Business Model Canvas for SIEGA Autobox Automated Locker

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Abstract— SIEGA Autobox is an innovative locker system designed to reduce physical interaction during transactions. It was developed in response to the COVID-19 pandemic. The system uses IoT and cashless payments to enable remote control and secure purchases. Initially, SIEGA Autobox was used to assist school canteen businesses that were struggling due to activity restrictions caused by COVID-19. Since COVID-19 has become endemic, the use of SIEGA Autobox lockers must be adapted to the needs of the times. This study aims to find the most effective business model for SIEGA Autobox using the Business Model Canvas (BMC) framework. The research suggests that the most suitable business model involves schools selling products directly through lockers. Based on interviews with Nusaputera National School and Theresiana 1 High School PICs, as well as the generated Business Model Canvas, the most suitable business model involves schools selling products directly through lockers. These products, sold by students, instructors, staff, or parents, typically have a medium to high economic value and a lengthy shelf life. To enhance locker awareness, schools could hold events such as open houses and publicize them on social media. Revenue would be generated through products sales or profit sharing with partner vendors and DBI (Dunia Bayar Indonesia).

Keywords— bussiness model canvas, school bussiness, locker system, IoT, cashless payment.

I. INTRODUCTION

In 2019, there was a COVID-19 outbreak that affected nearly every country in the world, including Indonesia [1]. This outbreak is extremely deadly because it spreads rapidly by contacting objects that have been infected with droplets from patients. Due to the outbreak, some businesses were forced to close since they did not fulfill the required health protocol standards. The outbreak began in Indonesia in February 2020, prompting the suspension of many activities in order to mitigate its impact [2]. The government is attempting to revive businesses that were negatively impacted by the outbreak while also continuing to implement good standard health protocols, which include wearing masks, maintaining distance, washing hands, avoiding traffic jams, and limiting mobility [3].

In its research, the Information Systems study program, via its innovation, developed an automation tool known as SIEGA Autobox. SIEGA Autobox is an entrepreneurial locker that allows small businesses to sell things through it. The locker is equipped with an IoT device that allows it to be controlled remotely from an internet-connected device, such as a smartphone, reducing physical touch between buyers and sellers [4]. Aside from that, the locker is equipped with a cashless payment option using QRIS, which can be accessed through the available application, minimizing the impact of the COVID-19 outbreak [5]. Initially, the use of SIEGA Autobox lockers was intended for school canteens that had closed due to the COVID-19 pandemic, with the objective of resuming transaction activities in these canteens.

The SIEGA Autobox locker's functioning method is as follows: users can access purchasing services through the available dashboard, and purchasers can then select the products they want to buy using the application. After successfully picking the item they wish to purchase, a QRIS payment will appear, which may be completed through a variety of existing digital wallet services and

digital banks. After the payment is successful, the user can open the locker where the transaction took place using the application. The locker will then unlock automatically, allowing the buyer to simply collect the stuff from it. Currently, the development of SIEGA Autobox lockers is limited since there are only 12 locker doors that can be accessed, therefore not many products can be stored in these lockers.

As time passes, the COVID-19 epidemic can be effectively managed, allowing transaction activity to return to normal [6]. To expand SIEGA Auto Box's business activities, a targeted and sustainable business plan is required. The company's business strategy will not be effective unless it is based on the correct business model. A business model is a common tool for transforming ideas into enterprises. Business models simplify complicated business realities into simple pieces that can be easily created.

Business Model Canvas is a business model generation tool that has grown in popularity among entrepreneurs due to its ability to display the core elements of a business simply on a single canvas. The use of the canvas business model is generally used for businesses that are being started to make it easier to determine the business strategy that will be implemented in the future [7]. According to Osterwalder and Pigneur, the Business Model Canvas is a business model framework displayed visually in the form of a canvas comprised of nine interconnected boxes. This model is used to explain, visualize, evaluate, and modify a business model to achieve better performance. The business model canvas consists of nine blocks: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure [8].

BMC can be utilized across all business lines and is not limited to the business sector. BMC is quite useful in speeding the process of identifying business strengths and weaknesses. Knowing one's strengths and shortcomings allows for a quick and effective needs and benefit analysis. Aside from that, the advantage of the Business Model Canvas is that it allows users to quickly modify business models and see how changes to one area affect other business parts [9].

Based on existing research, the BMC method can be used to develop a new business strategy model to face business competition, as well as to implement the Business Model Canvas to improve the effectiveness of using SIEGA Autobox lockers and provide more impact to support transactions using these lockers.

The purpose of this study is to determine the most effective business model for SIEGA Autobox. By studying and reviewing its business model, SIEGA Autobox can establish business development strategies that are beneficial and suitable for the continuity of its business, keeping it in line with current trends.

II. METHOD

A. Research Objectives
   1. Analyzing and determining the best Business Model Canvas (BMC) elements for the SIEGA Autobox business
   2. Developing an innovative and sustainable business model for the SIEGA Autobox business

B. Primary Research

   This research uses primary data gathered through interviews with business representatives who have used SIEGA Autobox technology, including PICs from several schools who have collaborated with SIEGA to gather the required data, namely Nusaputera National School and Theresiana 1 High School in Semarang.

   The information gathered from interviews with business representatives will be processed and utilized as a guide to create a Business Model Canvas for SIEGA Autobox.

C. Literature Review
   1. Siega Autobox

      SIEGA Autobox is an automatic locker developed based on IoT and Payment Gateway for the

entrepreneurial process. Initially, the SIEGA Autobox development process was employed for entrepreneurship in the field of school canteens to address the issue of cafeteria closures owing to the COVID-19 pandemic. SIEGA Autobox is a locker modified with an IoT-based microcontroller device that allows the door to open automatically via the internet. This locker contains 12 doors, each with a door stop device (solenoid), and all of the solenoids are connected to the existing IoT microcontroller. The door will only open after the consumer has completed the buying procedure using the application provided.

SIEGA Autobox Lockers are not only IoT-based, but they also integrate digital payment platforms like QRIS. Payment can only be made utilizing a cashless or QRIS approach when ordering through the application. This is done with the goal of reducing physical contact between sellers and customers, as these lockers are likely to be able to withstand the COVID-19 outbreak. After successfully making a payment using the application, the buyer will be able to open the locker that they have selected automatically.

2. Financial Technology

Financial technology refers to technology utilized in the financial sector. Fintech is currently developing at a rapid pace, with only 7% of users in 2007 rising to 20% in 2011, 36% in 2024, and 78% by 2017 [10]. This demonstrates that in the current digital era, all financial activities may be supported by existing technology to increase their performance and efficiency of use. Fintech implementations vary greatly, ranging from peer-to-peer lending, crowdfunding, e-wallets, payment gateways, investing, digital banking, and so on [11].

One of the financial technologies employed in the development of the SIEGA Autbox entrepreneurial locker is a payment gateway that allows users to make cashless payments via QRIS, simplifying and increasing the locker's efficiency. A payment gateway is a financial service that facilitates electronic payment processing [12]. One payment method that may be made through a payment gateway is QRIS (Quick Response Indonesian Standard), which is a payment method that uses a QR Code scan from banking services and is a combination of several types of QR from banking services and is a combination of several types of QR from various payment system service providers in Indonesia provided by Bank Indonesia [13].

3. Internet of Things

IoT (Internet of Things) is a concept that connects the digital world to human activities through the use of internet network technologies. IoT allows individuals to interact and communicate with other people and items equipped with IoT capabilities. Currently, IoT development is prevalent in society. The Internet of Things has been employed in a variety of areas, including industry, offices, government, and households [14].

One example of its applications in the household, IoT can be used to remotely operate electronic devices utilizing the internet network via a cellphone. It controls the solenoids that lock the locker door in SIEGA Autobox IoT lockers. When a user uses IoT to make a digital payment via a payment gateway utilizing the QRIS method, they can open the locker remotely using their smartphone [15].

4. BMC

Alexander Osterwalder and Yves Pigneur created the Business Model Canvas, which is now widely used by entrepreneurs, startups, and established companies. BMC is an effective tool for building business

models and strategic management tools that can be used systematically to comprehend, visualize, design, and develop new or existing business models to generate new alternative strategies based on business conditions.

BMC consists of nine interrelated parts that are critical to developing a successful business model. The nine elements are:

Customer Segments: components that identify various categories of people or organizations that the company aims to reach and service. Customers might be classified based on demographics, psychographics, behavior, or needs.

Value Proposition: a component that explains a product or service that fits the needs or solves problems for the intended customer segment. A compelling value proposition outlines why buyers should choose one company's offerings over competitors.

Channels: a component that describes how a company uses multiple channels to reach and interact with its consumers to communicate its value offer. Direct sales, internet platforms, collaborations, and retail distribution are some of the possible channels.

Customer Relationships: a component that specifies the type of relationship a company establishes with its various customer segments. Relationships can take many forms, including personal assistance, self-service, automated service, and community building.

Revenue Streams: a section that describes how a business makes revenue from its customers. Product sales, subscription fees, licensing, advertising, and service fees are all potential sources of revenue.

Key Resources: components that identify the strategic assets required to provide value propositions to customers. Physical assets, intellectual property, human resources, and financial resources can all be considered key resources.

Key Activities: components that highlight the most significant actions that a business must perform in order to function properly and communicate its value proposition. Primary activities may include manufacturing, marketing, distribution, customer service, and research & development.

Key Partners: a component that explains the network of suppliers, collaborators, and strategic relationships that support the company's business strategy. Partnerships can help businesses gain access to resources, cut costs, limit risks, and enter new markets.

Cost Structure: a component that outlines the costs incurred by the company while operating its business model. Cost structures can include fixed and variable expenses, as well as economies of scale factors.

III. RESULTS AND DISCUSSION

A. RESULT

The interviews were conducted at two schools that had implemented SIEGA Autobox technology: Nusaputera National School in Semarang and Theresiana 1 High School in Semarang.

Interviews were done at Nusaputera National School in Semarang by the PIC teacher who had been assigned to administer the SIEGA Autobox lockers, Mrs. Melinda Safitri, as well as Ricky Jonathan Sutrisno, a student who assisted with the locker management procedure. Meanwhile, interviews were held at Theresiana 1 High School with the Principal, Mrs. Theresia Dewi Pramesti, and Mr. Syaiful who is responsible for the locker management.

The interview provided the following findings.

Table 3.1 Interview Table

Question	Nusaputera National School	Theresiana 1 Senior High School
How has the locker been used so far?	It rotates between elementary, middle, high, and vocational school levels every month.	At present, it has only been employed at the high school level.
Items for sale in lockers	Dry snacks, little wall hangings, travel prayer mats, head scarves, and cosmetic products	Caps, ties, belts, and other uniform attributes.
Benefits for schools and students	Teaching students about new technology.	A new experience for students. Reduce staff to maintain the shop.
How to ensure the contents in the locker are safe.	CCTV Every morning, the locker is checked. If it is empty, it is filled again. There was a loss of food before	Check daily
Strategies to increase student awareness	The class representative provides information Give students projects related to the locker Create locker-related videos (TikTok, Instagram)	Providing outreach to students and parents
The business model applied	Products such as dry snacks are filled in by students and teachers. Lockers are separated into student and teacher divisions.	Using lockers to sell uniform attributes that are frequently left behind by students
Biggest challenge	Lack of responsibility by the user and lack of security surrounding the locker	Users must download the application and wait for verification first.
Special needs and policies	Every month, products should be replaced and sold. 1. Routine Tool Control	There is no specific policy.
Feedback	Lockers are seen as interesting for students to learn about	Students are attracted to the lockers
Input and suggestions	System upgrades for easier use.	Further socialization is necessary.

The interviews with Nusaputera National School and Theresiana 1 Senior High School reveal different approaches and challenges in implementing the SIEGA Autobox locker system.

Nusaputera National School uses the locker system at all levels of education, rotating it on a monthly basis. This strategy not only diversifies the user base but also helps in the integration of the locker system into the daily routines of various student groups. The school sells a variety of products, including dry snacks and cosmetics, to teach students about modern technology. Despite the benefits, issues such as a need for more user responsibility and security concerns have been raised. The school addresses these issues by installing CCTV and doing regular checks and restocking, despite reports of food loss. Class representatives, student projects, and social media advertising are all part of the comprehensive awareness strategy. Feedback implies that students find the lockers engaging and educational while system upgrades and additional socialization are required to improve usage and efficiency.

At Theresiana 1 Senior High School, locker usage is currently limited to the high school level, with a focus on selling uniform items such as caps and ties. This targeted strategy addresses a specific student's need while ensuring the availability of essential items. The school checks and restocks the lockers daily to maintain security and inventory. Outreach to students and parents is part of the awareness-raising efforts. The primary issue is that users must download an application and complete verification, which might be a barrier. Despite these obstacles, student interest in the lockers remains high, indicating a successful integration into the school environment. The school acknowledges the importance of ongoing socialization efforts to maximize the lockers' potential.

Both schools emphasize the locker system's educational benefits and potential to reduce staffing needs. However, issues such as security, user accountability, and application verification procedures must be addressed. Effective awareness strategies, regular monitoring, and system upgrades are important for increasing the locker system's benefit and impact. The positive feedback from students at both institutions lays a solid platform for the ongoing development and expansion of the SIEGA Autobox locker system.

B. **Discussion**

Based on the findings of the interviews, a Business Model Canvas was created to be used by other schools interested in implementing SIEGA Autobox technology. The Business Model Canvas that may be used is can be seen in figure 4.1.

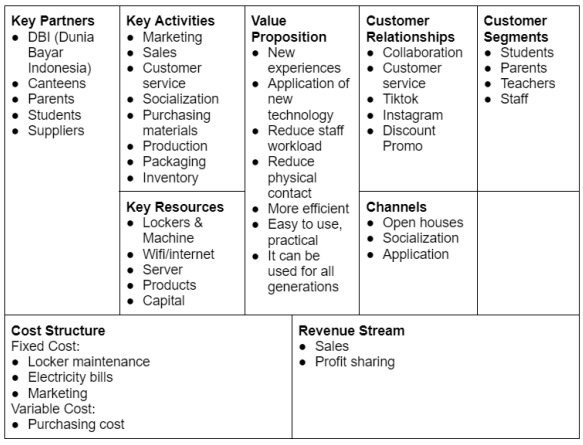

Figure 3.1 SIEGA Autobox BMC

This research analyzes the Business Model Canvas at Nusaputera School and Theresiana High School in the following order of each component:

1. Customer Segment

   The customer segment component aids schools in determining who their consumers are, allowing them to focus on serving prospective customers. Based on the interview survey results, the school addresses prospective customers such as students, teachers, staff, and parents of students.

2. Value Proposition

   The value that differentiates the school from other private schools is the utilization of technological developments in business, specifically, the SIEGA Autobox Automated Locker, which is not only IoT-based but also integrates digital payment platforms such as QRIS. This adds a new value proposition for customers: an application that is simple to use by all groups, saves time, and is more practical and efficient. Aside from that, locker automation can be used as a new technology-based educational tool for students. Using automatic lockers reduces both direct physical interaction and staff workload.

3. Channels

   The channel component describes how the school communicates with predetermined customers to distribute value. School distribution channels include open houses, school outreach, and mobile applications.

4. Customer Relationship

   This component shows how the school interacts with its customers. The school maintain good relationship with costumers through various channels, including social media (Tiktok, Instagram) and customer service. It is hoped that customers will become more loyal. Aside from that, the school offers discounts and promotions for specific events. The school is also collaborating with various parties.

5. Revenue streams

   Schools should pay close attention to the Revenue Streams component because revenue streams might impact the business's standing. The sale of products generates the school's money and profit sharing with various parties, such as the school canteen, school partners, etc. The school sets the selling price based on the minimal profit it hopes to attain.

6. Key Resources

   The key resources at school include locker machines, internet networks and servers, merchandise, and locker space.

7. Key Activities.

   The school's main activities include sales through automatic lockers, marketing via social media, open houses, acquiring products from suppliers, packaging, inventory, and customer support.

8. Key Partners.

   Students and teachers collaborate with product suppliers, Dunia Bayar Indonesia (DBI), a payment gateway from SIEGA Autobox Automated Locker, the canteen, and students' parents.

9. Cost Structure.

   The school fee structure is separated into two categories of fees: fixed and variable. Locker machine maintenance fees, electricity, and marketing expenditures are all expenses that schools spend regularly, regardless of the number of sales. Meanwhile, the variable expenses that must be expended include the costs of purchasing items in quantities that are directly proportional to demand. The greater the demand, the higher the cost of purchasing stock of commodities.

IV. CONCLUSION

Based on the conducted interviews with Nusaputera National School and Theresiana 1 High School PICs and Business Model Canvas that has been created, it can be inferred that for the time being, the most suitable business model that can be implemented is as follows:

The school will sell its products directly by placing them in lockers. The products can be procured by students, teachers, staff, or student's parents to be bought by all school residents or guests. The interview results indicate that the products being sold have medium to high economic value and a long expiry period. To raise awareness of the locker's existence among school inhabitants, the school could organize events such as open houses to introduce the locker to students and parents. Besides, management personnel might create and share locker-related content on their school's social media profiles. This could also be a form of school promotion via digital marketing media. Schools will get their revenue from selling their merchandise or profit-sharing with partner sellers and DBI (Dunia Bayar Indonesia)

Furthermore, Nusaputera National School and Theresiana 1 High School must focus on improving their business strategy and technological innovation. The Business Model Canvas's Value Proposition block focuses on technological innovation. Schools must prioritize generating and developing values for their customers. A technology innovation plan was developed so that schools did not have to invest a lot of money to generate earnings and attract new consumers.

LIMITATION

Because only a few schools have implemented these lockers, there were few sources to interview. It is hoped that future research will increase the number of sources and gather more data.

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