Prototype of SuperCloudPay:

Privacy-Preserving Wallet in Cloud Era

(Project Proposal)

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Table of Contents

Section I Executive Summary

SuperCloudPay is a secure privacy-preserving collaborative cloud-based e-wallet. Leveraging cloud technology and cryptography, SuperCloudPay brings revolutionary payment experiences to consumers. Its unique features unlock new possibilities for e-payment and money management.

Unique Value Proposition

Privacy

Security

Convenience

Collaboration

Our Goals

Create an e-wallet that

1. Protects customers' privacy
2. Has seamless cloud synchronisation
3. Enables unique functions such as bill splitting, promise, decentralised authorization for collaborative financial use, financial planning

Our Mission

1. Promote the use of e-wallet and create a uniform and full-scene payment ecosystem in Hong Kong which unifies card, cash, bank and online payments.
2. Further provides tailored services for cross-border transactions, mainly focusing on the Greater Bay Area initially.

Our Target Group

Hong Kong and GBA people who care about financial privacy.

Key Features

SuperCloudPay offers unique features to gain a foothold in and outshine the market:

- Seamless synchronisation: featured by the cloud-based platform, offering accessibility to multiple devices, with high processing speed and data security.
- Privacy protection: user privacy is highly protected with end-to-end encryption and minimum customer information disclosure.
- Auto bill splitting: bill splitting is supported to facilitate group payments that require multiple users to pay one bill together.
- Promise auto-payback: promises can be automatically paid when pre-set conditions are fulfilled to prevent defaults.
- Decentralised authorization: enables groups of people to decide the use of money with self-defined rules with the authorization from a certain number of group members.
- Financial planning: SuperCloudPay provides user-friendly budget planning services with an emphasis on privacy protection.

Business Model

- Individual customers: SuperCloudPay provides individual customers with the secure, privacy-protected transaction and personal financial planning services. Customers can either bind existing payment methods to their account or directly deposit money as a balance in SuperCloudPay to enable transactions.
- Group customers: Additional to individual customers, they can form groups like families, societies, or firms. Group customers can enjoy functions like auto bill splitting and group accounts with decentralised authorization. Different fees will be charged for commercial groups like some societies and firms.
- Merchants: Merchants can charge their customers through SuperCloudPay and acquire data analysis reports. Transaction fee and analysis fee will be charged.
- Investment: With all the deposits from customers and merchants, SuperCloudPay may invest in certain portfolios to generate revenues.

超雲付
SuperCloudPay

Section II Problem Statement

2.1 Market Research

An e-wallet, or a digital wallet, is a mobile app for making e-payments using smartphones. In recent years, the e-wallet market has been developing rapidly as a knock-on effect of the surge of the e-commerce market. Meanwhile, its intrinsic convenience is the primary reason which accounts for its increasing demand (see Figure 1).

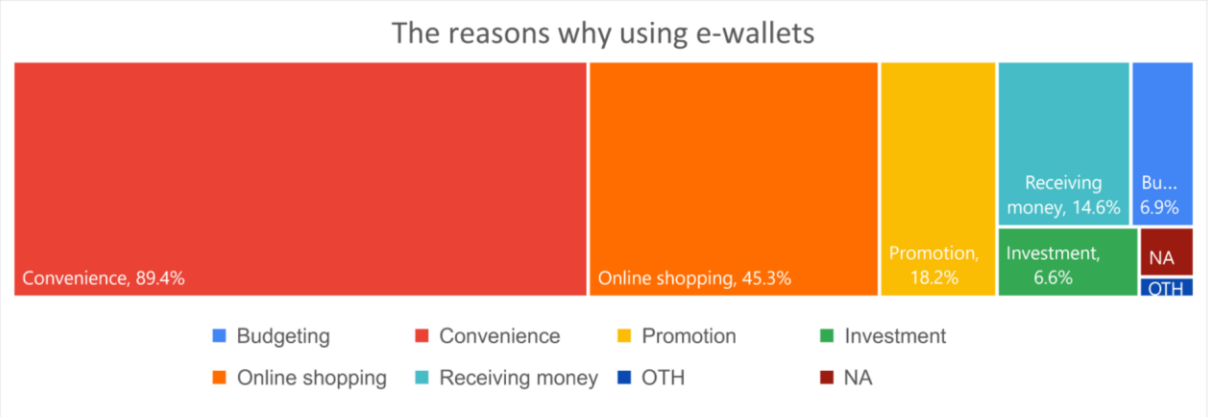


Figure 1: Reasons for using e-wallets (Survey)

Nevertheless, as identified by various reports, there are still some obstacles for this market to grow further. To understand the market better for better wallet design and implementation, SuperCloudPay conducted market research by surveying respondents' payment preferences, privacy concerns, data sharing sentiments, and improvement suggestions for existing e-wallets.

Here are our five key findings.

Key Finding 1

E-wallet is becoming the most frequently used payment method and taking increasingly large market shares in the e-payment ecosystem.

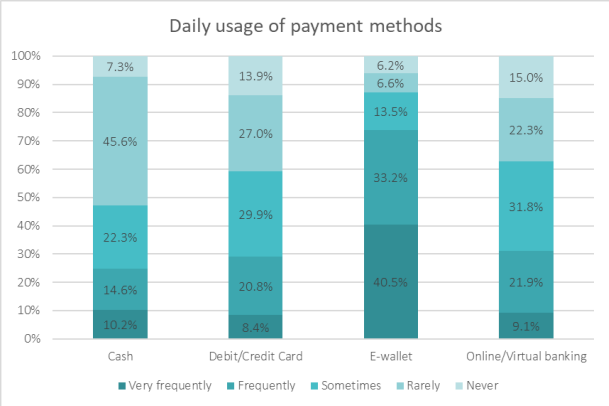


Figure 2: Daily Usage of Payment Methods (Survey)

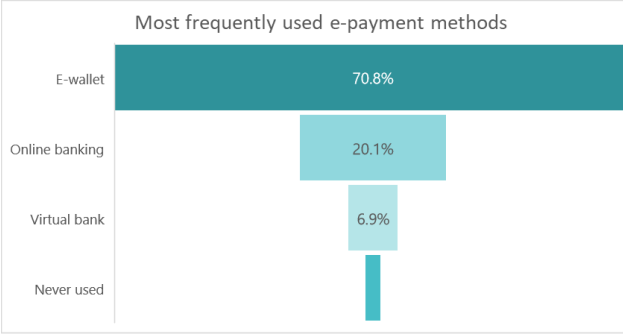


Figure 3: Most Frequently Used e-payment methods (Survey)

Key Finding 2

Current e-wallet market in GBA is roughly divided by WeChat Pay (85.8%) and Alipay (63.1%), with others taking minimum shares.

The average number of frequently used e-wallets is approximately 1.8, indicating under most cases, people would be loyal to 1 or 2 e-wallets.

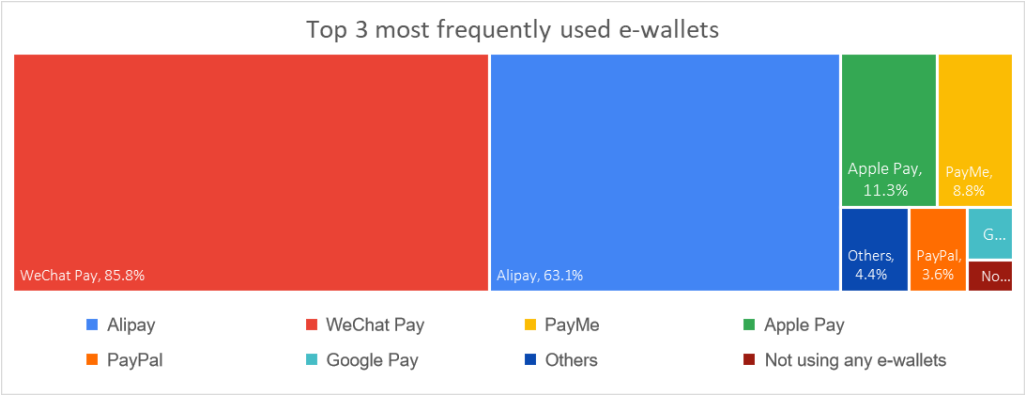


Figure 4: Most Frequently Used e-Wallets (Survey)

Key Finding 3

Further improvements of existing e-wallets are required, claimed by nearly half of respondents.

a. Among the half respondents, **one-third of them are focusing on privacy/security aspects**, indicating privacy and security gradually become the critical concerns of e-wallets' future development.
b. Apart from privacy/security, **fees and limits** related to daily usage shows another way to raise consumer satisfaction level in e-wallets.

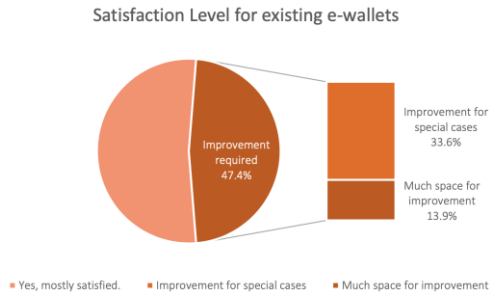


Figure 5: Respondents' Satisfaction Level for Existing E-Wallets (Survey)

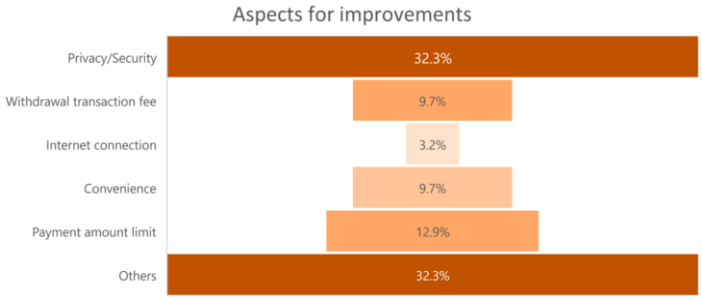


Figure 6: Aspects for Improvements (Survey)

Key Finding 4

Increasing needs for data synchronisation in e-wallets, with a surging number of digital devices held by individuals.

a. Most of the respondents (93.1%) possess 2 or more digital devices for daily usage.
b. Over half of the respondents expect that e-wallets can be used in multi-devices and data can be synchronised across devices.

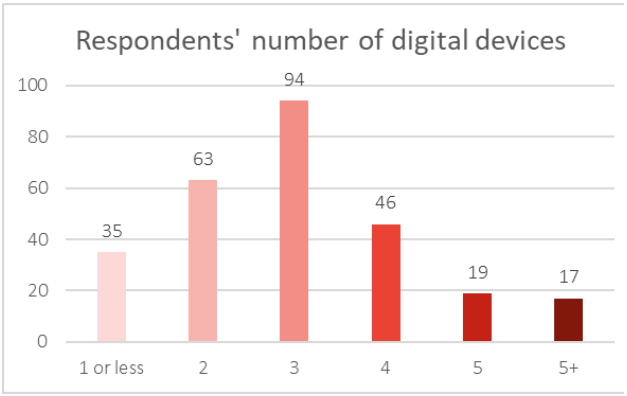


Figure 7: Number of Digital Devices (Survey)

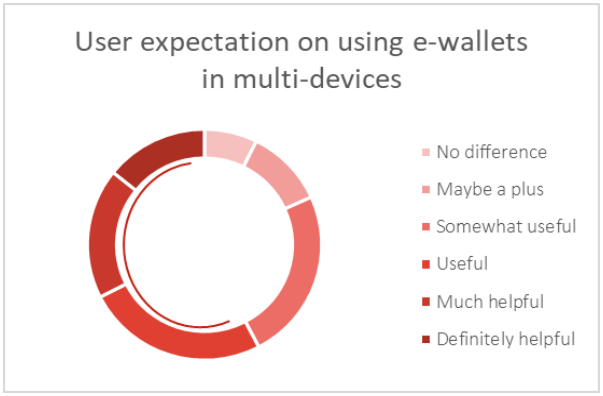


Figure 8: Expectation on Synchronisation (Survey)

Key Finding 5

Around 60% of respondents have to split bills by themselves when hanging out with friends. **Over 80%** of them highly value the auto-bill splitting functions provided by e-wallets.

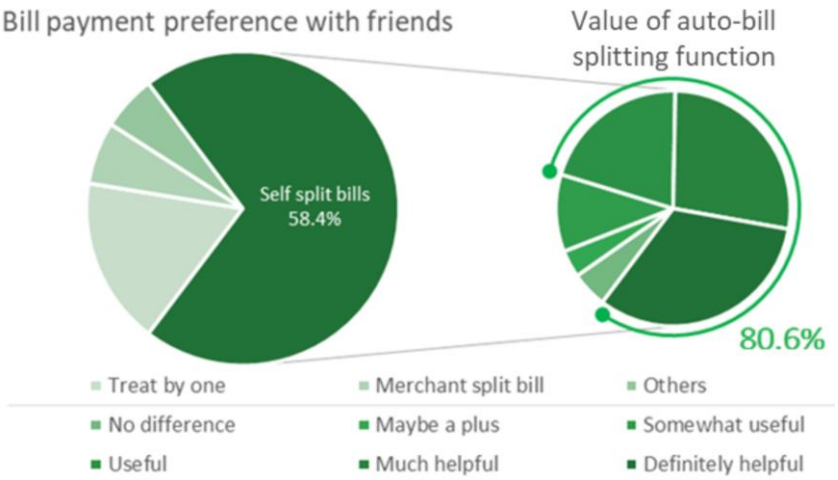


Figure 9: Bill Splitting Preferences (Survey)

Note: The complete survey in addition to the raw data responses is attached in the Appendix 1.

2.2 Problem Statement

Inadequate Privacy Protection

Privacy protection has always been a point of concern when people use e-wallets. In Hong Kong, the issue is regulated under the Personal Data (Privacy) Ordinance (PDPO). However, the rules and boundaries for companies to hold and use users' personal data are still ambiguous, since the wordings in PDPO leave considerable space for them to manage user data at will. According to the Legislative Council of Hong Kong S.A.R. (2018), some researched firms keep personal data up to seven years or even permanently. Under such circumstances, there are sufficient reasons and evidence to be concerned about the condition of e-wallet privacy protection, which hinders the popularisation of e-wallets in Hong Kong.

Security Concerns

Payments are generally secured by various technologies in e-wallets. Nevertheless, there's no certain standard for implementing security measures in the e-wallet industry, and service providers tend to take their own measures with regards to different application scenarios. Non-uniform standards and diverse usage environments makes it difficult to secure the e-wallet all the time. Thus, people are concerned about the security issues like theft of data, loss of account, and other issues during transactions.

Limited Functionalities

Most e-wallets currently focus on payment and transaction functions only. But in real-life applications, customers need more beyond payment and additional features should be taken into consideration when developing e-wallets. For scenarios like gatherings and other team activities, people nowadays tend to pay a lump-sum bill by one person and others pay him/her later. Such inconvenience is always accompanied by problems like excessive payment for a single person, and some people reneging on the bill. A built-in automatic bill splitting function is useful under the circumstances.

Lack of Support for Collaborative Wallet

Existing e-wallets support personal use instead of collaborative use. While large-scale clubs, community groups and companies often manage their funds using traditional banking services, banking services are usually less accessible to smaller groups such as family, friends, classmates, small clubs and SMEs, and bank accounts can only be managed by certain authorised representatives. For some groups in which decisions are often collaboratively made by the majority, a collaborative wallet may be a better option for them. The existing e-wallets lack functions like distributed authorization of certain usage of money with predetermined voting rules with the group of people.

Section III Our Solution

3.1 Solution Overview

SuperCloudPay is a stored value facility, i.e. users have to deposit money into their SuperCloudPay wallets for future use and the money deposited is held by SuperCloudPay. Every user account is binded with a mobile phone number, which is verified upon registration. A user account can have multiple wallets, including personal wallets, shared wallets and organisation wallets. There is no transaction fee.

Basic Functions

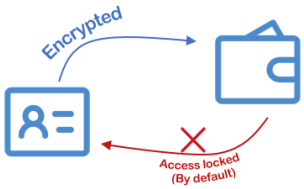
Online Payments
- In-App (e-wallet account binded)
- Web (Scan QR code)
- Bill payment (inside our app)

Instore payments
- Consumer-Presented Mode
- Merchant-Presented Mode
  - **Dynamic** Code
  - **Static** Code

P2P Fund Transfer
- Transfer by
  - Phone Number (contact)
  - Wallet Address
  - **One-Time Identifier**

Top-Up
- Convenience stores
- via bank account
- via online banking transfer
- via FPS

Money withdrawal
- User can withdraw money from their wallets to binded bank account
- **Free transaction fee** for small amount withdrawal
- Withdrawal fee charge by percentage for large amount



Identifier
- Wallet address is encrypted on merchant's terminal
- Only when facing **compliance needs** the wallet address would be disclosed to regulatory authorities

Unique Features

Cloud-based

- **Seamless Synchronisation**
  - accessible on multiple devices
- High Processing Speed
- Improved Data Security

Privacy Protection

- **End-to-end encryption** for
  - Transaction details & Wallet balances
- **Encrypted Wallet Address** in merchant terminal
  - Only regulatory authorities can reveal the consumer identity under legal process.

Bill Splitting

- Facilitate social activities by auto-bill splitting with others
  - Easy to use by **photoing items** and **input remarks**;
  - Auto-pay merchants once bill collection succeeds;
  - Refund if bill collection fails.

Promise

- Automatic payment by conditions
  - You would **never overdue** your payment!

Decentralised Authorisation

- Importing **Decentralised Consensus logic** to e-wallets
- Two types offered:
  - **Shared Wallet**: family, class, small groups, ...
  - **Organisation Wallet**: community, associations, ...

Financial Planning

- **Budget** planning and management
  - User-friendly & **Privacy preserving** emphasized

3.2 Unique Features

Synchronisation

SuperCloudPay is a cloud-based digital wallet with seamless synchronisation. It can be accessed on multiple devices (e.g. smartphones, tablets, laptops, desktops, Apple Watch) simultaneously. With data stored in the cloud, there is no fear of losing data due to the loss of devices or destruction of physical servers.

Data Encryption

SuperCloudPay values user financial privacy. All transaction details (including payer, payee and transaction amount) and wallet balances are end-to-end encrypted. For anti-money laundering, unverified users do not enjoy unlimited account balances and annual transaction amounts. Despite the encryption, the limits are enforced by zero-knowledge range proofs. No user data is provided to any third party apart from law enforcement agents and regulatory authorities.

Bill Splitting

Upon payment, a user can initiate a bill splitting request with its contacts or other users by specifying their account numbers or one-time identifiers. The payment is made and confirmed if and only if every participant of the splitting has paid. A transaction is regarded as failed if it is not confirmed within 15 minutes. The amount paid is refunded afterwards.

Promise

A wallet (or a user corresponding to a personal wallet) can make a 'promise' to another wallet by specifying the payment amount and payment conditions in the 'promise'. Examples see Appendix 2.1.

Decentralised Authorisation

Besides holding one personal wallet, a user can hold multiple shared wallets and organisation wallets. The user who creates the wallet is called the creator. Both wallets (hereinafter referred to as 'MNA wallets') implement the M out of N authorisation logic.

M out of N authorisation

In an MNA wallet, whilst deposit does not require authorisation, usage and withdrawal of money require the consent from a predefined number of users (hereinafter referred to as 'M out of N consensus'). Once the consent condition is satisfied, the money can then be spent or withdrawn. The consent condition can be modified by the wallet creator to be approved by a M out of N consensus. See Appendix 2.2 for more details and examples.

Shared Wallet

Shared wallets are typically for family, friends and classmates. Unverified wallets have a user limit of 50, a balance limit of $5,000 and an annual transaction limit of $25,000. Verified wallets enjoy unlimited wallet balance and annual transaction limit. To verify a wallet, specify a verified user as the representative. The KYC information of the representative is then binded with the wallet. The representative is obliged to bear legal responsibility for any money laundering or illicit activities associated with the wallet.

Organisation Wallet

Organisation wallets are typically for clubs, SMEs and community groups. While there is no user limit, balance limit and annual transaction limit, they require identity verification. There are two types of organisation wallets - private wallets and public wallets. In private wallets, transactions and wallet balances are encrypted as in personal wallets and shared wallets. In public wallets, transaction records and wallet balances are revealed to the public. The consensus process is private. See Appendix 2.2 for more details and examples.

For security measures of our wallet, please refer to Appendix 3.

3.3 Business Model

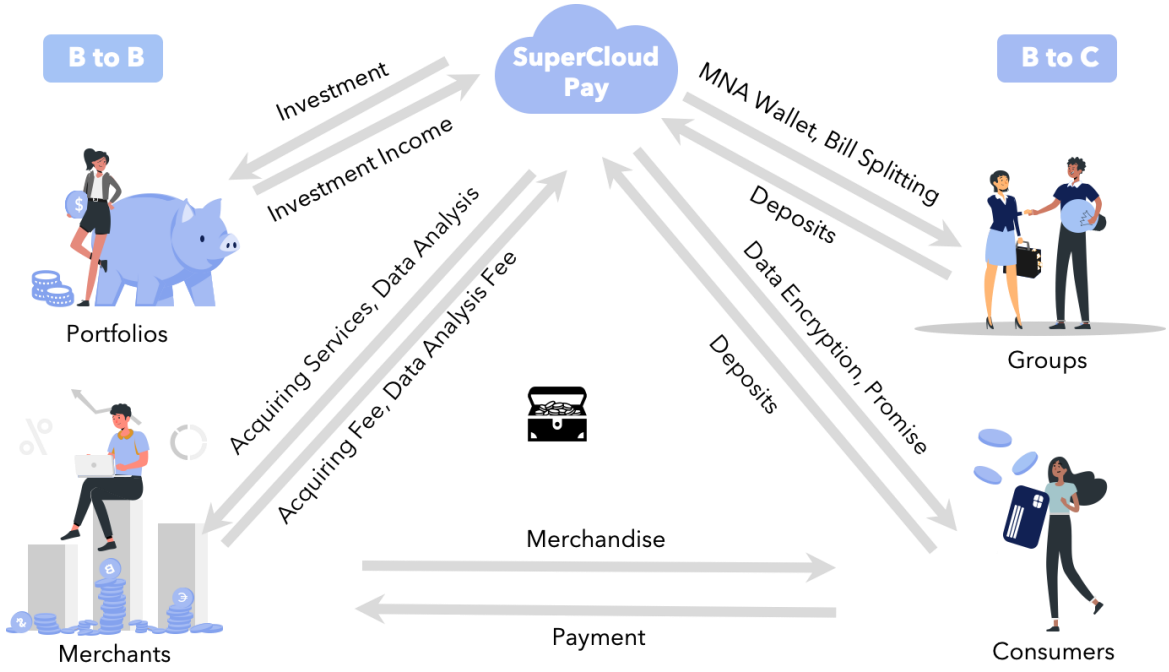
Cost Structure

Research & Development	Operating Expenses	Other Expenses
● Research ● App development ● Consulting ● Launching ● Salaries of R&D Staff	● Operation ● Customer Support ● Infrastructure ● Maintenance ● Monitoring ● Compliance ● Sales and Marketing ● Administrative	● Financing Cost ● Interest Expense ● Amortisation Cost ● Income Tax Expense ● Sundry Expenses ● Miscellaneous Expenses

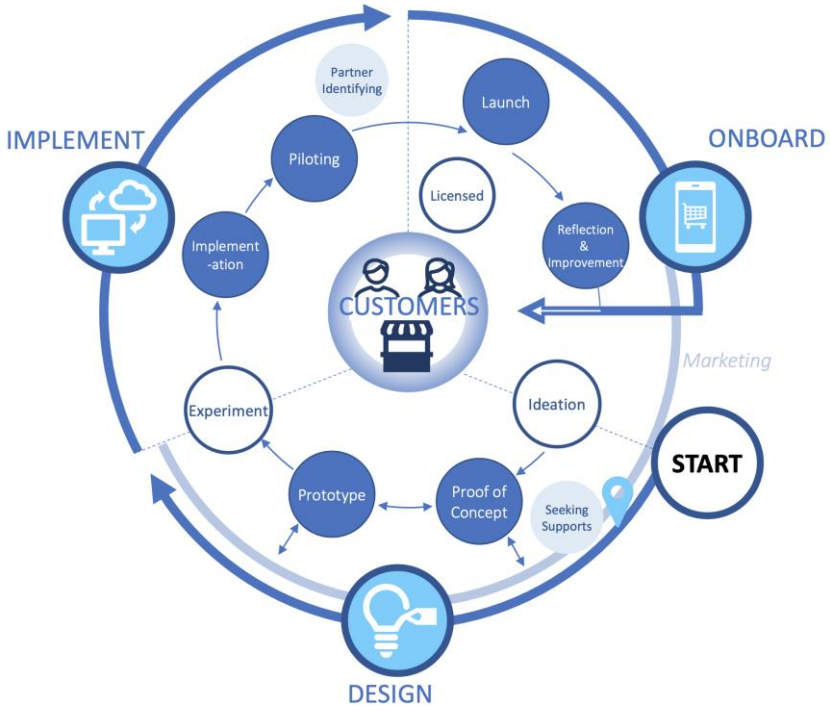
Revenue / Capital Streams

Pre-Launch	Post-Launch	
Fundings ● Crowdfunding ● Angel investment ● Seed funding from entrepreneurship competitions and/or incubation programs Other income ● Donation ● Personal investment from founders	Investment Income, Net ● Investment in Treasury Bill ● Investment in Portfolios ● Investment in Real Estates Shareholder's equity ● Stock issuance ● Stock transaction	Merchant Acquiring ● Transaction fee ● Data analysis fee Customer Acquiring ● Withdrawal fee Other Revenues ● Funding schemes ● Donation ● Other income

Business Value Cycle



Business Process Cycle



Section IV Marketing Plan

4.1 SWOT Analysis

Strength	Weakness
1. **Highlighting privacy preservation for customers**: end-to-end encryption, zero-knowledge proof. 2. **Synchronisation**: cloud-based, seamless synchronisation to enable access on multiple devices. 3. **Unique and useful functionalities**: bill splitting, promise, decentralised authentication, financial planning for customers. 4. **Data analysis**: allow statistical analysis for merchants while still maintaining the privacy of user data. 5. **Compatibility**: compatible with various payment methods (affiliated with virtual banks/bank accounts/FPS) in both online and in-store payment scenarios	1. **Competitiveness**: given the existing solidified market of payment, card payment is still the majority in Hong Kong. Only considering e-wallets, existing players like Apple Pay and Google Pay are already strong, let alone Alipay and WeChat Pay. It might be difficult for a start-up to challenge the existing payment order even with new features. 2. **Marketing & customer cognition**: privacy-preserving is something hard to advertise, customers may not have direct cognition on how the products protect their privacy. 3. **Depth of data analysis**: considering the need to protect privacy, the results of data analysis may not be in very detailed but sufficient.
Opportunities	**Threats**
1. **Growth of e-commerce**: Due to COVID-19 and other factors, e-commerce gains remarkable growth in Hong Kong; out e-wallet may catch this trend to facilitate e-payment and take the market share corresponding to the marginal demand for e-payment approaches. 2. **Cross-border payment**: a remarkable share of trades in Hong Kong are contributed by cross-border transactions, tailored services could be provided to attract cross-border merchants and customers. Emphasis may be put on the Greater Bay Area, as well as the overall international condition. 3. **Young generation**: the younger generation may rely more on their phone and be less willing to carry a bunch of cards; they also care a lot about privacy and are more open to new technology and products. They are preferable objects to start.	1. **Existing competitors**: Apple Pay, Google Pay (e-wallets facilitating card payments) / Alipay, WeChat Pay (e-wallets with stored value and also connect to bank cards) already forms a solidified market and they are already providing similar services 2. **Resources of large FinTechs**: existing large companies may adopt ideas like privacy protection quickly with their advantages in technology and resources. 3. **Consumer habits**: Octopus and credit cards are heavily rooted in Hong Kong people's daily lives, making it hard to challenge their status.

4.2 Market Segmentation and Targeting

Demographic	Psychographic
1. Preliminarily, the youth in Hong Kong. And expand gradually to all Hong Kong people. 2. Further, all potential customers with cross-border payment demands in the GBA. 3. Finally, all cross-border merchants and customers over the globe.	● Individuals who care about financial privacy ● Groups with financial collaborative needs

4.3 Competitor Analysis

Competitor Identification

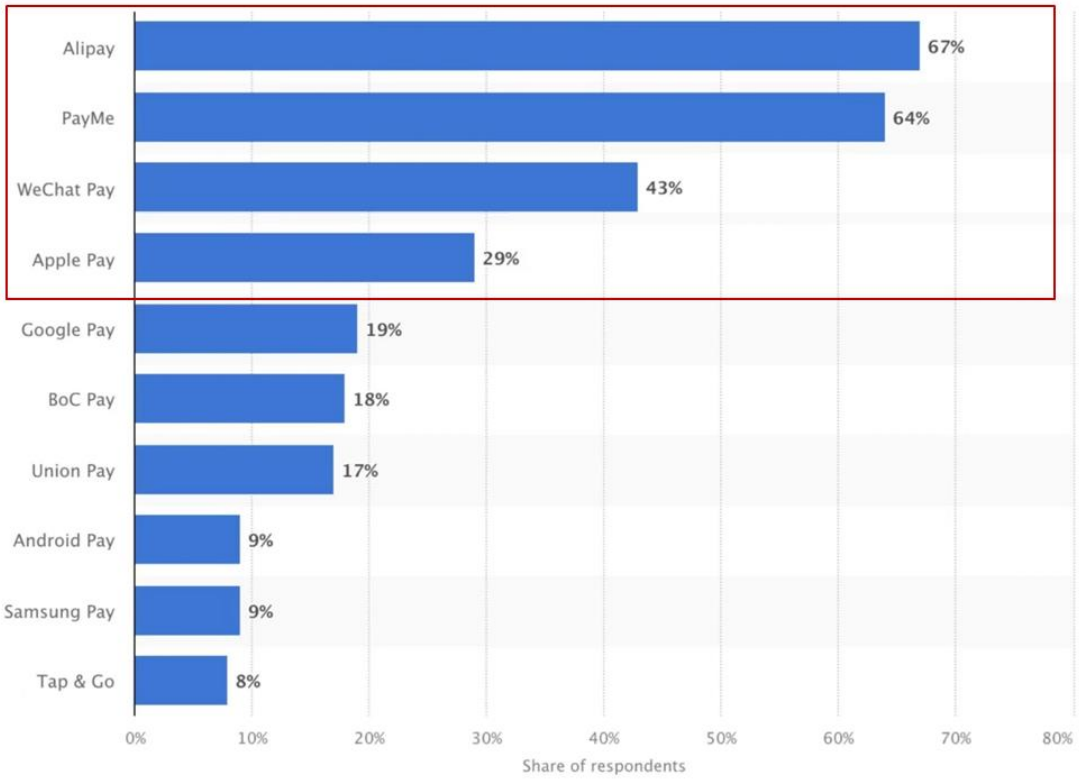


Figure 10: Most popular mobile wallets in the past six months in Hong Kong as of May 2020
Source: https://www.statista.com/statistics/996436/hong-kong-most-used-mobile-wallets/

Competitor Comparisons

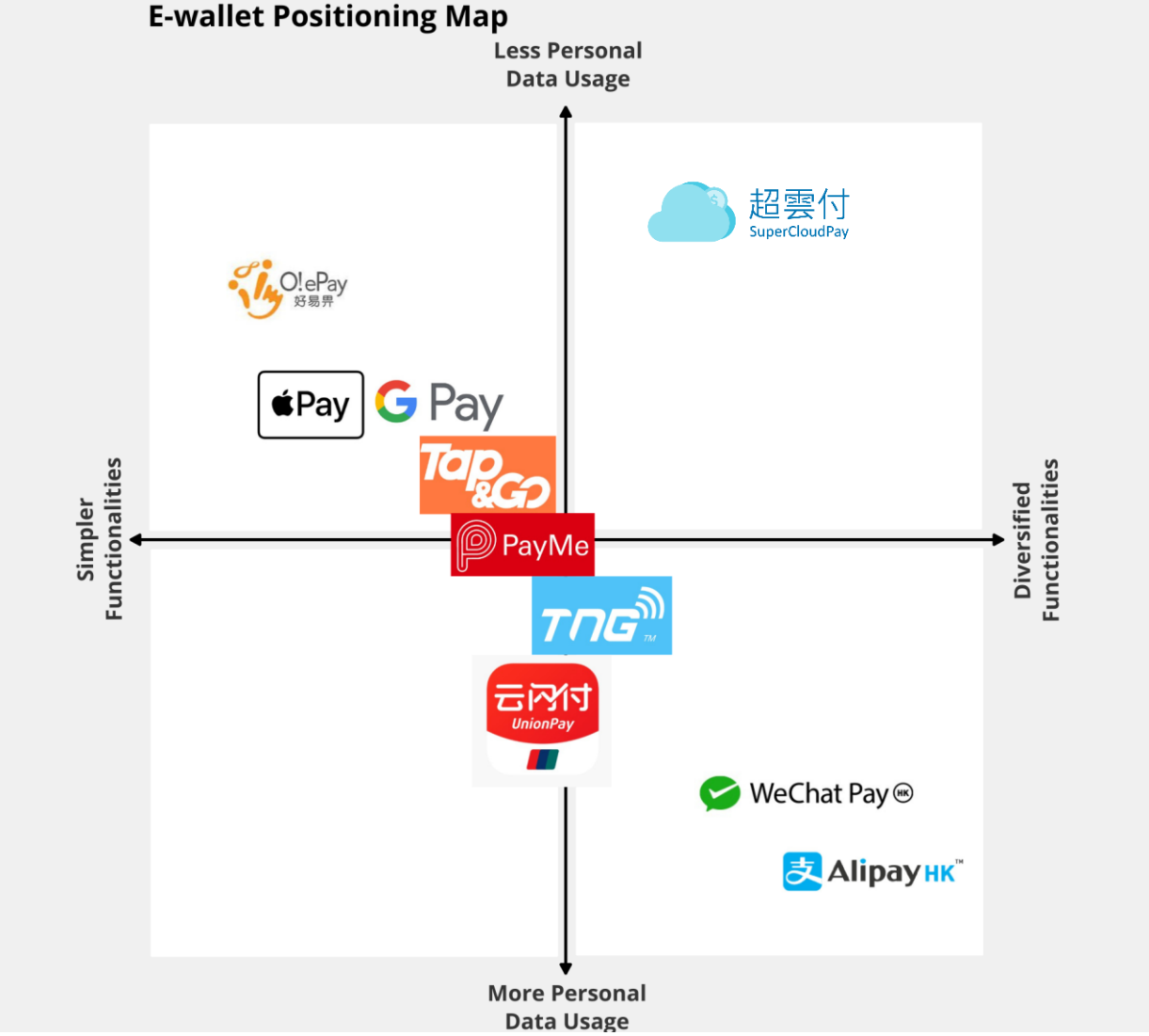
As our starting point is in Hong Kong, we identify the top 5 e-wallets shown in Figure 10 as our major competitors.

	SuperCloudPay 超雲付	Alipay	PayMe	WeChat Pay	OlePay	Apple Pay
Online Payment	✓	✓	✓	✓	✓	✓
Instore Payment	✓	✓	✓	✓	✓	✓
Bill Payment	✓	✓	✓	✓	✓	-
P2P Transfer	✓	✓	✓	✓	✓	-
Store Value	✓	✓	✓	✓	✓	-
Credit Card Binding	✓	✓	✓	✓	✓	✓
Global Transfer	✓*	✓	-	✓	-	-
Bill Splitting	✓	-	✓	-	-	-
Cloud- based	✓	-	-	-	-	-
End-to-End Encryption	✓	-	-	-	-	-
Collaborative Wallet	✓	-	-	-	-	-
Financial Planning	✓	-	-	-	-	-

**in mature stage*

4.4 Market Position

Positioning Map



Positioning Statement

"For consumers and merchants who expect safe and convenient e-payment services and value privacy, SuperCloudPay is an e-wallet that provides secure payment services with privacy protection, cloud synchronisation, and useful features."

4.5 Marketing Plan

Overall Marketing Strategy

We generally treat individual customers and merchants separately and give up parts of our profit to reward the participants in the initial stage and improve customer loyalty. Advertising and marketing strategies should be precisely object-oriented.

Promotional Stage (2024 - 2025)

Initial stage marketing plans are designed for attracting new customers and increasing customer loyalty.

1. Individual customers: One-time reward; coupons; mission-driven rewards like inviting new users and successful transactions; zero transaction fee for depositing money back to bank accounts.
2. Merchants: Low or zero fee rate for new merchants with the duration of the initial stage; free customer data analysis and advisory services; free advertisements in the app.

Mature Stage (2026 onwards)

Mature stage marketing plans are the regular operational marketing plan, we focus more on the balance of profitability and long-term subscribers.

Marketing strategies

1. Content marketing (individual customer, customer education): emphasise privacy protection features and how the e-wallet will benefit their life.
2. Inbound marketing (merchants and individuals; we tailored content for merchants and individuals to showcase the use cases of our product and its advantages.
3. Social networks and viral marketing: advertising on sal media like Instagram, Facebook, YouTube; inviting Internet celebrities to promote the product.
4. Direct selling (merchants): Approach merchants to introduce our product and persuade them to join the system.
5. Cobranding (with partners): advertise together with possible partners like virtual banks.

4.6 Pilot Scheme

Duration （2023 Q3 - 2023 Q4)

Second half of the second year of development, six months.

Participants

Customers: HKU students and staff.

Merchants: Shops and restaurants in and around HKU and other potential partners.

Details

After finishing the development of the whole product with merchants' app, customers' app, and backend, the pilot scheme will simulate the real-life implementation scenarios with all functionalities on and off the HKU campus. During the six-month period, all services will be provided without charges. The major purpose is to test the system of its functionalities, efficiency, reliability and security.

Merchant partners will be invited to install our product to support their daily transactions. Individual users will also be recruited to experience all the features. All groups and societies will be welcomed to use our application for managing their collaborative accounts.

An evaluation scheme will be on the heels of the pilot scheme to conclude the performance of the product. Analyses will be made on potential problems and possible solutions to prepare it for large-scale marketization.

Benefit for Participants

Merchants

During the scale of the pilot scheme, merchant partners will be charged zero transaction fee on all transactions and acquiring services. Additionally, free data analysis service will be provided.

Individual customers

All functionalities including regular transactions and payments, bill splitting promise and MNA wallets will be available to participants with zero charge. One-time rewards will be provided if the participant accomplishes certain goals like inviting new users, and making certain amounts of transactions. Further rewards like a sweepstake will be offered to participants who are involved in the evaluation of the scheme with useful feedback.

Evaluation scheme

Feedback forms will be delivered to all participants including individuals and merchants. The participants can choose to provide us with usage data for evaluation purposes only. Analyses of the system will be conducted based on all the operational data during the pilot scheme to figure out the problems and further consummate the product.

Follow-ups

Remaining balance and personal data

By the end of the pilot scheme, we will remind our customers to use up the balance as much as possible. If customers cannot use up the balance at the end, they will be asked to provide a bank account only for a refund of the remaining balance. Necessary personal data on the cloud server like affiliated card information and other authentication information will be deleted immediately at the end of the scheme.

Rewards on evaluation scheme

Participants will be invited to fill in evaluation forms and give advice to our product. All participants of the evaluation will be involved in a sweepstake for some gifts.

Pilot rewards in official operation

All individual participants will be provided with a unique code as the identifier of pilot scheme participants. With the code, they can enjoy certain benefits like coupons or credit points when the product is marketized for official operation. Merchant partners in the pilot scheme will be offered free premium membership for a certain period after the product's official launch.

Section V Financial Plan

5.1 Cost Estimation

Pre-Launch Stage

The following pre-launch stage financial plan is prepared with the $100,000 Dean's Fund as budget. The table specifies the level of employee, duration of employment, and monthly rate for every task as far as possible, as well as fees for necessary service adoption.

Item	Position / Item Name	No. of Months/Units	Monthly Rate / Unit Price (HKD)	Subtotal
a) Cloud services adoption (2022 Q3-Year2 Q4)				
Cloud Service	Cloud service for pilot scheme	7	273	1,911
	Cloud assistant for tuning and testing	2	6,413	12,826
			Subtotal	14,464
b) Technical implementation support of prototype				
UI/UX Design	UI developer	1	6,413	6,413
	Art assistant	1	6,066	6,066
			Subtotal	12,479
System architecture	System architect	2	6,413	12,826
			Subtotal	12,826
Function implementation	Software developer	3	6,413	12,826
			Subtotal	12,826
Prototype UAT & documentation	Test Engineer	1	6,413	6,413
			Subtotal	6,413
c) Consultation and Financial Planning				
Compliance consultation	Regulatory consultant	0.5	9,360	4,680
			Subtotal	4,680
Governance and financial planning	Business analyst	1	9,360	9,360
			Subtotal	9,360
d) Pilot schemes				
Report & promotion brochure production	Business analyst	0.5	9,360	4,680
	Art assistant	0.5	3,033	3,033
			Subtotal	7,713
System maintenance	Technical assistant	1	6,413	6,413
			Subtotal	6,413
Promotion expense	Brochure distribution	200	2	400
	App publication	1	200	100
	Coupon distribution	500	10	5,000
			Subtotal	5,400
Customer reflection analysis	Business analyst	0.5	9,360	4,680
			Subtotal	4,680
Total				97,254

Position	Hourly Rate (HKD)	Daily Rate (HKD)	Remarks
Student Art assistant	70	280	Assume 50% part-time assisting
Technical assistant	74	296	
Business analyst	108	432	

NOTE:

(a) 50% Part-time assisting refers to 20 hours/week, on average 4 hours/day.
(b) Formula for calculating hourly rate: Monthly Salary x 12 months/ 52 weeks/ 40 hours.
(c) Rent of cloud service is only for the pilot scheme period. Rent of cloud service after official launch may largely differ due to customer scale.
(d) To facilitate HKU students' project experience, most of the technical implementation work would recruit qualified undergraduate students from the Engineering and other faculties.

Post-Launch Stage

	Promotional Stage		Mature Stage		
	2024	2025	2026	2027	2028
Operation cost	63,472.00	69,819.20	76,801.12	84,481.23	92,929.36
Maintenance cost	14,888.00	16,376.80	28,014.48	30,815.93	33,897.52
Monitoring cost	21,136.00	23,249.60	35,574.56	39,132.02	43,045.22
Marketing expense	50,000.00	55,000.00	30,250.00	33,275.00	36,602.50
Administrative cost	16,560.00	18,216.00	25,037.60	27,541.36	30,295.50
R&D cost	56,000.00	61,600.00	37,760.00	41,536.00	45,689.60
Other expenses	10,000.00	11,000.00	15,100.00	16,610.00	18,271.00
Total cost	232,056.00	255,261.60	248,537.76	273,391.54	300,730.69

5.2 Revenue Estimation

Post-Launch Stage

	Promotional Stage		Mature Stage		
	2024	2025	2026	2027	2028
Investment Income, Net	20,000.00	30,000.00	20,000.00	30,000.00	45,000.00
Merchant Acquiring	40,000.00	60,000.00	80,000.00	120,000.00	180,000.00
Funding and Donation	50,000.00	75,000.00	120,000.00	180,000.00	270,000.00
Other income	10,000.00	15,000.00	20,000.00	30,000.00	45,000.00
Total revenue	120,000.00	180,000.00	240,000.00	360,000.00	540,000.00

5.3 Profit Estimation

Post-Launch Stage

	Promotional Stage		Mature Stage		
	2024	2025	2026	2027	2028
Total Revenues	120,000.00	180,000.00	240,000.00	360,000.00	540,000.00
Total Expenses	232,056.00	255,261.60	248,537.76	273,391.54	300,730.69
Net Profit	*-112,056.00*	*-75,261.60*	*-8,537.76*	86,608.46	239,269.31

Section VI Sustainability

6.1 Unique Value Proposition

Privacy

SuperCloudPay values user financial privacy. While existing e-wallets have insufficient privacy measures, SuperCloudPay is the first cloud-based wallet for fiat money with end-to-end encryption.

Security

SuperCloudPay leverages cloud technologies to ensure the security of e-payment and e-wallet services provided to consumers.

Convenience

SuperCloudPay aims to bring convenience to consumers. Novel features are devised based on consumers' needs, such as bill splitting, promise and financial budget planning.

Collaboration

SuperCloudPay promotes collaboration on money usage by introducing a novel concept of m out of n decentralised authorisation. Shared wallets, private organisation wallets and public organisation wallets are designed for various collaborative needs.

6.2 Social Implications

Strong Privacy Protection for Users

All data, including wallet balances and transaction details, are end-to-end encrypted. Unlike existing e-wallets for fiat money, SuperCloudPay does not share user data with merchants or any other third parties apart from law enforcement agents and regulatory authorities. Upon payment, the wallet address is encrypted before storing on the merchant terminals (or masked using identifiers). The payment information would not trace back a particular user unless required by law-enforcing agents or regulatory authorities.

Enhanced Payment Experience

With SuperCloudPay's unique functionalities, consumer experience in both online and instore payments, as well as P2P fund transfer, are enhanced. Payments thereafter become more convenient and secure.

Decentralised Collaborative Wallets for Groups and Organisations

Group users in the same social circles and/or organisations will greatly benefit from SuperCloudPay's unique Shared Wallets and Organisation Wallets, whose functions are not included in any of the current mature e-wallets such as Alipay, WeChat pay and Apple Pay. Group users can open a shared wallet account for the group and collectively manage it. Decentralised consensus logic is used in Shared Wallets and Organisation Wallets, enabling each group member to make decisions about transactions with an adequate weight.

Public Transparency for Charity and Community Groups

The Public Transparency function makes each transaction detail available to people outside the group, which is an effective way for charities and other public organisations to honestly disclose their financial position to the public.

Social Inclusion for Unbanked Population in Developing Countries

In developing countries and rural areas, access to banking is limited. SuperCloudPay enables people with limited or no access to traditional banking services to make payments via their smartphones, given that smartphones are comparatively more accessible among them.

6.3 Sustainability

Our unique value proposition and implications on society help us stand out and sustain in the market. In particular, we provide privacy-concerning users - which makes up 69.25% of the market according to our survey - with a better choice of digital wallets. Furthermore, the unique collaboration feature enables us to have effective user attraction and retention. After Shared Wallets and Organisation Wallets are adopted by the initial users, the customer-base can be expanded exponentially by the network effect. By collaborating with other banks and e-wallets, SuperCloudPay will be able to improve customer loyalty.

6.4 Foreseeable Problems & Solutions

Align with Regulatory Requirements

Regulated by the Hong Kong Legislative Council and Monetary Authority, the marketization of e-wallets is facing increasingly more regulations and compliance requirements, which mainly consist of two parts.

Part 1: Capital Requirements

E-wallet providers should ensure at least 25 million HKD before entering the market. According to the Payment Systems and Stored Value Facilities Ordinance (Cap. 584) by HKMA, "a store value facility (SVF) licensee must have a minimum paid-up share capital of HK$25 million and evidence of sufficient working capital for protecting the float."

Part 2: Licensing Requirements

Since the commencement of the SVF licensing regime (2016), only a total of 16 SVF licensee[1] have come on board in Hong Kong, showing relatively complex procedures for SuperCloudPay being licensed.

> [1] *SVF licensees in Hong Kong include all onboarding e-wallet and prepaid card payment services providers with value storage features.*

Competition - Business Expansion Problems

As shown in the market research (Section 2.1), the e-wallet market in GBA is centred around WeChat Pay (85.8%) and Alipay (63.1%). Besides, the market indicates that most of the successful e-wallets are supported by Big Tech firms (Alibaba, Tencent, etc.) or financial institutes (PayMe etc.). There is no doubt that conquering market shares under the giants should be difficult.

More importantly, new features and functionalities offered by SuperCloudPay are supported by existing technologies, implying that the giant companies may easily develop similar products and outshine ours, given a more powerful team, business network and customer base.

Possible solutions

Considering the fierce e-wallet market and strong competitors, SuperCloudPay is exploring ways to break the deadlock.

Option 1: Target virtual banks as potential affiliation partners

Supporting by the market research, the development of virtual banks in Hong Kong is also entering an awkward stage:

1) Highly overlapped features with existing e-wallets,
2) Similar customer base with traditional banks,
3) Precarious market share: Currently, it is mainly supported by promotion schemes and cannot be a long-term strategy.

However, if a virtual bank forms a partnership with SuperCloudPay, various advantages can be facilitated by our non-homogeneous competition.

1) **Shared customer base**: as a pilot product, SuperCloudPay may seek help from virtual banks for the license in traditional financial executions, i.e., deposit, withdrawal, etc. In this way, every user in SuperCloudPay would hypothetically open an account in the virtual bank. In this case, topping up with the affiliated virtual bank can enjoy coupons, further enhancing the marketing effect.
2) **Different focuses**: virtual bank aims at increasing financial inclusion for the underbanked population, while SuperCloudPay is targeting current e-wallet users chasing better functionalities and privacy protections.

Option 2: Utilise crowdfunding for initial capital accumulation

In general, crowdfunding can be divided into 2 streams, reward-based and equity. The advantages and limitations for both of them could be summarised as follows.

Pros	Cons
1) **Access to "Cheap Money"**: compared to debt/stock issuance, crowdfunding attracts people by low barriers to entry. 2) **Expanding capital pool**: Statista shows that transaction value is expected to show an annual growth rate (CAGR 2022-2025) of 1.41% resulting in a projected total amount of US$1.9m by 2025.	1) **Inadequate amount for capital accumulation**: Based on Statista, the average funding per campaign in the Crowdfunding segment amounts around US$7,000 in 2021, which is far below the capital requirement of applying for an SVF licence. 2) **Uncertainty of crowdfunding result**: a binary nature of crowdfunding campaigns is that rewards are only distributed to whomever hits the target. It's possible that SuperCloudPay winds up spending a lot of time and energy running a campaign that ultimately fails.

Section VII Milestones and The Way Forward

7.1 Milestones

7.2 Implementation Timeline

Year	Quarter	General	App Development & Design	Finance & Compliance
2022	Q1	- Idea Formulation - Market research and preliminary research - Proposal and application for dean's innovation and entrepreneurship fund		
	Q2	- Recruitment	- Research on ● Infrastructure ● Tool ● Service ● platform - Research on security and encryption tools	- Research on financial requirements - Research on compliance issues
	Q3		- App development - Research on security and encryption tools	- Research on investment options - Detailed cost and revenue models - Regulatory research

			- UX/UI	
	Q4		- App development - Research on security and encryption tools - Design UX/UI	- Research on funding options - Regulatory requirements
2023	Q1	- Pilot Scheme preparation	- Pilot Scheme promotional materials	- Research on legal consulting services - Research on funding options - Company registration
	Q2	- Pilot Scheme starts	- App maintenance and debugging - Marketing materials	- Research on investment options - Cost and revenue models - Cash Flow Projections - Obtain SVF licence
	Q3	- Pilot Scheme ends		
	Q4	- Evaluation & improvement		- Legal documents - Privacy and Data Policy

7.3 The Way Forward

Although our starting point is Hong Kong, we aim to expand our business to GBA and China in the short-term and to the global market in the long-term. In the mature stage, more potential features will be evaluated and introduced to meet customers' needs, such as cross-border remittance, and service scope will be expanded to encompass or interoperable with nascent financial technologies such as stablecoins, CBDC and cryptocurrencies.

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Appendix

Appendix 1: Market Research Survey

1.1 Original Survey

Google Form (English version): https://forms.gle/yinvsjr64Ey6HK2n8

Tencent Form (Chinese version): https://wj.qq.com/s2/9668419/f216/

1.2 Raw Data of survey (No. of Respondents = 274)

https://docs.google.com/spreadsheets/d/1RgB_YkYMp47-WGftuuqDDfLhNr89V6zB/edit?usp=sharing&ouid=106265686999015997461&rtpof=true&sd=true

1.3 Result Visualisation

https://drive.google.com/file/d/1RP3VmBUO7RFKLKvapMSsfSQx9fFZzitj/view?usp=sharing

Appendix 2: Solution Details with Examples (selected)

2.1 Promise

A wallet (or a user corresponding to a personal wallet) can make a 'promise' to another wallet by specifying the payment amount and payment conditions in the 'promise'. The result is a logical AND of payment conditions. Some examples of a promise are 'A to B, 500, when 2022-02-08 *and* A has enough balance', '10, when A has enough balance'.

2.2 M out of N authorisation

In an MNA wallet, whilst deposit does not require authorisation, usage and withdrawal of money requires the consent from a predefined number of users (hereinafter referred to as 'M out of N consensus'). Once the consent condition is satisfied, the money can then be spent or withdrawn. The condition is a logical OR of a set of logical statements specifying the number of consents required from a set of users. For instance, A creates a shared wallet for himself as well as B, C, D, E, F, G, H and I, with consensus logic '2 out of {A,B,C,E,G} *or* 1 out of {D,E} *or* 3 out of {F,G,H,I}'. All of them can deposit money into the shared wallet. Only D and E can use the money inside the shared wallet without asking for consents from other users. For B, it has to seek consents from {A,C,E,G}. For H, it has to seek consents from any 2 users from F, G and I. Besides

'M out of {a set of users}', for user convenience, there are some predefined logical statements that can be used by a simple click, such as 'math.ceiling(N/2) out of N', meaning that consents from more than half users are required to reach the consensus. For example, '1 out of {A} *or* math.ceiling(N/2) out of N' is a valid consensus logic. Only A can use the money without seeking for consents. For other users, besides themselves, they have to seek consents from 4 other users out of the 9 users including A to use the money. The consent condition can be modified by the wallet creator to be approved by a M out of N consensus.

Organisation Wallet

Organisation wallets are typically for clubs, SMEs and community groups. While there is no user limit, balance limit and annual transaction limit, they require identity verification. KYC documents required include the registration documents. The organisation is obliged to bear legal responsibility for any money laundering or illicit activities associated with the wallet. There are three roles in an organisation wallet -- creator, administrator and participants. Administrators are appointed by the creator. They enjoy the same privileges as the creator except the right to appoint administrators. There are two types of organisation wallet -- private wallet and public wallet. In private wallets, transactions and wallet balance are encrypted as in personal wallets and shared wallets. In public wallets, transaction records and wallet balances are revealed to the public. SuperCloudPay users can join a public wallet by invitation or via an invitation link. When joining the wallet, a user can choose to reveal its identity (username or phone number) or hide. The consensus process is private, i.e. the voting is anonymous.

Appendix 3: Security Measures (selected)

3.1 Anti-Money Laundering

Different limits are posed for different levels of verification, as detailed below. Zero-knowledge range proof is used for enforcing such limits in the end-to-end encryption setting.

	Balance Limit	Annual Transaction Limit
Unverified Personal Wallet	HKD 5,000	HKD 25,000
Unverified Shared Wallet	HKD 5,000	HKD 25,000
Verified Wallet*	Unlimited	Unlimited

* *Verified Wallet includes verified personal wallet, verified share wallet and organisation wallet*

3.2 Anomaly detection

Unsupervised machine learning is used for anomaly detection. Once an anomaly is detected, the system is notified. Subsequent actions will be carried out for investigation. Federated learning is used for training the model in a privacy-preserving manner. Moreover, Number of transactions per hour is limited to 30 to prevent denial of service attacks.