to explore data in specific city areas.

## 6. Styling and Customization:

- We customized the styling of the map and scatter plot for clarity and ease of use. This included adjustments to the layout, color schemes, labels, and tooltips to enhance user interaction and data comprehension.

Through these methodological steps, we successfully developed an interactive visualization tool that enables users to explore the distribution and characteristics of Emergency Sanitary Pad Stations across different city areas. This tool not only presents the data in an engaging and informative manner but also allows for an in-depth analysis of the availability and accessibility of these crucial facilities.

## 3 Results

### 3.1 Interpretation of Data

### 3.2 Comparative Study

#### 3.2.1 Micro Level - Evaluation of sanitary napkin stations in Guangdong

Explain our rating system and compare the 3 sanitary pad dispensers according to Excel.

#### 3.2.2 Macro Level - Compare China with other countries

In 2021 during the 13th National People's Congress conference, a member of the National People's Congress named Wang, Zuoying suggested to the Treasury Department these three policies:

1. the inclusion of the basic version of sanitary napkins into medical insurance;
2. establish a designated fund to provide free period to certain group of women;
3. promote the national reduction of value-added tax on feminine hygiene products.

These policies were not sponsored, and the Treasury Department redirected the topic to the National Health Commission.

Internationally, Scotland became the first region to offer menstrual supplies free of charge in 2020. India, our less developed neighbor, abolished the tax on sanitary products in 2018 and is promoting a program of cheap sanitary napkins for one rupee

(RMB 0.09) a piece. Korea doesn't have a nationwide program but started to distribute free sanitary napkins in 10 public areas in Central Seoul starting from 2018.

Table 3.1 is a summary of the 20 countries and regions that provide different levels of free menstrual supplies.

## 4 Challenges and Limitations

### 4.1 Survey Improvement

The survey design is not yet complete and might causes bias. The way questions are framed influence how respondents interpret and answer them, leading results skew in a way that assumes certain preferences. For example, "no interest in buying other products" is not an option in the question to explore additional products.

Acquiescence bias can also be caused by a tendency to agree with statements regardless of their content, especially relating to personal habits (sanitary issue, price, conflict of interest, cultural issue, etc.) as well as the location selection.

### 4.2 Vending Machine IoT System

Discuss any challenges faced in designing the IoT system and purchasing software of the sanitary pad stations.

### 4.3 Visualization Map Data Collection

Address any limitations of your research methods or data.

## 5 Conclusion

Our project "FreePeriod" uses teamwork, creative thinking, and resource connections to make sanitary pads available to those in need. We built an IoT vending machine prototype for our emergency geminie product accessible station network. We also built a website data visualization analyzing existing stations in Guangdong province. We further developed a rating system, conducted school user survey to implement the station on campus, and proposed multiple policy recommendations. By implementing these suggestions, any institution can effectively address period stigma and period poverty issues, manage potential conflicts of interest, and uphold a progressive and inclusive image. These steps not only improve the immediate environment for students and staff but also contribute to broader

Table 3.1: 20 countries and regions that provide different levels of free menstrual supplies.

Free to all in all public areas	No tax	Free in certain regions or public areas
Scotland (community centers, youth clubs, and pharmacies etc)	India	New Zealand (school)
	Kenya	Australia (school in New South Wales and Victoria)
	South Africa	United States (school in Illinois, Washington, New York, New Hampshire, and Virginia)
		France (school in Île-de-France)
		Kenya (school)
		South Africa (school)
		Botswana (school)
		Korea (public areas, e.g., library in Central Seoul)
		Uganda (school)
		Zambia (rural school)
		Canada (schools and federal agencies in British Columbia, Ontario, Nova Scotia, and Prince Edward Island)

societal changes regarding menstrual health and gender equality.

## 6 Recommendations and Future Work

### 6.1 Leverage online supplier & Lowering Cost

To maintain a sustainable business, it is important to explore partnerships with popular online platforms for discounts or special offers for students and staff. Implement programs to provide free or subsidized sanitary products to students, especially those in financial need.

### 6.2 Sustainable Design & Environmental Awareness

Promote the use of sustainable menstrual products like menstrual cups, cloth pads, or biodegradable pads. For example, we could add survey questions about awareness and usage of eco-friendly sanitary products to gauge environmental consciousness. Raise awareness about the environmental burden of sanitary waste disposal practices and implement proper disposal methods to minimize environmental impact. We have also been in touch with professors and students in the Material Science field to collaborate and potentially make sanitary napkins recyclable.

In addition, we aspire to attach solar panels to the vending machine to make it functional off-grid outside. This design is beneficial to under-developed

rural areas in China. We could even attach it to tri-cycles and distribute it free of charge after securing donations. Big brands like Cola have already been using solar panel vending machines in Japan. Thus, it also has an overseas market.

### 6.3 Health and Hygiene Education

Organize workshops and seminars on menstrual health and hygiene. Include information on sustainable practices and proper disposal methods. This not only provides essential gender and health education for young girls and women in the community but also could raise awareness about women's rights in society.

### 6.4 Managing Conflicts of Interest

- 1. Transparent Procurement Processes:** Ensure transparency in the procurement of sanitary products, avoiding any appearance of favoritism or conflicts of interest, and use open tenders and clear criteria for selecting suppliers.
- 2. Diverse Committee Involvement:** Form a committee with diverse representation (students, faculty, administrative staff) to oversee initiatives related to sanitary issues. This committee can also review potential conflicts of interest. Regarding the implementation of stations on campus and validating the rating system, we plan to consult experts such as staff members trained in electricity safety and

handicap people association regarding their user experience.

3. **Regular Audits and Reviews:** Conduct regular audits of procurement processes and initiatives. Ensure funds allocated for sanitary issues are used effectively and transparently.

## 6.5 Upholding University Image

1. **Positive Communication Strategy:** Publicize efforts and initiatives related to improving sanitary facilities and promoting gender inclusivity. Use the university's platforms to highlight commitments to sustainability and social responsibility.
2. **Community Engagement:** Involve the university community in decision-making processes related to sanitary issues. Encourage feedback and suggestions from students and staff.
3. **Collaboration with External Organizations:** Partner with NGOs, governmental organizations, and corporations that focus on menstrual health and gender equality. These collaborations can enhance the university's reputation as a socially responsible institution.
4. **Regular Updates and Reporting:** Provide regular updates to the university community about ongoing initiatives and improvements. Transparency in actions and communications helps maintain a positive image.

## 6.6 Legislation Recommendations

We plan to expand to other high schools, middle schools, and even primary schools. For the beneficiary students that do not have income, such as those younger than 18, it is likely that they cannot afford the education program or the sanitary napkin product.

We can find alternative 'customers' such as those people affiliated with the school:

- asking alumni, the investment office, or logistics office from the schools to sponsor an emergency sanitary napkin station;
- inviting the sanitary napkin producers to give the products to the schools;
- inviting local businesses to sponsor local schools to get the products and education program as a community goodwill project;
- asking donors to fund the sanitary napkins, e.g., through an online donation page at crowd-sourcing websites, Red Cross, or Tencent Charity.

We also would like to promote the inclusion of the basic version of sanitary napkins into medical insurance and promote the national reduction of value-added tax on feminine hygiene products. We plan to model the policy details after the example of the baby care room legislation in Guangzhou.

In the future, we will find our advocate from members of the National People's Congress and the National Committee of the Chinese People's Political Consultative Conference. We will collaborate with them and other locations that implemented the Emergency Feminine Product Accessible station to suggest to the Health Commission office in Guangzhou to share our experiences and demand legislative laws to mandate the delivery of sanitary napkins in public places.



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