Point of Sales Terimal – Accessible Cashless Payment Device

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ABSTRACT

The main emphasis of this Point of Sales terminal design is the product should provide easier Cashless payment methods, building trust while operate the terminal and accessible to all group users. Few interests which will shape the design's outline, this include the interactions between the seller with the customer and possible self-service payment for disadvantage groups. The new design will improve the quality of common POS Terminal in market such as the visual identity, features and usability while trying to increase the user's trust and payment privacy.

Keywords: Point of Sales terminal, accessible, usability

ABSTRAK

Fungsi utama Point of Sales (Mesin Kasir) adalah mesin dapat membantu pembayaran Non-tunai, membangun kepercayaan saat mengoperasikan mesin dan mesin dapat diakses oleh segala kalangan pengguna. Ada beberapa hal yang menjadi arahan desain; interaksi antara penjual (kasir) dengan pelanggan dan fitur self-service (mengoperasikan mesin sendiri) bagi kalangan disabilitas. Desain baru akan meningkatkan kualitas mesin POS yang sekarang umum dipasaran dalam sisi identitas produk, fitur, faktor kegunaan sekaligus meningkatkan kepercayaan dan privasi saat bertransaksi.

Kata Kunci: Mesin Kasir, akses, kegunaan

INTRODUCTION

Point of sale software allows you to organize and access your store data. A point of sale terminal includes physical material and allows you to run the software. For instance, a POS terminal may include a computer or a physical terminal, a scanner and a receipt printer. A point of sale system is then a combination of software and physical equipment that aims to facilitate commercial operations. A point of sale terminal (POS terminal) is an electronic device used to process card payments at retail locations. A POS terminal generally does the following:

- Reads the information off a customer's credit or debit card
- Checks whether the funds in a customer's bank account are sufficient
- Transfers the funds from the customer's account to the seller's account (or at least, accounts for the transfer with the credit card network)
- Records the transaction
- prints a receipt

There are mainly 4 point of sale technologies:

- Legacy Software [On-Site Server]
- Cloud Computing Terminals
- Mobile Terminals
- Self-service Terminals

The Popularity of Cahsless Payment

With the ever-growing technology innovation, it is safe to say that people's daily basis is significantly improved. Technology development also increase the quality and experience of purchasing items, this convenience provides benefits to customer-seller and economic growth in the bigger picture. One of the pruducts created between the technology innovation and the demand of convenient, safer and simpler payment methods is Point of Sales terminal.
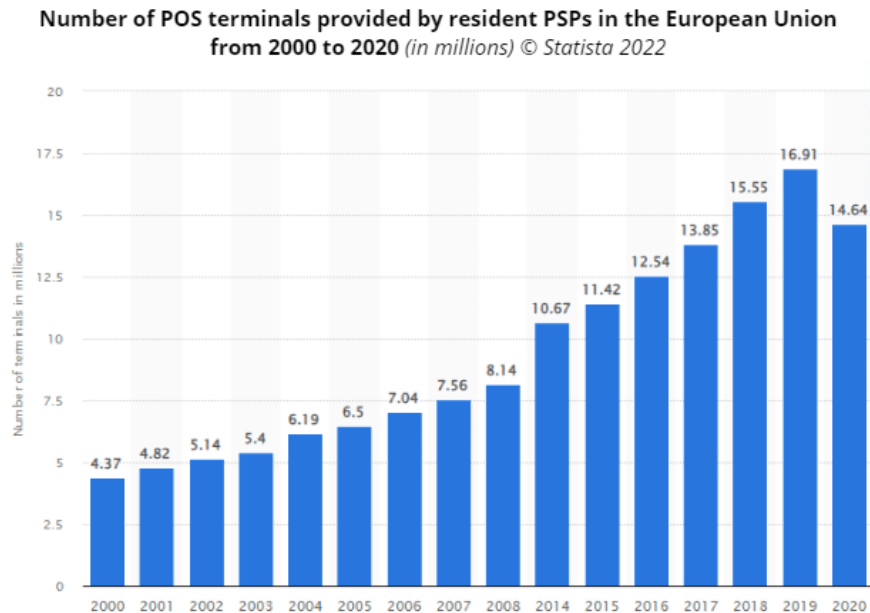
Figure 1. Point of Sales demand increasing popularity in multiple purpose of usage and economic activities

"In the European Union member states, the amount of POS (point of sale) terminals has risen to around 16,9 million in 2019. Around 11,7 million of those are in the Euro area. As of the end of 2018, there were a little over 15.5 million points of sale terminals processing payments, reported across the whole European Union. This means that the number has gone up steeply from 2018 to 2019." - Raynor de Best [Oct 6, 2021]

Understanding Market and User

To outline the design work, looking at the market and all types of users will help to understand the strength, opportunities and weaknesses of POS products in the market. They are a few types of establishments as part of the market evaluation. the store's size, location and layout will be part of the final design's shape consideration.

Figure 2. Purchasing scenario (flow), the possible usage of point of sales terminal

Although some stores have almost the same customer pattern (*Figure 2.*), there are a few differences. The size of the store indirectly impacts the requirement of the terminal features and size even though

user interaction between customer to cashier and customer to the terminal is relatively the same. Some stores are more suitable as market target, because of their number and developement overtime.

- Fast-Food Restaurants benefit from the new improvement of the point of sale terminal. These terminals help customers choose the menu more freely, avoid long queues, see their menu in detail, and avoid language barriers. Features such as "accessibility mode" are often added to help newcomers and disability groups to operate the terminal. in this situation of self-service, display and complete features are important.
- Bakery, Food-stall, Post-Office and Food Market often utilize terminals as cashless payment methods. The type of stores often use basic POS Terminal but also it is very common to see that they added extra screen/display on customer point of view for QR code (QR payment) or Payment total. often than not, the cashier should responsible to guide the customer on how to use the terminal.
- On-site fashion stores and other physical stores (grocery) reacquire POS terminals to help payment process. with various selling items and a varied range of customers, this will push the store to accommodate a wider range of payment systems although interactions between seller/staff and customer are considerably low and Fast.

Usability and Accessibility

To provide best experience for user, there are few design outlines which will help operate product, accessible and well-rounded design. **Usability** is a measure of how well a specific user in a specific context can use a product/design to achieve a defined goal effectively, efficiently and satisfactorily. Designers usually measure a design's usability throughout the development process—from wireframes to the final deliverable—to ensure maximum usability. Usability Requirement Relevant for Design:

- Information on the use of the Product (labelings, instructions and warnings) must be:
- be available via more than one sensory channel.
- presented in an understandable way. presented to users in ways they can perceive.
- presented in adequate size and suitable shape (contrast, spacing, etc.)
- IC card readers should be movable to accommodate different radii of action (person in wheelchair as well as tall person standing up).
- Use of standardized colors and symbols in the labeling of buttons etc.
- Card readers should not be to heavy.
- Robust casing, in case the device is dropped.
- Haptic feedback (the use of touch to communicate with users)

Payment Card Industry (PCI): Point Transaction Security (PTS) Point of Interaction (POI) - Modular Security Requirements Version 4.0 - June 2013 [Security Standard Council]

Ergonomics also part of usability, aims to improve workspaces and environments to minimise the risk of injury or harm. So as technologies change, so too does the need to ensure that the tools we access for work, rest and play are designed for our ergonomics need. The focus of the type of stores will determine the type of works.

"Produktivitasdan kinerja merupakan salah satu dari prinsip ergonomi. Kinerja pekerja terletak dalam aspek kerja termasuk egonomi itu sendiri. Untuk menghasilkan produktivitas dan kinerja, ergonomi akan merancang pekerjaan yang akan cocok untuk para pekerja sesuai dengan kebutuhan dasar para pekerja."[8]

Accessibility takes part in understanding how the product's function and benefits can be accessed by all groups of users (age and disability). **The concept of accessibility** on products are co-exist with an ever-growing awareness of **Sustainable Development Goals (SGDs)**, one of the major goals following this modern era is reducing inequality. this movement is limited to act of service but also efforts to create or improve the quality of all products and facilities (accessibility). In a design context, accessibility describes how people can draw full benefits from the system or product. This serves deeper concern compared to Usability regarding how certain groups of people with various scenarios use the product and get benefit from it. This usually involves designing for people with various types of disabilities, such as vision, hearing, mobility, cognitive, using wheelchair etc.
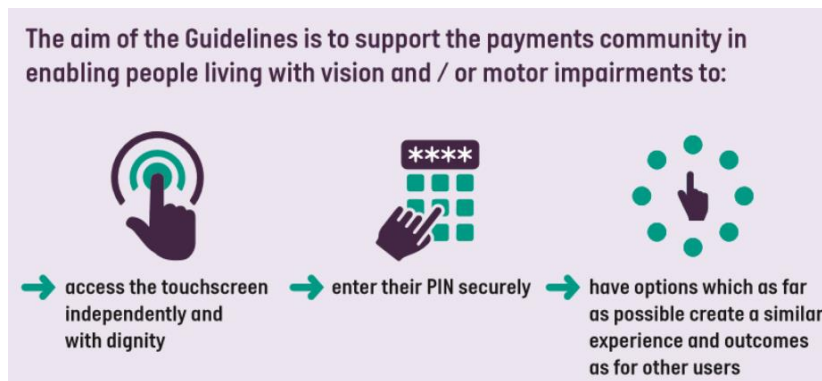
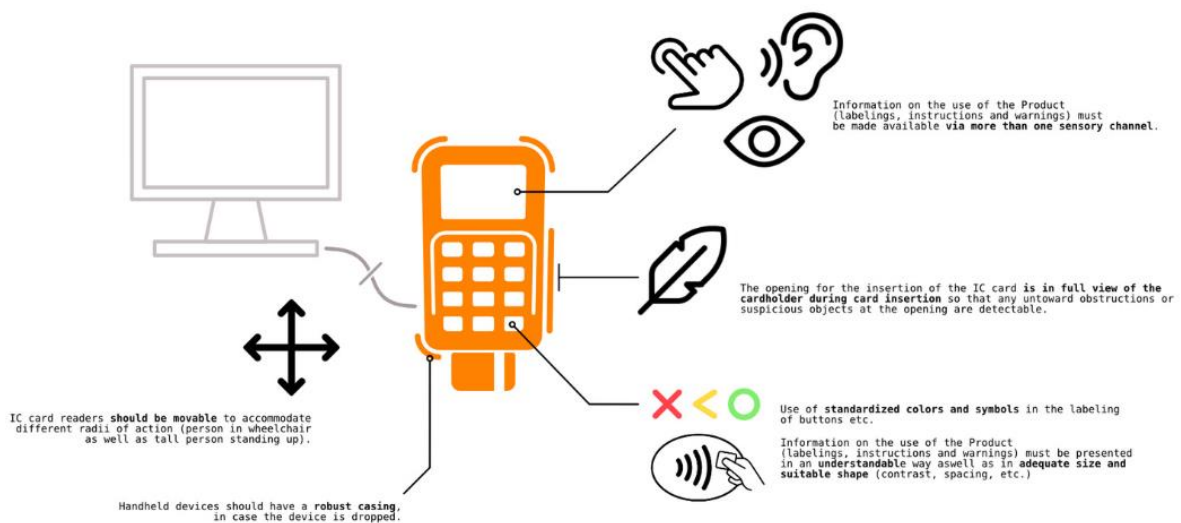*Figure 3. Usability and Accessibility help outline and improve design work*

Figure 4. Sensory feedbacks provide extensive information regarding payment status for users

17 Sustainable Development Goals (SDGs) are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth.

Following the spirit of these goals through design, two key goals become part of the design direction. The well-designed product, concerning its usability, accessibility and ergonomics aims to provide equal facilities and features for all groups of users while indirectly sparking fresh ideas for Industry and

furthermore introducing accessibility design improvement. At the end of the day, the design is expected to bring impact outside its purpose as an economic instrument.

Figure 5. Sustainable Developement Goals number 10 and 9

Privacy and Security

The layout of the store, placement of POS machine, Queue formation and space will be considered to optimize the end result of the design. The following are basic of privacy precaution on POS terminal usage:
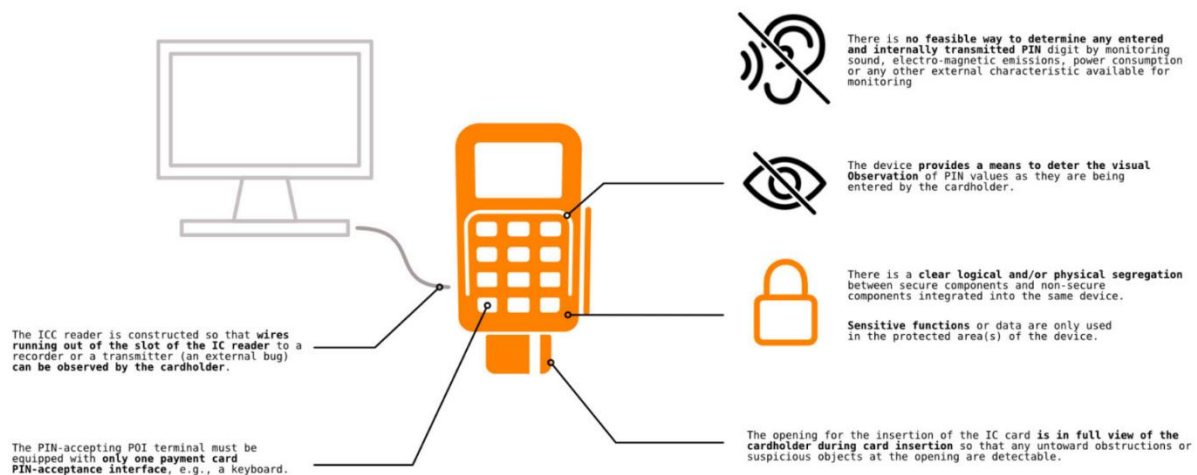

Figure 6. Basic Privacy and security on POS Terminal

Besides the internal factor of Terminal design, visuals, usability and accessibility, there are a few concerns regarding external factors that might impact the design *(figure 7.)* :

- Queue patterns of customers reduce the feeling of privacy in some cases
- Camera System (CCTV) should not point/direct view on POS machine
- Many stores have glass covers for their counter table
- The payment receipt must be given to a customer
- The product should be accessible and the cashier/seller should be able to interact with the product to help
- The self-service terminal is preferred even more in pandemic situations
- Visual of the product should coexist with most of contemporary store design

Figure 7. User's feel of Privacy while using POS terminal

If there is something certain about cash transactions is Act of Criminal, A skimmer is a device that is rigged to the card reader of an ATM machine. An unsuspecting user will enter their card into the ATM, not knowing that the device attached to the slot (unnoticed or ignored) has proceeded to record their payment card data. Although this type of crime has been discovered for almost a decade, the method and target list are growing. Dip-in or Slide (Magnetic slide) methods become prime targets, the visual of the skimmer machine also evolve to avoid suspicion, although with the help of online news people will be more aware the "distrust" feeling is hard to go by.
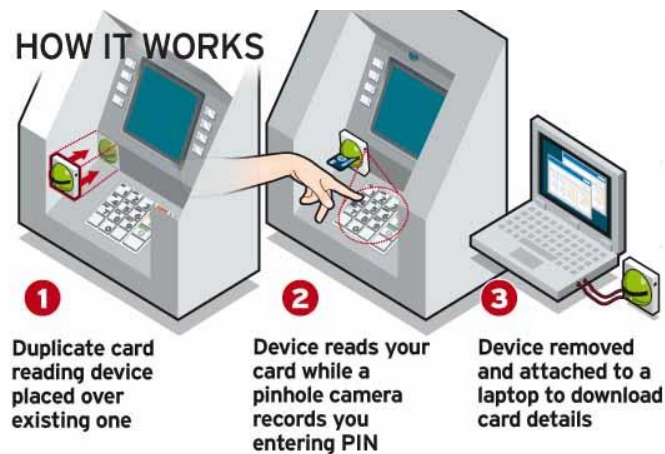

Figure 8. Criminal method on ATM Machine

POS terminal just like ATMs are an important instrument in the economic cycle. Many banks have published Card chips and Chip readers (Tap method) to battle this act of crime. A Clear, Clean, Simple and Seamless display are crucial to gaining the trust of customers and more importantly allows the POS owner to check and monitor any suspicious attachment on the product.

METHOD

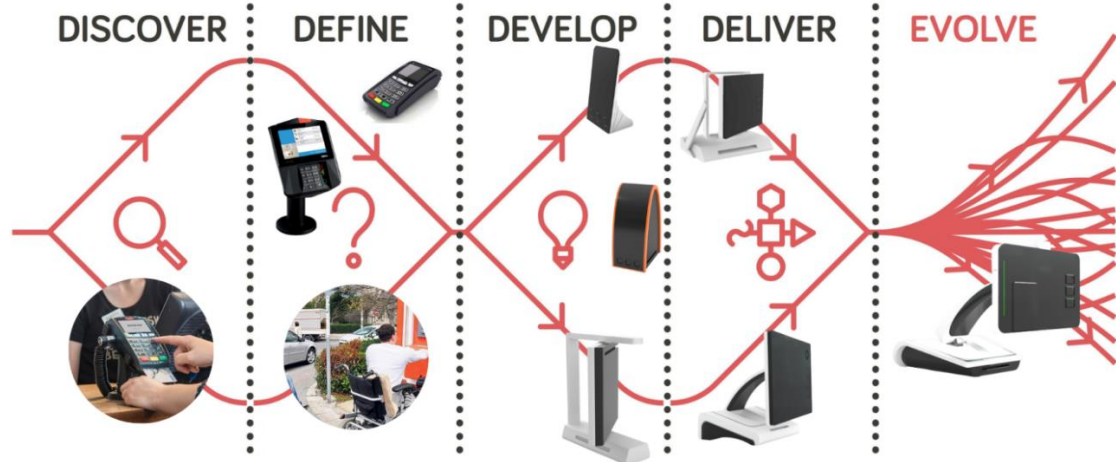The Double-diamond design method was used to outline and depicting the design process

Figure 9. Double Diamond Design Approach

To highlight the entire design work stages, the following part will show more detail focus on designing area such as sketches, implementation of image scales and product's feature. Below is highlight of design flow-chart:
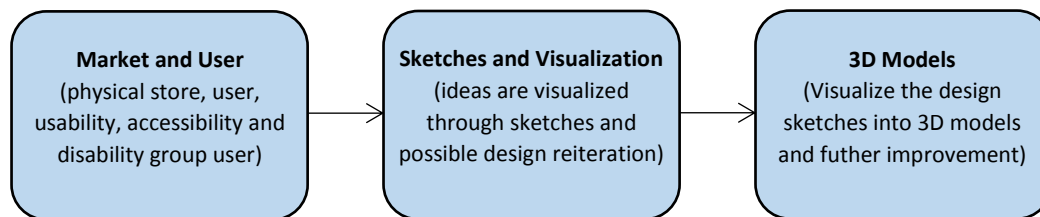

Market and User
(physical store, user, usability, accessibility and disability group user)

Sketches and Visualization
(ideas are visualized through sketches and possible design reiteration)

3D Models
(Visualize the design sketches into 3D models and futher improvement)

Chart. 1. POS Terminal Design Process

Visualization and Image Scale

Continuing the Introduction chapter, Visualization of product is important since it inform the product's identity and usability. Market's visual analysis through image scale is needed to assesst best design approach. The following image scales are separated following POS Archetypes (products size, utilities and feature) with Light, Heavy, Sharp and Rounded (Continuous) as the chart's axis (the axis or value can be change following the chart purpose)

Chart 2. Image Scales POS terminal, following their archetype (Size, Utilities and Features)

DISCUSSION

Sketches and Design Idea

Through the market and image (visual) analysis; POS terminals don't need multiple screens, interactions between customer with seller can be provided through moveable screen or handy/smaller device. Furthermore, Terminal should allow people with slight impaired or disability to operate product without problem (Usability and Accessibility page.3).

Figure 10. Alternative sketches

(Figure 10) the Approach of this idea is create POS terminal which suitable to all kind of stores layout without modify or damaging-installation. The handy size and small design are intended to fulfil its purpose to be accessible for wider range of user.

Figure 11. Alternative sketches

(Figure 11) this design leans toward the idea of interactive and more playful approach to operate the POS terminal. To accomodate any assistance from seller, the customer could swipe the screen without have to move the product. Bigger screen also provide better information or certain payment detail that might important for customer before confirming purchase.
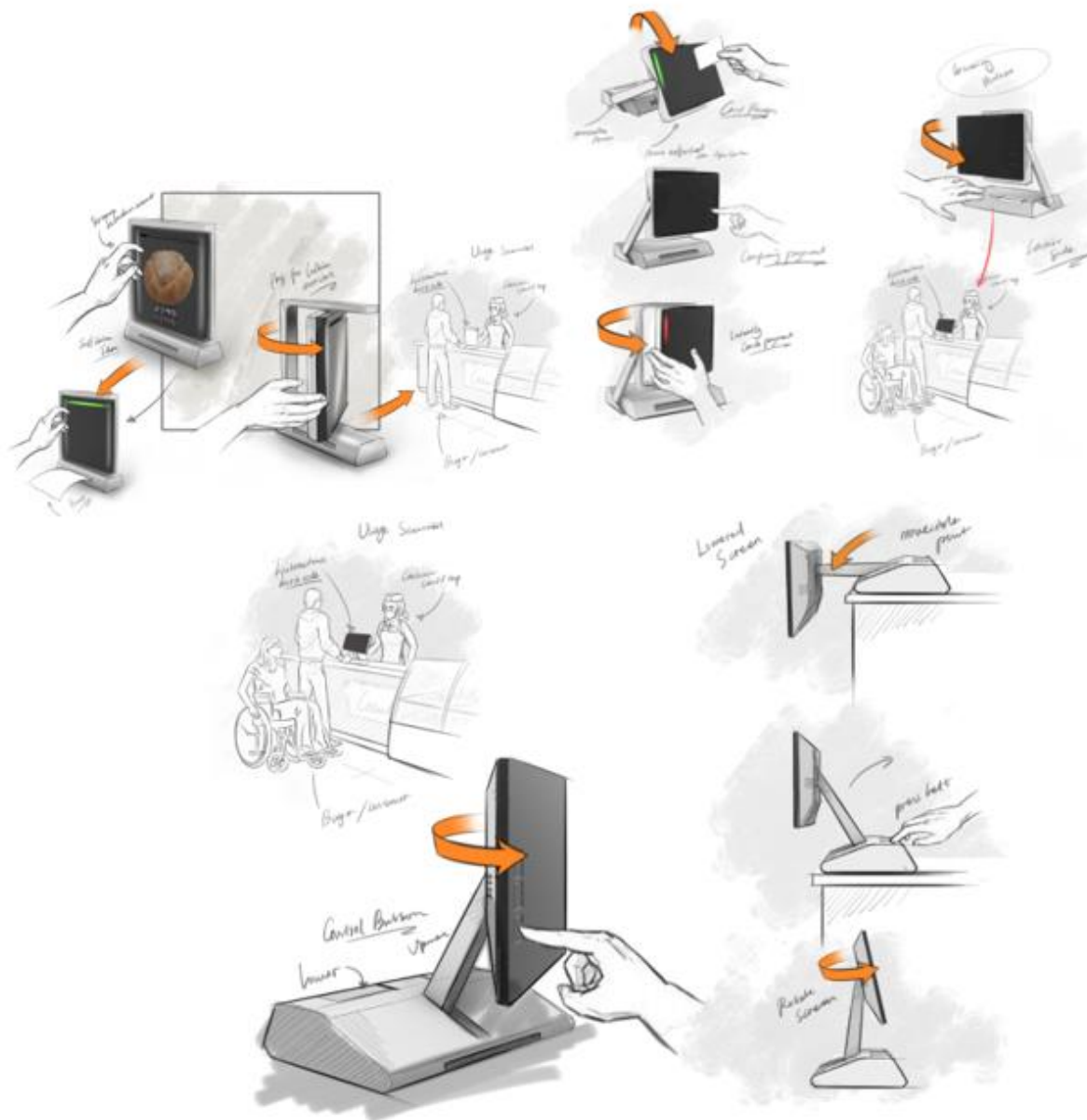
Figure 12. Main Alternative sketches

(Figure 12) The idea goals of this alternative are a unique experience of usage, clear functionality, easy interactions and provided with accessibility features. The touchscreen will help the seller to put detailed information about the purchased item for customers and boost the overall visual product to be more contemporary. Few adjustments such as screen arms, moveable touchscreen and confirmation payment buttons are expected to welcome new users, people on wheelchair and elderly people to try the new cashless payment method.

Final Design

Besides the obvious symbol (Payment Status Button) and lights, there are several improvements to help customers to understand how to operate the terminal. The visible arm hinge, visible card reader

location, screen holder and receipt output are playing a role to emphasize terminal identity and informing users indirectly through visuals. these ideas are not far taken from products in the market, this decision was made to preserve the feeling of familiarity and avoid confusion

Figure 13. Final POS Terminal parts; (Front, side and behid details)

Operate the Product

POS Terminal serves as a Cashless method of payment, this also includes QR code method, Chip reading and Tapping card or reader area. Sensory feedback such as LED lights colour change, Sound and button texture (haptic feedback) will inform the customer about their stage of payment and purchase cancellation. The receipt also will be provided. It is useful for people who may not be able to see the screen clearly or at all, to have the following information provided to them in an alternative way:

- the payment amount due (ideally before the PIN is entered)
- which accounts can be selected and which is ultimately chosen
- the status of the payment e.g. 'authorising', 'complete' or 'declined'
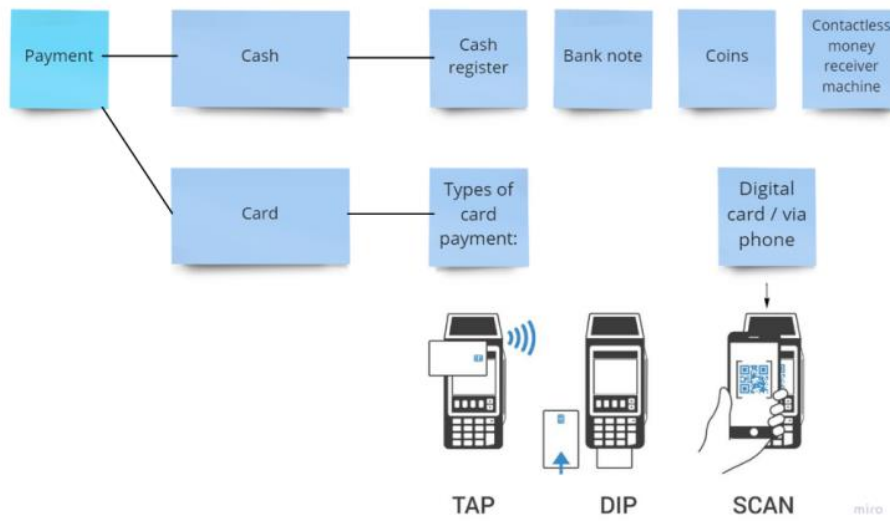- any other information that would be available to a person with sight
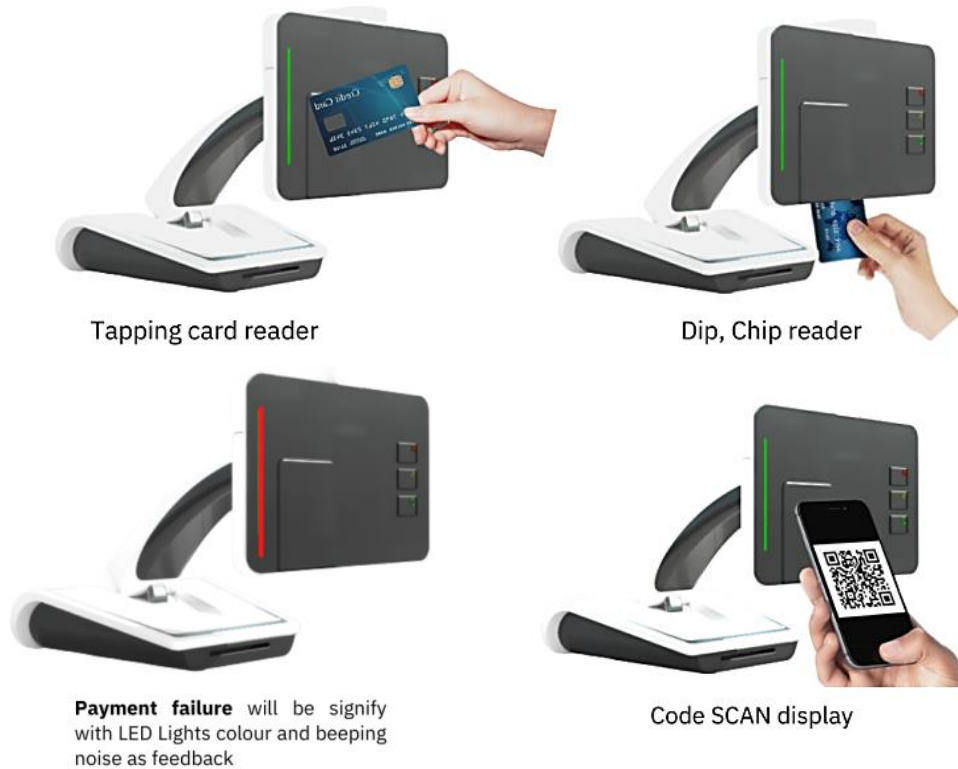
Chart 3. Payment flow-chart

Figure 14. Designed POS terminal payment method

Accessibility Feature

Interactions are necessary during this purchasing and payment stage. Payment cancellation, card malfunction, price cross-check, changing payment methods or as simple as how to operate the product are a few examples of the importance of interaction. POS terminal is equipped with a few fixed hinges which will support the display screen and screen arm. At the base of the screen arm, a swivel connection (joint) will allow the screen to be rotated toward the cashier view.
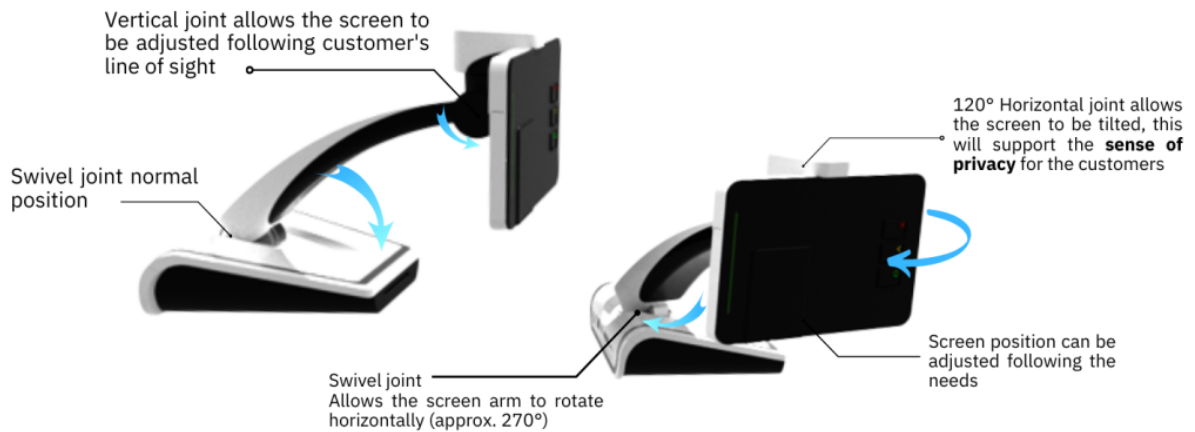
Figure 15. Design articulation, provide accessible feature for privacy and people in wheelchair
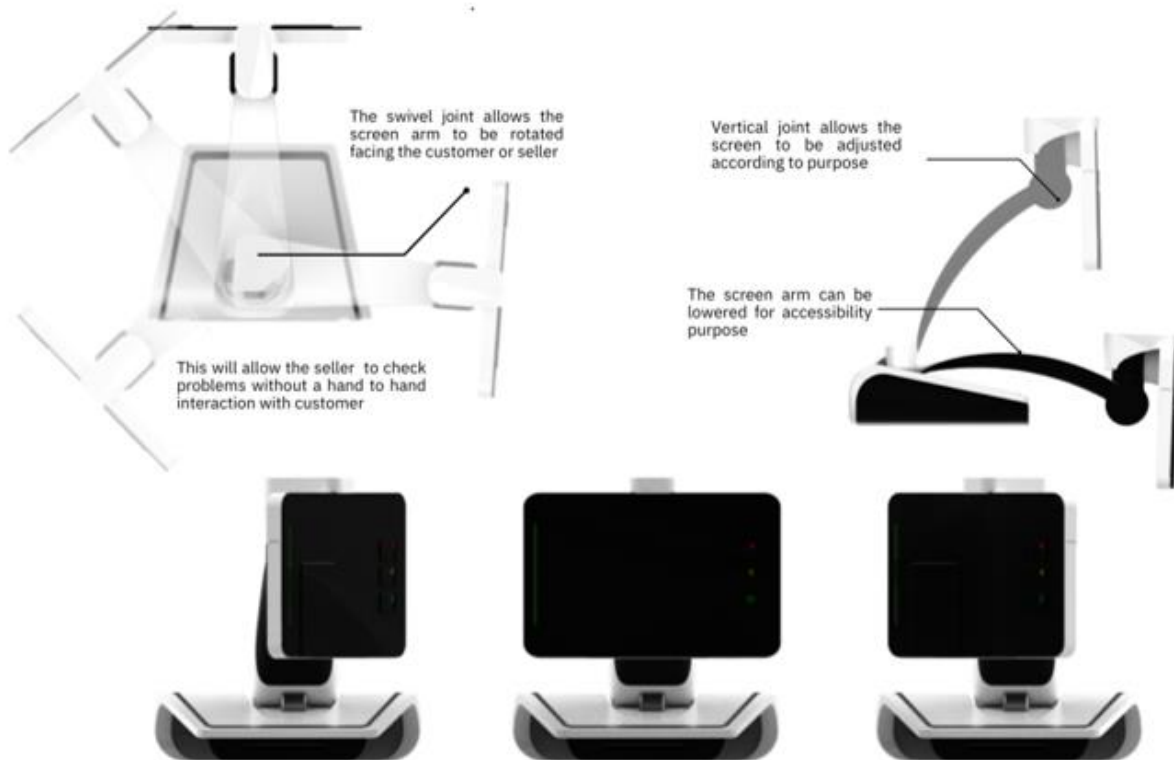

Figure 16. Design range of motions, to accomodate usability, sense of privacy and access to cerain users.
Terminal Articulations are expected to provide a good user experience. the product is designed to be equal for all groups in terms of self-service, it also facilitates easy interaction and assistance or service from seller and customer.

Figure 17. POS terminal screen adjusted for customer in wheelchair

Figure 18. POS terminal on normal display position

Figure 19. POS terminal display on store table, various position

CONCLUSION

Innovation in payment technologies including the use of POS terminals has provided many benefits for shop owners and the majority of customers. However, with these innovations come with responsibility to ensure that all people despite disadvantages could enjoy the modern payment facilities. Under the spirit of Sustainable Development Goals (SDGs), the new POS Terminal's designs emphasize on the idea of usability, accessibility and privacy for all user types while retaining its self-service features. Through the design approach, the product is expected to bridge between the user needs for safe-easy payment method and better economic instrument in this modern time.

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