Master's Degree Dissertation

Vemini Expansion to Singapore

Ferdinando Burgo, Frederic Eichelmann & Piertommaso Severini

MsC International Business Management

UPF Barcelona School of Management - ESCI - UPF

Academic Year 2020 – 2021

Mentor: Tomislav Rimac

upf. BARCELONA SCHOOL OF MANAGEMENT ESCI upf. School of International Studies

Project performed within the framework of the Master of Science in International Business Management program taught by Barcelona School of Management and ESCI-UPF, centre associated with Pompeu Fabra University

Resumen

Vemini es una empresa italiana que creó un dispositivo biométrico para escanear la mano de sus usuarios y conectarlo a su identidad digital. El producto permite a las personas realizar diferentes acciones en la vida real: pagos, acceso a la casa, acceso al automóvil y firma de documentos. Vemini tiene como objetivo redefinir el paradigma de autenticación para Internet de las cosas. En el lenguaje de la tecnología de la información, por “autenticación" se refiere al proceso o acción de verificar y comprobar la identidad de un usuario o proceso. El producto específico que discutiremos en esta sección es nuestro Point-of-Sales Terminal. Vemini proporciona una solución diseñada para redefinir el paradigma del sistema de pago, ofreciendo una solución que no necesita tarjetas ni móviles, sino impulsada por nuestra autenticación biométrica central descentralizada (la palma de su mano). Este plan de negocios tiene como objetivo evaluar los riesgos y posibilidades relacionados con el enfoque de nuestra empresa en el mercado de Singapur. Gracias a nuestra nueva tecnología totalmente desarrollada internamente y a la orientación tecnológica de los países asiáticos, aspiramos a ser la empresa de autenticación biométrica más eficiente de Asia por dos razones: nuestro dispositivo confiable y nuestros casos de uso versátiles. Imagine un mundo interconectado donde una identidad única, confiable e interoperable le permite acceder a cualquier espacio, pagar o asegurar lo que ama. Aspiramos a crear este mundo.

Palabras clave: Europa, Singapur, Distribuido, Libro mayor, Tecnología, Blockchain, Vemini, Biométrico, Privacidad, Fintech, Plan de negocios, Comercio internacional.

Abstract

Vemini is an italian company that assembled a biometric device for the hand palm scanning that provides its users with a decentralized digital identity. The product enables people to perform different actions in real life: payments, house access, car access and signature of documents. Vemini aims to redefine the paradigm of authentication for the Internet of things. In the language of information technology “authentication” stands for the action of verifying and proving the identity of users. The specific product we will discuss in this section is our Point-of-Sales Terminal. Vemini provides a solution designed to redefine the paradigm of the payment system by providing a cardless and deviceless solution powered by our core decentralized biometric authentication (the hand palm). This business plan aims to evaluate risks and possibilities related to the approach of our company to the Singaporean market. Thanks to our new technology totally developed in house and the tech-friendly mindset of asian countries, we want to be the most efficient Biometric company in Asia for two reasons: our reliable device and our versatile use cases. Imagine an interconnected world where a unique, trusted and interoperable identity allows you to access any space, to pay, or secure what you love. We are creating this world.

Keywords: Europe, Singapore, Distributed, Ledgers, Technology, Blockchain, Vemini, Biometrics, Privacy, Fintech, Business Plan, International Trade, Startup.

Abbreviation:

B2B	Business to Business
B2C	Business to Consumer
B2B	Business to Government
BEP	Break Even Point
COGS	Cost of Goods Sold
DBS	The Development Bank of Singapore Limited
DPL	Distributed public ledger
FAR	False Acceptance Rate
FIN	Foreign Identification Number
GDP	Gross Domestic Product
HQ	Headquarter
HR	Human Resources
IAM	Identity Access Management
ID	Identification
IDaaS	Identity as a Service
IoT	Internet of Things
KPI's	Key performance indicators
LCL	Less than Container Load
NFC	Near Field Communication
NRIC	National Registration Identification Card
OCBC	The Oversea-Chinese Banking Corporation
OTP	One Time Password
POS	Point of Sale
QR	Quick Response code
SaaS	Software as a Service
SGD	Singapore Dollar
SME	Small and medium-sized enterprises
UEN	Unique Entity Number

Table of contents

1. Executive Summary

Since our company operates in the Blue Ocean Strategy, this research draws attention to some trends in different industries. Firstly, the increasing diffusion and the evolution of new payment methods alternative to cash. Secondly, nowadays a digital identity serves to identify a person online and offline (International Conference on Artificial Intelligence and Smart Systems (ICAIS), 2021). A digital ID can include information such as an identity number, social security number and biometrics. The digital identity is the collection of information about a person that exists in digital form and this identity allows one individual to perform different actions in the real world. However, this identity can be stored in different forms and can be subject to different forms of fraud. For this reason this research is in charge of three main tasks:

Q1. Define the competitive advantage of the hand palm among the other biometrics systems.

Q2. How to carry the identity of people in a single, decentralised and trustworthy object and define the security of this technology.

Q3. How to make this object/service marketable.

Q4. Which is the best location to perform a test-case for this service? Evaluate risks and possibilities of exporting this technology and its related features to Singapore.

2. Vemini Technology

2.1. Vemini

Vemini EU is an Italian-based startup that offers its services in Italy mainly to governmental entities. The mission of the organization is redefining the paradigm of access security and authentication process through a solution resilient to human error, centralized vulnerabilities and any future threats. All this in order to protect the most critical and intimate commodity of our daily life: Identity. Vemini developed a blockchain-based technology able to provide Digital Identities to its users. Vemini is able to provide its service through an infrared Hand Palm Reader and authentication system that create a totally decentralized identity. Vemini aims to match an important need in the market: allow people to carry out their digital identity and have access to services in a safe way. Vemini guarantees the identity and privacy preservation of individuals combined with the most cutting-edge cybersecurity system. The high standard of data-security and data-protection is guaranteed by the use of Ethereum, which currently is the most used DPL: distributed public ledger (blockchain). By using a DPL, Vemini does not need to store any personal information of users in a private database. Vemini only provides users' data access to different use cases,

which the main one is represented by the payment use case. Market trends and current issues with central institutions show the necessity to develop decentralized Digital Identities for both people, documents, goods and currencies. In conclusion, Vemini is the most efficient way to digitally identify consumers, by linking their physical Identity (via infrared Hand Palm Reader) to its electronic counterpart: their Digital Identity.

2.2. Biometrics: Palm Veins Authentication

Biometric authentication is a system that provides and proofs the identity of people. It is also a technical term that refers to metrics related to human body characteristics and authentication implemented in computer science. Biometric authentication is a recognition method that gives an individual identity through defining the authenticity of a particular physical feature possessed by the user (Telgad, Siddiqui, & Deshmukh, 2014). In the case of Vemini, we exploit the precision of the Palm Vein of the human being that is the most reliable biometric feature because the false acceptance rate is the lowest among other biometrics criteria. Individual authentication biometric systems are increasingly employed in several areas, such as security, office & home access, official document signature and personal devices. This business plan presents an overview of biometric authentication related to the Fintech Industry. Vemini POS Terminal (A POS Terminal with a palm veins scan integrated) interconnects several computing devices connected to the internet, and it can enable the devices to communicate with each other and allow the users to perform different activities. The integration of IoT[1] with biometric systems will improve security systems making them more secure, precise and reliable (International Conference on Artificial Intelligence and Smart Systems (ICAIS), 2021).

Biometric traits are divided into two criteria: physiological and behavioral. The physiological biometrics include the shape of the body like a fingerprint, face recognition, iris recognition, hand geometry, palm print, and retina recognition. The behavioral biometrics include voice recognition, signature verification and gait (International Conference on Artificial Intelligence and Smart Systems (ICAIS), 2021). Vemini provide users the possibility to use palm hand veins biometrics to execute several actions, once linked to the users' digital account or digital ID (*the full palm veins biometric enrollment procedure for users is shown in detail in chapter 3.2*) (*the process of palm veins image acquisition and data elaboration is displayed*

[1] Internet Of Things

in appendix 1). Once acquired the image, the palm hand biometric data is split into three parts and stored in three different locations:

- ❏ Blockchain Network
- ❏ Vemini Singapore Server
- ❏ User's OTP (Smartphone)

By dividing the data in three parts, neither Vemini nor third parties can trace back the transaction data or biometric data of users. This can be done only with the end-to-end encrypted key, owned by the users, that can go back to and control the chronological history of their actions in the Vemini Identity Manager App. The current biometric systems of recognition are not so reliable: the fingerprint recognition is not touchless, and this can create potential problems for its usage expansion after the COVID-19 pandemic. The face recognition has the advantage of being a touchless scan, but has a False Acceptance Rate (FAR) of 1:77 (Soltane & Bakhti, 2012), unreliable if compared to Palm Veins recognition. Face recognition and fingerprints are not impossible to tamper and have low accuracy compared to other solutions (Center For Strategic & International Studies, 2020). In exchange, the Palm Veins recognition ensures a touchless experience and is tough to forge. Hence, hand palm is among the most reliable biometric solutions for security applications (Ponnusamy, Sridhar, Baalaaji, & Sangeetha, 2019). This is confirmed by the FAR, of 1:1,250,000, way higher compared to the currently most used solutions (Soltane & Bakhti, 2012).

Biometric Authentication Methods Compared

Features	Palm Veins	Iris	Face	Fingerprint
Touchless Scan	✓	✓	✓	
Easy User Experience	✓			✓
Highest Accuracy	✓			
Impossible to Tamper	✓	✓		
Easily Deployable	✓		✓	✓
FALSE ACCEPTANCE RATE	1: 1 250 000	1: 1 000 000	1 : 77	1: 100 000

Source: Vemini EU; Soltane & Bakhti, 2012; Center For Strategic & International Studies, 2020

2.3. Blockchain

According to Investopedia's definition, blockchain is an alternative type of database. Databases store data in spreadsheets or huge tables, similar to the excel tables. These data are in some cases accessible to anyone, however are owned by a private business or 'central' institution. To work, traditional databases need servers, i.e. massive computer clouds that can store and give access to data. Moreover, they need very low temperatures. For example, the information we can find in Facebook, are stored in Facebook's databases. In the same way, personal information over identities of people, are stored in government databases. Even if people need to authorize such organizations to store their data, these central institutions have complete control over them. Nowadays, the concerns over our data is growing and growing, since people are forced to authorize each website to manage their data in order to have access to web pages. (Investopedia, 2020).

On the other hand, blockchain stores data in blocks (or chunks) that are chained together in the blockchain. When the blockchain is decentralized, the chain is guaranteed by the participants (nodes) to the network and not by a private (or centralized) institution. In the same way, the database is built by connecting participants' computers, and there is no need for a central huge server that stores data. The validity of the data stored, are guaranteed by the participants to the network. Each time a new block is introduced to the network, it needs to be validated by a majority of members belonging to the network (Consensus Protocol)(de Haro-Olmo, Varela-Vaca, & Álvarez-Bermejo, 2020). Data stored in the blocks includes information such as past transaction details or personal data, these information are permanently. Further details on public blockchain, decentralization and data compliance in appendix 2.

2.4. Vemini POS Terminal

Vemini POS Terminal is a next generation mobile device that offers multifunctional capabilities and optimizes the checkout process for businesses. It comes with several optional features including 4G LTE/3G, Wi-Fi, Bluetooth, microphone, rear camera, barcode reader, hand palm veins reader and base. It includes the android open architecture firmware, which enables Vemini developers to deploy the back-end software needed to connect biometrics and blockchain technology (fact sheet in appendix 3).

2.5. IDaaS: Identity as a Service Model

Vemini Italy is based on a Software as a Service (SaaS) approach, that is a subscription based software licensed to businesses and final users, that allows them to use the Vemini identity management, through an electronic wallet or a smartphone application (identity manager application). More deeply, Vemini Biometric Circuit uses a IDaaS approach, that is a SaaS-based Identity Access Management (IAM) that provides a secure access control to the users' identity profile and credentials management, with a single sign-on or a single authentication. Vemini Italy uses the IDaaS Identity model, a standard that gives users access to their identity, linked with the palm veins, and connects their payment methods in order to authorize payments and manage the bank accounts connected. This payment service is the model we export to Singapore. Successively, additional services will be integrated and Vemini scanners will be expanded to hotels, offices, residential buildings, museums and other governmental infrastructures. The problem with the current biometric payment systems is the smartphone. Indeed, the benefits of biometric are limited by that. Hackers or scammers can get access to the smartphone and bypass the biometric authentication system. This creates a lack of security that Vemini overcomes by using the palm vein technology, the IDaaS model and the Vemini POS. Such new services will make Singapore the first smart city completely digitalized and integrated. The deviceless payment service is the business model expansion we propose to penetrate the Singaporean market, a door for the entire Asia, a region where cashless and cardless payments are growing at a faster pace than western countries.

3. VEMINI in Singapore

3.1 Expansion Plan to Singapore

The expansion plan in Singapore foreseen the distribution of the next generation of contactless payments: deviceless payments. Payments can be authorized by using your hand. The authentication is done through the Vemini POS Terminal. For the initial stage, the targeted clients are retailers in large malls located in Singapore. This service deliver two fundamental improvement to the end consumers' daily life:

- **Faster Payment Method**

Merchants subscribed to our service plan are provided with Vemini Point-of-Sale (POS) Terminals, integrated with the palm vein scanner and Android software connected to the Vemini system. Users will be able to pay in such retails by using their palm veins only. Users do not need a personal scanner or a smartphone to authorize the payment: the scanner is included in the Vemini Point of Sale Terminal

(Fact Sheet in Appendix 2). Consequently, the Vemini POS Terminal will be present like traditional POS in the retail stores and supermarkets in Singapore.

- **Safer Payment Method**

Mobile POS payments are currently the most advanced methods of payment which permits cashless, contactless and passwordless transactions. To permit payments it uses the NFC technology that involves the necessary use of a smartphone, that guarantees the identity of the owner of the credit cards. The intermediation of the smartphone reduces the benefits of the biometrics security system involved because the smartphone represents a point of failure prone to data leaks. Such biometrics are used only to remove the need for passwords, since the authentication is realized with the biometric recognition. But, malicious hackers can potentially take possession of the identity of the user by cracking and manipulating the smartphone and then, the fraudulent use of the mobile wallets.

The payment service for final customers (B2C channel) is provided for free. As soon as a solid users' network base is consolidated, new services will be introduced such as access to buildings or to governmental services, under the IDaaS model and subscription fee applied to customers in order to activate the service. The users will not need to create a new account (digital ID) or employ another technology: with the same palm veins vector and Digital ID, they will enable access to the building they need and use the same Digital Identity to get authenticated.

3.2 VEMINI App & Enrollment: Biometric ID Management

The Vemini biometric ID management application needs to be developed in-house (costs explained in the financial part) for the specific business model expansion in Singapore. Vemini Singapore provides to final customers an application, Vemini ID Manager App**.** The App will be available for free in both Google Store, Apple Pay and the Web.

The application enable users to:

- ❏ sign-up and create their Vemini digital ID;
- ❏ verify identity with passport or ID card;
- ❏ manage and select methods of payments (any credit card or e-wallets);
- ❏ link the palm hand veins biometric (procedure explained below);
- ❏ Authorize payments with palm hand biometrics

The registration of the palm veins of users will be facilitated by VivoCity merchants, who will be motivated to help us in accordance with our marketing strategy described in chapter 6.

4-STEP ENROLLMENT PROCEDURE

1. Once the Vemini App is downloaded, users must sign-up and generate the personal Vemini digital ID. The digital ID provides an univoque identification number owned by the user and stored in the blockchain system. Once created the ID, users need to verify their identity by sending a picture of the passport or ID card issued by the Singaporean government.

2. After the identity is verified, users must add at least one method of payment (by linking their credit cards or e-wallets provided by local institutions) and they must register their palm hands. To do so, they can go to one of the affiliated retail stores. The user accesses the account management by the Vemini app and selects the option “shows the QR Code to do your hand’s veins enrollment”. The smartphone will open a QR code which refers to the user’s unique identification number.

3. Users must communicate to the merchants the need to enroll their hand. Successively, merchants need to fill a simple procedure: they must activate the Vemini POS Terminal function to “execute a new hand enrollment”. By selecting this option, the merchant activates a QR code reader (same infrared scanner user for reading the palm veins). The user must scan the user’s QR code to the POS Terminal camera. By doing that, the POS Terminal is linked to the user’s digital ID account for sixty seconds. Then, the user must scan his/her palm on the terminal camera, immediately. A notification will appear to the user’s smartphone, asking for a double check confirmation.

4. After these steps are completed, users will be able to pay with their hand at the stores subscribed to Vemini service, by scanning their hand to the Vemini POS terminals provided to merchants. Once the user confirms the linkage with his/her palm veins, there will not be any further confirmation to execute payments with the user’s hand. The authorization to payments using the Vemini payment service needs to be done only during the palm enrollment, and is given when the users subscribe to our service.

3.3. Covid-19 Response

Since early 2020 the COVID-19 pandemic has had a tremendous impact on countless aspects of daily life. Every country adopted different measures, but

approximately every country went in the same direction. During this year, different solutions have been implemented to reduce the infection rate. A primary strategy has been to reduce transmission rate through the adoption of remote working and education (e-learning) in mainly all the public and private institutions. Enhanced hand hygiene and the use of facial masks have decreased the spread of germs and consequently the infection rate. The growing use of e-commerce helped to avoid and reduce any kind of contact between people. However, since the restrictions took away people still presented the same needs: to pay, to be identified or show official documents (flight tickets, parking tickets, ID, healthcare card). These particular needs are not compliant at all with all the hygienic measures necessary to avoid the spread of pandemic. The majority of governmental entities in charge of managing the technological infrastructures in order to curb the pandemic effects on businesses are showing a gap to manage people's needs.

In this scenario, Vemini has a great competitive advantage towards its competitors for three reasons:

- ❏ The hand and the infra-rey scanner must be 20cm away from each other.
- ❏ The new digital identity developed by Vemini allows people to perform a wide variety of actions without any need for object/electric devices which may be vectors of infections and contagion.
- ❏ The challenges posed by COVID-19 pandemic creates new rooms for research and development of alternative solutions to the traditional ones.

4. Market Analysis Summary

4.1. Singapore External Analysis: PESTLE

Singapore is a sovereign island city-state located in Southeast Asia. The city-state is one of the richest countries in the area, with a very broad open economy and a strong promotion of business. According to the World Bank's Doing Business Report, Singapore is the second country in which it is easier to do business out of 189 counties (Appendix 4). This factor, plus the high technology level in the country, led our team to choose Singapore as the first destination for our startup: Vemini Project, Palm Veins Biometric Authentication Circuit. The PESTEL analysis conducted shows the feasibility of doing business (especially for a tech-startup) in Singapore (Appendix 5). Furthermore, the SWOT analysis shows the main threats and opportunities of Vemini (Appendix 11); to name a few among all, the focus of Vemini in a fast-growing industry and the compliance of Vemini's service with legal policy.

4.2 Industry Analysis: Market Trends

Thanks to its disruptive technology, Vemini offers an end-to-end service that starts with providing a new authentication experience and culminates in an innovative data management and identity governance that allows us to intercept four fundamental markets:Cashless Payments, Biometrics & Cybersecurity and Digital Decentralized Identity & Data Trust. These three industries converge in a single project that aims to preside over a blue ocean market, exactly as done in the past by Amazon, Uber, Airbnb and PayPal.

Cashless Payments

In Singapore, 68% of the Payments (online and offline) are performing using Credit Cards. At least 73% of all Singaporeans own at least 1 credit card and overall, there are over 5.6 million Credit Cards in circulation (Binsted, 2021). Because of Covid-19 the push to cashless payments is growing at a fast pace. Asian Banking and Finance forecasted cards payment will raise to S$ 158 billions by 2023, from 98 billions of 2018 (asianbankingandfinance.net, 2020). Cashless payments include credit card payments but also mobile payment transactions in physical retail stores. Mobile payment transactions are substituting the credit card ones. The number of people owning a smartphone is around 4.7 million in Singapore (Appendix 6)(Müller, 2021). Mobile POS payments accounted for $2 billions in 2019 and it is expected to grow to $13.9 billions by 2025, surpassing the digital commerce transactions total value by 2024, a tough market segment to target given the strong competitors in the country such Paypal and Alipay. Nevertheless, Mobile POS payments are forecasted to achieve 1.5 millions of users by 2025 (from 0.5 millions in 2019), with an average transaction value per user of 10,217.63 US dollars, way higher than digital commerce average transaction value (Appendix 7, 8 and 9). Those trends in Singapore give space to Vemini Biometric Authentication System, which aims to substitute cashless transactions - both credit cards and mobile payments - in order to provide deviceless transactions.

Biometrics and Cybersecurity

Valuates Reports, companies building reports jointly with PWC, McKensy and other leading consultancy companies, forecasted the global biometric technology market size will grow at a CAGR of 16% during 2018-2025, achieving a total value of USD 42 billion by 2025 (reports.valuates.com, 2019), from USD 14 billion in 2018. Among its uses, biometrics improve: cost-cutting in terms of value and time, highly secure identity management, more reliable than passwords or tokens and Less potential scams or identity theft. It is getting more integrated day by day with banking, finance and e-commerce sectors, since biometric technology is faster, more convenient and more reliable than conventional security systems, such as password and other

authentication methods (Valuates Reports, 2021). Among the most valuable advantages, it reduces frauds and security breaches compared to the classical passwords or tokens, that can refer to badges or credit cards, for example. The Vemini biometric system uses a reader, related software and a decentralized database to match the user data with the software. The database is decentralized thanks to the blockchain, a decentralized, distributed and public digital ledger.

Digital decentralized trust and digital identity

The digital identification market has an economic value equivalent to 3% - 13% of global GDP if effective and high-level solutions are presented, according to a McKinsey investigation over the application of digital identity (or digital ID) in seven countries (the research considered countries from Africa to the US) (mckinsey.com, 2021). McKinsey highlights how the digital ID can improve civic and social empowerment, in addition to providing economic gains to both businesses and consumers. There are several ways in which digital ID can be implemented: from authorization of payments, to access to building and to identity authentication. The digital ID and Identity Access Management together with public decentralized blockchain ledgers can, indeed, provide the solution to underdeveloped countries with lack of institutions, in order to guarantee the authenticity of documents, identities and reduce scams and identity thief where central institution are not strong enough to guarantee it (ingroupe.com, 2021). But how can digital decentralized identity bring benefits to physical users as well? It can be possible with the concept of data trust and data governance by the consumers. Right now, every person provides its data for free to big tech companies, from Facebook to Amazon. Once our data is provided to such organizations, they sell them in blocks. The paradigma of data trust twists the rules: data will be owned by users that can decide to resell it successively, directly to companies. In Vemini Singapore's concrete case, such data refers to payments and consumer decision data, that consumers can decide to sell or keep private. Finally, the versatility of Vemini technology allows it to move horizontally on different use cases from payments to physical access to Border Control and the digitization of personal documents, steps that Vemini aims to achieve once the market is successfully penetrated.

4.3 Competitors Analysis

Thanks to its unique UPS (Unique Selling Proposition) Vemini offers several reasons why customers should prefer us rather than other direct competitors or other payment methods (Appendix 10).

Amazon One - Deviceless payments in USA

Amazon One is our direct competitor in hand palm biometric devices and biometric payment systems. It enables Amazon Store customers to scan and register the users' palm in order to link to the Amazon e-wallet (Kumar, 2020). Currently, Amazon One is available only in US Amazon physical stores in Washington (Perez, 2021). We believe a further expansion will come soon in the US, which made us opt to discard the US as an appetible country to launch Vemini Biometric System. However, given the legal background in Europe and Singapore, Amazon One is illegal in the mentioned area: the store of biometric data by a private company is illegal. Vemini in Europe is compliant with GDPR (The General Data Protection Regulation 2016/679 regulation in EU law on data protection and privacy in the European Union and the European Economic Area.) and PSD2 (The Revised Payment Services Directive is an EU Directive, administered by the European Commission). Vemini overcomes this problem by storing data in the blockchain public ledger.

Card Payments

Nets, Visa & Mastercard are the main traditional competitors which allow card payments in Singapore. The three circuits have 92% of the total market-share of card payments in the country (Appendix 6). Card payments are at the moment the most used cashless payment method used worldwide in retail stores. Card payments made up 53% of transactions in Singapore in 2017, while e-wallets were used for only 4% of in-store sales (WorldPay, 2018) (worldpay, 2018)(Appendix 12). Card Payments require commission fees for the vendors, while users in some cases pay annual fees to get and use the credit or debit card services. Card payments require commission and then cost for the sellers or bank providers, both traditional banks but also innovative banks such N26. Vemini Biometric System can penetrate and replace the payment market, offering cheaper commissions and safer payments, by integrating the biometric blockchain circuit connecting the user Vemini E-Wallet directly with the user bank or paypal account, in order to reduce commission paid by retailers for each transaction.

PayNow and mobile wallets

E-wallets and mobile payments are growing at a fast pace and will substitute the credit card market soon. Currently, the number of e-wallet or mobile wallets in Singapore are 13. Among them we find bank-owned mobile wallets, non-bank mobile wallets and multi-currency wallets. Vemini e-wallet belongs to the non-bank multi-currency category (SingSaver Team, 2021). Mobile payments in physical stores are increasing drastically in Singapore after the introduction of PayNow, a peer-to-peer funds transfer service that allows people to transfer SGD funds instantly to a seller or creditor, using the payee's designated mobile number or NRIC/FIN or UEN number instead of his/her bank account number (posb.com, n.d.). In 2020,

beyond cash deposits and withdrawals falling for COVID-19, the number of PayNow transactions has nearly doubled for both OCBC and DBS customers, largest banks in Singapore (Wong, 2020). PayNow is available to retail customers of nine participating banks in Singapore (abs.org, n.d.). Mobile wallets operating in the country are associated with PayNow to execute transactions, such as PayLah from DBS Bank, Alipay, Google Pay among others. After the national rollout of a unified QR code linkable with users' mobile bank account, in the country 27 different e-payments methods (SingSaver Team, 2021). Nevertheless, PayNow needs a smartphone to work and does not use blockchain technology. Transaction safeness and comfort can be increased with the introduction of blockchain and biometric recognition. For now, PayNow uses face or fingerprint recognition through the smartphone. Therefore, a device is still needed to link the user and the retailer fund account. Vemini aims to eliminate the mobile phone intermediation, by using palm vein recognition to authenticate and authorize transactions directly in order to execute purchases, bringing to the next generation of cashless payments: the deviceless payments.

5. Strategy and implementation

5.1. Sales Strategy

Vemini sales strategy for the expansion to Singapore is based on partnership with two influential local businesses: VivoCity Mall and VIA™. In VivoCity we will launch the biometric payments and the Vemini POS Terminal for the first time. The mall will work as a pilot test. VIA™ partnership is needed in order to connect payment methods such as e-wallets credit card or maestro cards to our Vemini biometric ID manager app. Merchants in VivoCity will not be charged with any subscription fees for the first twelve months: VivoCity shops are crucial to the network development. Once the network base will be large enough and Vemini service awareness increases in the city, our product will be promoted to other malls and also hotels, in order to increase the number of retails and compatible business related to the product. Vemini Singapore targets both B2B and B2C channels, rather than B2G channels like Vemini EU. Sales consists in selling our service to merchants and retailers. The hardware is lended to merchants as part of the service, but is still owned by Vemini. Once the subscription is not renewed, the POS terminal must be handed back. Revenue streams will be generated by two channels: subscription fees (SaaS approach) and commission fees on user transactions, applied to the retailer as done by the main payments companies (Visa and NETS, for instance). The fees are in line with the market fees, but Vemini does not ask for a % of the total transaction, as done by the competitors. The identity manager application will be available in both Apple Store and Google Play. It will be provided for free, in order to attract the end users, the VivoCity customers. In order to generate revenues, Vemini

asks commissions to retailers, like other companies such as VISA are doing (T.,21). In the following table are displayed the Vemini Singapore subscription plans:

	Basic Plan	**Business Plan**	**Business+ Plan**
Total Price	7,99 SGD/month	9,99 SGD/month	99,99 SGD/month
Features Included:	- 1 Devices - Basic Software	- 2 Devices - Basic Software	- 4 Devices - Advanced Software
Transaction Fee **1st Year Promo**	0,15 SGD ~~0.15~~ 0.10 SGD	0,15 SGD ~~0.15~~ 0.10 SGD	0,15 SGD ~~0.15~~ 0.10 SGD

Sales Strategy for B2B

Typically B2B customers are in constant research for solutions that can enhance their business. Vemini helps its partners in three main processes: With our service we help the society to curb corruption and bribery which helps us to sell not only security and protection but also transparency of data management. Thanks to our financial partner which will be a mobile wallet alliance, we can ensure easier currency exchange and a smooth method to purchase goods while people are travelling. To reduce risks of our B2B partners, we offer real-time visibility. In this way, Vemini reduces the risk of input errors as well as limiting the scope of responsibility to the services provided by the partner company.

To reach higher sales Vemini needs more merchants or partners which offer the POS to their clients as a possibility to perform transactions. Therefore, stakeholders need to be persuaded by the service and the related product. To establish a network of partners and investors, sales representatives need to be equipped with product and industry/knowledge in order to communicate it to potential customers. These networking activities can be done in fairs or similar press activities. In this section, are crucial partners, business developers and sales representatives which help Vemini to reach more business customers through the typical sales channels (cold emailing, calls, networking and demonstration on place). Goal for the sales strategy is to reach 425 business partners, in the first year, to use our POS system in their stores/facilities. In the final year we expect 10674 stores, as it is computed in (Appendix 26). With the B2B relations the revenue will come from lending the Vemini POS to final partners that can subscribe to three different monthly plans. The target is to make businesses subscribe to plans such as “Business+Plan”, they have lower transaction fees and more assistance from Vemini. This can also boost the partner's attractiveness, which relates to more stakeholder satisfaction of Vemini.

Sales Strategy for B2C

Vemini will reach its final customers through the app which is available on every Smartphone Marketplace (Apple Store and Play Store). Vemini will focus on building a solid relationship with the end users especially in three main stages: acquisition, activation and retention. The acquisition will be better discussed in the Marketing Plan Summary. The activation will be the first-usage moment where the customer will directly test the efficiency of the service. This is called the first “WOW-moment” as the customer will be involved in a futuristic service. The retention will mainly focus on four main things: The price point, because customers are charged zero fees and dont need to pay registration fees. The enrollment requires just a few minutes, and then it is immediately possible to proceed visiting any partner to enroll in the Palm Vein and perform monetary transactions. The risk reduction which will be provided by our service: physical card loss or duplication, cyber vulnerability and cash theft and e-crimes are no longer possible. And finally customer care, Vemini will focus on rapid response time, customer feedback collection, analysis and finally omni-channel support that guarantees to correct any error. This will solve any unexpected issue of the customer or eventual error of the service.

In conclusion, the first Biometric Point Of Sale - Vemini demonstrates how identifying individuals can be an essential tool in managing the relationships between consumer and the merchant. Retail POS transactions are the final confirmation of a transaction relationship as well as an exchange of value. A positive customer experience within this critical part of the sales process is essential to successful integration with biometric identification. Furthermore, through the years, users will have the chance to use their digital identity in more stores and facilities while Vemini is growing. As we see in the SWOT (Appendix 12) our strengths and features mark a vantage point for Vemini.

Future Expansion Strategy

Looking at the future, Vemini will expand the business model in order to integrate new services that will be accessible with the user's palm veins biometric recognition: authentication in banks and ATMs, access to buildings, museums, offices, access and payment to public transportation, among others. To reach these sales strategy objectives, which we can see in the Strategy Map and Balanced scorecard (Appendix 13). Customer base, partnership and network need to grow, so it is important for Vemini to focus on B2B and B2C in further expansions. The loyalty of our service is the main goal which will guarantee the integration with more and more services/partners and more sales/commissions.

5.2. Partnerships

Local Partnerships are crucial to effectively penetrate the Singaporean market.

VivoCity Mall

It is the largest shopping mall in Singapore, with 99,987 square metres of net lettable area and 142,854 square metres of gross floor area spread over a three-storey shopping complex and two basement levels (VivoCity, 21). In 2018, VivoCity attracted 55.0 million visitors and S$958.2 million of record tenant sales (Mapletree Commercial Trust, 21). As a partner, VivoCity will be provided with palm scan devices and the Vemini system for a very convenient price in exchange for registering Vemini users' palm. To this VivoCIty shops will pay no subscription fee in the first year. The only charge to VivoCity consumers will be the commission fees, which are also free in the first year, required for transactions as happens with credit card circuits, while they will offer a better and easier payment experience to VivoCity customers.

VIA™

VIA™ is a cross-border mobile wallet alliance which allows users and merchants to do payments based on QR-based (Viaconnects, 2020). VIA™ facilitates mobile wallet issuers to integrate payments into a cross-border network in order to exchange money between different types of e-wallets or bank accounts. Singapore currently has 27 e-payment methods and establishing a partnership with all of them could be time-consuming and expensive (SingSaver Team, 2021). By doing a partnership with VIA™, Vemini App users' will be able to connect their digital ID manager to any personal e-wallet outstanding in Singapore. Hence, transfer of money will happen directly between Merchants wallets and VIA™, while the authentication and authorization process is managed by Vemini. Also, VIA™ guarantees foreing travellers to pay with different currencies to merchants, at competitive rates. The role of Vemini is to guarantee the authenticity of authorization of transactions. By introducing Vemini in the VIA™ ecosystem, the QR code currently used to authenticate the merchant's account will be switched with the palm hand biometrics and transaction can be done directly scanning the hand on the POS terminal rather than scan the merchant's QR code with the smartphone.

Future Targeted Partner: Millennium Hotels in Singapore

After two years of operating the expansion, the goal is to penetrate Hotels in Singapore. For Hotels, the service will be different: we will provide scanners to access hotel rooms, plus POS terminals for the reception and the hotel bars. For customers, nothing changes: users not enrolled yet can subscribe easily by

downloading the app and linking their palm directly at the reception desk, using the POS terminal. In this case, the revenues will come from the complete service we offer to the hotel. Users will not pay any fee to access hotel rooms.

5.3. Logistic and Supply Chain Strategy

Vemini needs to provide high quality software and hardware to both final users and businesses. The POS terminal, developed in Italy, needs to be delivered to our Singapore HQ. Our technicians will install it to our partners in VivoCity's resellers.

In the following, are shown the steps we are going to follow for the Logistic. To start we will import the hardware from Italy, as a "kick off" strategy to penetrate quickly and cost efficiently the market. When higher amounts will be needed, we switch to the "outsourcing strategy" by taking a partnership with asian companies, with contracts that guarantees the high quality standard of Vemini POS Terminal. The objective is to keep the company a service company, lean in terms of hardware production and mainly specialized in software management.

1. For the first year, we estimated a need of 850 Vemini POS Terminal devices in total for the first year. Therefore, the kick off strategy foresees importing 1000 devices from Italy (850 plus 150 as safety stock). A LCL container is needed for the, with a total dimension of 1 cbm, with incoterm condition 'Delivery at Place'. The total cost is estimated to be 755 Singapore Dollars, that is 470€, at the current exchange rate (Appendix 14, 15).

2. For the following years, our subsidiary in Singapore plans to outsource the hardware production. By adopting this strategy, Vemini can focus on the firmware and biometrics improvements and, at the same time, reduce costs of manufacturing, shipment costs and international risk: on the worst scenario for Asian economy and a cut on retailer subscriptions, the flexibility of the subsidiary ensure a fast response and rapid re-adaption by using the devices returned by the companies in different channels or different industries like banks or hotels, without bearing factory costs. Nevertheless, keeping the Vemini POS maximum quality, smooth operations and simplicity is a crucial requirement, to beat the current and future competitors. In the appendix 16 the logistic strategy - "kick off" and "outsourcing" - is explained in detail.

5.4. Human Resource

5.4.1 HR policies

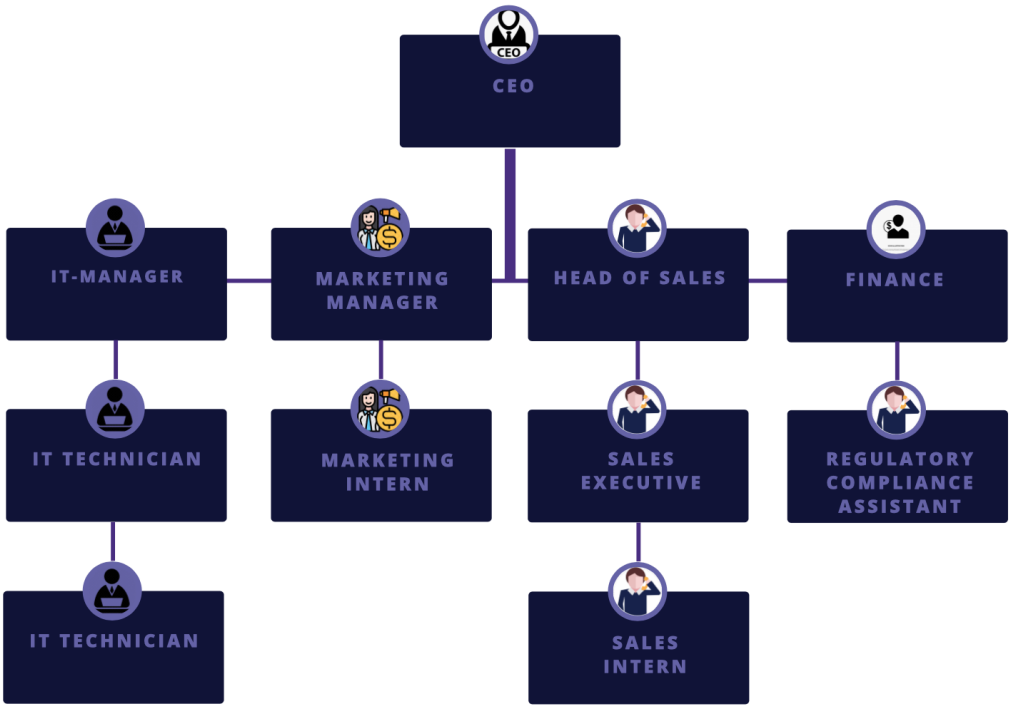
For a long time businesses have been attached to time-consuming, ineffective and expensive legacy systems that are unable to keep up with the rapid digitization of their workflows and processes. Vemini want to takes human resources to the next level; empowering employees (present and future) to make better decisions at a faster pace. First of all Vemini will concentrate on building up talent density by creating a workforce of high performers. Secondly, Vemini guarantees 2 weeks of training before starting the real work, cross-communication between employees and managers as well as enhancing relations between employees and the opinion flow among colleagues. To be successful as a startup Vemini needs to apply the following HR policies which are: flexible work hours, task-oriented projects, leave application such as sick leave or holidays, joining and exit policies, training and development, personal benefits and benefits oriented to team building budget, diversity and inclusion policy, as well as anti harassment policy. (Gibbons, 2021) Finally, Vemini Singapore employees must accept a non-disclosure agreement, crucial to not pass information or insights to competitors or related companies. Nevertheless, it is important to hire and retain the best talent the market can offer, looking for millennials specialized in fintech solutions and IT technicians in order to boost the company's performance.

5.4.2 HR Strategy and HR needs

As an innovative technology company we need to implement a modern HR Department, this will be done through a people management platform which will operate as a key function of the company. This platform includes: compensation management, performance management and other core processes related to HR (Sussley, 2021). The company will start with a simple organisational structure to operate efficiently in the Singapore market. Since the software and the hardware development is done in Italy, for Singapore expansion we need only commercials, marketing and IT technicians. The Country manager will be responsible for the management, administration of the subsidiary, local relationships and recruitment. The sources used are: LinkedIn, Glassdoor and Universities career offices. Vemini Italy HR collaborators will initially join the subsidiary to build commitment and corporate culture among new young employees. A strong culture organization is vital for the millennials between twenty to thirty year olds, which are target employees for Vemini Singapore. Given the forecasted explosive growth, we will need to hire additional employees for the IT and Marketing departments after the second operating year. Having a strong corporate culture at the base is crucial to integrate the future employees.

In the following the jobs will be described which we need to have in our company to successfully expand into the Singapore market. The full job descriptions and salary are in (Appendix 17). In the following chart is shown the initial organizational structure of Vemini Singapore.

Organizational Chart:



6. Marketing plan summary

6.1. Market Segmentation

(Dorfleitner, Gregor & Hornuf, Lars & Schmitt, Matthias & Weber, Martina., 2017) divided companies belonging to the FinTech industry into four major segments in accordance with their distinctive business models. Similarly to traditional bank institutes, FinTechs companies can be distinguished on the basis of their involvement in financing, asset management, payments and insurance services (Ajlouni and Hakim, 2019) (Appendix 18). The Vemini core business will exclusively involve its users in the Payments section: alternative payments methods, blockchain and cryptocurrency and other FinTechs facilities. Firstly, alternative payment methods include mobile payments, e-wallets, bank transfers, and “buy now, pay later” instant financing. Secondly, Cryptocurrency payment gateways allow businesses to accept transactions of cryptocurrencies as payment from customers in exchange for goods or services.

Firstly, we have to distinguish between the user and the customer of our product. The users will be the physical people, while the customer will be mainly other business entities. The main customers for our product/service are not the end users. In the first phase, It won't be the user who will pay for the device, instead our customers will be the major players in the arena of financial services. (Appendix 19). Relying on the basic information of similar industries, we can figure out the basic demographic information of our potential market segment as we see in: (Appendix 20).

6.2. Marketing Strategy

Value Proposition: Vemini want to redefine the paradigm of authentication. (Appendix 20)

Vemini is a user-centric digital identity solution that puts the user in control of their data.We have developed a blockchain-based technology able to provide Digital Identities to its users. We are able to provide our secure service through an infrared hand palm reader and authentication software. Vemini enable access for customers that were previously excluded from the traditional financial system by enhancing infrastructure.

6.3 Strategic objectives

The main driver of the whole project protecting the most critical commodity of our days: Identity. The security solution is then inserted in an interconnected ecosystem of secure accesses: enabling trust in an interconnected digital future. In this vision, Singapore will be our testing ground due to its population density, infrastructure quality and tech-friendly environment.

These are the main marketing objectives of Vemini which are divided into two categories - quantitative and qualitative:

Quantitative:

The quantitative goals of the marketing strategy are aligned with the financial part and all the estimations are being computed on the bases of Singaporean benchmarks (Appendix 36).

- ❏ Provide freely to VivoCity Mall 2 POS devices for each store in order to penetrate the market. This will be an opportunity to exploit the network base creation and fast expansion, also thanks to the help of VivoCity

mall and its 340 shopping points. Stores will get a free subscription for the first year and a discount of 0.05 SGD on transaction fees.

- ❏ Achieve an e-payments transactions market share of 8% in 5 years (Appendix 27). Achieve a market share of retailers affiliated with Vemini of 20% in 5 years. (Appendix 26).
- ❏ Placing 850 POS devices in one year. There are around 340 establishments in Vivo City Mall today. Placing 850 devices in the first year means cover the 100% of the shops with an average of 2 devices per shop, plus additional 85 shops from different malls that we aim to achieve with our massive marketing campaign.
- ❏ Achieving 20.000 transactions per day after the second year.
- ❏ Achieving SGD 4.554.833 in transactions revenues in the first three years

Qualitative:

The qualitative objectives are divided into three categories on a time base: year, monthly, daily and are better explained in the (Appendix 23) to sum up:

- ❏ **Strategic (1+ year):** Involve the projects that require a longer planning and will affect the added value for customers in the long term. Vemini will deploy news services and use cases that can be used with the same biometric digital ID: Vemini BioAccess, BioTicket, BioSignature and BioATM.
- ❏ **Tactic (3 months - 1 year):** Activities that need to be planned and tracked quarter by quarter. Furthermore, in this section we analyze the readiness of the organization to meet its financial needs and business needs.
- ❏ **Operational (daily):** Involve all the tasks to be performed on a daily basis to make the business rolling. It indicates all the daily tasks required to source, build and bring our products (software + hardware) to market.

6.4 Marketing Mix

Product

The product offered to the market can be divided into two categories: the service, offered to Businesses and End-Consumers and the hardware, offered to Businesses in order to authenticate the customer identity to receive payments.

1. The Hardware component is identified in the Vemini Point-of-Sales. Vemini POS is a solution designed to redefine the paradigm of payment system by providing a cardless and deviceless solution, powered by the Vemini core decentralized biometric authentication (Vemini EU, n.d.). Translated, is a new generation POS that integrates the vein scanner, in order to biometrically identify and authorize action by the individuals registered to Vemini. The Point-of-Sales has a software runned by Android and the firmware is modified in order to be compatible with the scanner and the blockchain technology, which function as a ledger to record and store the transactions. It is developed by Vemini Italy and will be provided to the partner retailers in Singapore.

2. The service can be broken down into two main elements: the Vemini App and the Vemini Biometric Circuit.

    - The Vemini Biometric ID Manager App is an application available for Android, iOS and Web. It contains the ID management platform for users. The app allows the users to register to Vemini, enable their preferred bank account and credit card and manage them in order to perform transactions later on. The enrollment procedure is better explained in chapter 3.2.

    - Vemini Biometric Circuit is the backhand software that allows the app to be connected to the different use-cases and thus authorize transactions between users and brick-and mortar-shops. The data-elaboration is better explained in the (Appendix 1).

Pricing B2B

The pricing is aligned with the financial part and the estimations are being computed on the bases of the data of the balance sheet. The pricing justify our revenue model, stream cost and guarantee a BEP in five years of constant operations as we will analyze deeper in the financial part of this business plan. The Basic-plan which is based on small retail shops, the Business-plan which is set up for SME and Finally the Business+ plan, which will be for big enterprises (Appendix 22).

Place

The City Area that involves the primary central business district of Singapore. This district is chosen as it is the hotspot of our target market. The reason for choosing Singapore is elucidated in the Pestel Analysis. The aim is to partner with existing business, shopping malls (VivoCity), banks and credit card providers (through Viaconnect).

Promotion

Vemini marketing promotion can be divided into two main categories: offline and online promotion. Promotion Offline can be divided into two subcategories: B2B promotion for the Vemini Biometric Circuit to get more affiliated businesses and the B2C promotion for the Vemini Biometric ID Manager App, to increase the network of final users. Increasing the number of network users is crucial for the diffusion of Vemini as a payment method. The more users using Vemini E-Wallet, the more businesses affiliated to Vemini Biometric Circuit. On the other hand, the more retail stores using Vemini POS and Biometric Circuit, the more the willingness to download the Vemini ID Manager App and be part of the Vemini community.

- ❏ Offline B2B promotion

Vemini Biometric Circuit will be promoted to fintech forums and technological trade shows, in order to reach businesses interested in innovative products to enhance the services offered to their customers. Forums selected are: Singapore Fintech Festival 2022 and the Singapore Tech Forum 2022. Finally, Vemini Asia will plan workshops with the aim to educate our affiliated partners and their team, in order to educate at cascade the end-consumers that will subscribe and register their palm in our partner stores and offices. Traditional Business Cards with our contacts and Brochures with Vemini Ecosystem will be distributed at both events, as an economic offline promotion useful for promoting our company in important stages.

- ❏ Offline B2C promotion

Vemini Biometric ID Manager App will be promoted initially with flyers distributed to local retailers affiliated with us, such as VivoCity Malls. Successively, press releases and ads will be posted in local newspapers, in both the online and offline version, in order to ferment the awareness of the new technology that is about to land in the city. Since we are targeting businessmen and high-wealth consumers, we believe that many of them still read papers which are also becoming less expensive with time. In 2018, the average newspapers in circulation in Singapore was still above 700 thousands (SPH Media Solutions, 2020). Once the startup begins to have businesses affiliated, we will use strong digital and static commercials. SPH Media Solutions Division will be the partner for our promotion around Singapore. Commercial outdoor media banners will be installed in VivoCity malls and flyers distributed massively to affiliated retail stores in order to promote the Vemini Biometric Circuit and stir up the Vemini ecosystem in the City. Outdoor Media are high-impact, engaging and cost-effective and offers sustained awareness and influences consumers to download Vemini App (SPH Media Solutions, 2019).

- Promotion online

Promotion online will be done mainly through the use of paid media like Instagram, Linkedin and Youtube, in order to increase our consumers' engagement and expand our network (Appendix 24a). Moreover, promotion will consist of owned media like creating a press release on our website Vemini.eu. Finally all the earned media (make people, SME, retails, forum of specialists, startup hubs, incubators and big companies speak about the company) will help to expand our customer base.Our online promotion will consist of short videos and pictures that show how the Vemini Ecosystem works, in order to reach both consumers and businesses and save costs on advertising commercials, since one commercial achieves both sides of the platform (B2B and B2C). By clicking on the advertisement, users will be brought to a dedicated web page of Vemini Asia with two sections: Vemini for businesses and Vemini for customers.The main objective of our online promotions will be find in (KPI's in Appendix 24b) to sum up:

- **Awareness:**

  Brand awareness. → Reaching an average of 5 to 7 impressions per person in the target audience. Our target market is composed of 910.000 people (Statista, 2020) and we aim to reach 10% of market share in four years, consequently we aim to reach an average of 455.000 to 637.000 impressions in four years. Afterwards, we will compute the bounce rate and maintain it at a low percentage compared to the total traffic.

- **Consideration:**

  Engagement and app installation → We aim to achieve an average download rate of 150 downloads per day in the first two years and afterwards a stable 70 downloads per day in the third and fourth years.

- **Conversion:**

  Conversion of users into early adopters of the service → As conversion we mean: downloading the app, subscribing to a monthly subscription and signing up. We aim to reach 100.000 downloads in four years.

7. Financial summary

For the following forecasts and financial calculations, references and benchmarks used are shown in detail in the appendix 36.

7.1. Sales forecast and revenues

For the purpose of the business plan, for the next five years revenues are generated by the payment service only[2]. The sources of revenue are subscription fees and transaction fees, both applied to the merchants. For the forecast, we considered the 9.99$ monthly subscription plan only, as an average between the three plans available. Fees on transactions are 0.15 SGD, at the exception of the 2022 (year 1), where is left a margin for a potential promotional discount on fees (fees and translation in EUR in the appendix 25). To forecast market share and revenue generated we used two main benchmarks:

- **Partnership with Retailers**
  Last data on retailers in Singapore counted in total 41.037 merchants currently operating in the country (CAGR 2016-19 of 5.87%). In 5 years, we aim to achieve more than 10.000 retailers with our service (Appendix 26), reaching a market share of 20% and total revenues from subscription fees of 1.279.635 SGD.

- **E-Payments Transactions**
  Number of e-payments transactions, which include mobile payments and credit card transactions (excluded online transactions), grew at a CAGR of 4% (2015-2019). Details are in appendix X. We forecast to achieve 450.000 transactions per day in five years, for a total e-payments transactions market share of 8%. Main revenues come from the commission on the transaction: 0.15 SGD, total revenues in transaction fees of 25.579.635 SGD (Appendix 27).

7.2. Cost structure

The main cost for Vemini Singapore arises from the Vemini POS Terminal. However, the device is lent (and not sold) to merchants, following the ‘as a service’ model. Hence, the COGS is mainly composed of the device setup and device maintenance, which need to be done once a year. The pure cost of the devices (screen, case, POS and assemblage) are part of the total investments. Other operative expenses include sales and marketing costs, office rent, staff salaries and finally the amortization and depreciation, that includes the depreciation of the POT terminals (Appendix 28).

[2] Nevertheless, a new source of revenues would come with new palm digital ID services for customers.

7.3. Investments

Main investments for starting operations are the mobile and web application development, the BOPS or servers needed to run operating systems and manage part of the data (one of the three part of users' data that will be stored in our databases), the IT equipment for our employees and finally the investments on POS terminals that Vemini will provide to merchants who subscribe to our service. Here below, is reported the D&A years for each category of investment (D&A calculations in appendix 29). Finally, R&D expenses for software and hardware improvements, as well as development of new business solutions to be used with the biometric digital ID.

Depreciation and amortization time, per type of investment.

• Application	10 Years
• Servers	5 Years
• IT Equipment	5 Years
• Vemini POS Terminal	5 Years
• R&D	5 Years

7.4. Break even analysis and POS Terminal break even time

According to our forecasts, the break even point will be reached between year 3 and year 4. In detail, it will be reached once the transactions per day will pass the 115.500 transactions. About the POS terminal break even time, Vemini Singapore is able to recover the investment done with the Pos Terminals after 435 days (one year, two months and a half) of subscription. This break even time level is reached once the average daily transactions per store achieve the 33 transactions per day, per store. This last number matches with the average of the forecasted transactions for the five year period 2022-2026 (Break even time details in Appendix 30).

7.5. Net income and cash flow

According to the forecast, Vemini Singapore will start to become profitable in the fourth year of operations. The main driver of our profitability is the high number of transactions reached once the network base of users and merchants affiliated is big enough to generate a high volume of revenues, with costs for operating expenses and investments which relatively decrease over time (Appendix 31 and 32). Total operating expenses drop to 40% in 2026 (year 5) and revenues are forecasted to grow above the 25.000.000 SGD in five years.

The business project needs funds to cover the high outbond of cash in the first three years. In total, at least 4.900.000 SGD (3.000.000 EUR) are needed to cover the investments and operating expenses. From 2026 onwards, the financial situation will become more relaxed. From the same year, funds on R&D will be eventually further incremented (Cash flow in appendix 33).

Funds needed will be seeked from equity crowdfunding and investments from government, business angels and venture capitals in Singapore. Vemini EU recently won a first investment round of 1.000.000€ from X-Europe, based in netherland, for the purposes of fintech solution development. This capital will be used as our first round equity funding, together with additional 500.000€ that we aim to obtain from investors in Singapore. In total, we aim to raise 3.500.000 SGD as startup capital (2.170.000 EUR). (Appendix 34)

About bank loans, the first needed is of 2.000.000 SGD, in year 1 and a second one of 800.000 SGD (in total 1.750.000 EUR). For the first one we estimated an interest rate of 5% and for the second one of 3%, lower estimation since the company is closer to generate profits. Total interest rates and loans repaid are based on a period of repayment of 10 years. (Appendix 35)

7.6. Contingency Plan

In the event that the partnership with VivoCity Mall will not be successful, Vemini Singapore already targets alternative partners: in Singapore, retailers and little shops are mainly located in citymalls. In total, there are 171 shopping malls and we will propose our project to alternative malls, proposing discounts and advantages to merchants as well as a disruptive technological innovation for the entire mall in general.

In the eventuality we will struggle with equity funding rounds we will slow down our operations, that means slowing the production of Vemini POS terminals, postponing our forecasted partnership with merchants.

Finally, in case VIA™ will not be interested in this kind of partnership, we will opt to develop our personal mobile wallet and therefore to manage the financial part of transactions and value stored as well, with VIA™'s competitor .

8. Conclusion

We argue that all the questions posed in the Executive Summary were satisfactorily answered.

Q1. Define the competitive advantage of the hand palm among the other biometrics systems. Vemini shows higher performance compared to its competitors regarding the following features: scalability, acceptance rate, extra services provided, fraud security, default risk management, low reliance on objects/devices and interoperability with other systems.

Q2. How to carry the identity of people in a single, decentralised and trustworthy object and define the security of this technology. The combination of Biometrics features implemented by the Blockchain systems guarantees the security of the service and its interoperability in order to serve multiple functions (access, payments and signatures).

Q3. How to make this service marketable? The qualitative strategic objective of the Marketing Plan Summary explains how Vemini aims to expand to new sectors and industries (real-estate access, document signature, goods tracking) in the following years. The Digital Identity is a versatile asset suitable for different scopes. The quantitative strategic objectives of the Marketing Plan Summary explains our numerical targets to reach our customer base. Furthermore, the sales strategy explains which channels will be used in order to market the service.

Q4. Which is the best location to perform a test-case for this service? Evaluate risks and possibilities of exporting this technology and its related features to Singapore. The in-depth analysis of the Singapore market, combined with the business strategy of Vemini delivers a complete overview of how to bring Vemini's products to the Singaporean market.

In conclusion, human beings and its growing and evolving needs for services that integrate digital identity and secure deviceless payments combined with the implicit need for data-security gave Vemini's project a chance to succeed. This study concludes that Vemini business strategy shows all the necessary business tools required to approach and penetrate in the Singapore market.

9. References

1. Center For Strategic & International Studies. (2020). *How Accurate are Facial Recognition Systems – and Why Does It Matter?* csis.org. Retrieved 6 5, 21, from https://www.csis.org/blogs/technology-policy-blog/how-accurate-are-facial-recognition-systems-—-and-why-does-it-matter
2. de Haro-Olmo, F. J., Varela-Vaca, Á. J., & Álvarez-Bermejo, J. A. (2020). Blockchain from the Perspective of Privacy and Anonymisation: A Systematic Literature Review. *Sensors*, *20*(24), 7171.
3. International Conference on Artificial Intelligence and Smart Systems (ICAIS) (Ed.). (2021, March). *Artificial Intelligence and Smart Systems (ICAIS), 2021 International Conference on. :1359-1365*
4. Investopedia. "Blockchain Explained." *Investopedia.com*, Luke Conway, 2020, https://www.investopedia.com/terms/b/blockchain.asp. Accessed 31 05 2021.
5. Ledger Academy. (2020). *Why Decentralization Matters*. ledger.com. Retrieved 05 30, 2020, from https://www.ledger.com/academy/crypto/why-decentralization-matters
6. Ponnusamy, V., Sridhar, A., Baalaaji, A., & Sangeetha, M. (2019). A Palm Vein Recognition System based on a Support Vector Machine. *IEIE Transactions on Smart Processing & Computing*, *8*(1), 1-7.
7. Soltane, M., & Bakhti, M. (2012). Multi-modal biometric authentications: concept issues and applications strategies. *International Journal of Advanced Science and Technology*, *48*.
8. Toshendra, K. S. (nd). *Private Blockchain: How It Is Different From Public Blockchain?* Blockchain Council. Retrieved 05 31, 2021, from https://www.blockchain-council.org/blockchain/private-blockchain-how-it-is-different-from-public-blockchain/
9. Telgad, R., Siddiqui, A. M., & Deshmukh, P. D. (2014). Fingerprint image segmentation using global thresholding. International Journal of Current Engineering and Technology, 4(1), 216-9
10. Reiff, N. (2020). *What Is ERC-20 and What Does It Mean for Ethereum?* Investopedia. Retrieved 05 31, 2021, from https://www.investopedia.com/news/what-erc20-and-what-does-it-mean-ethereum/
11. Ziechmann, K. (2021). *Introduction To Smart Contracts*. Ethereum.org. Retrieved 05 29, 21, from https://ethereum.org/en/developers/docs/smart-contracts/
12. Abbas, S. A. (2020, 11 30). *A Guide to Central Provident Fund (CPF) for New Employers*. osome.com. Retrieved 05 29, 2021, from https://osome.com/sg/blog/guide-to-central-provident-fund-for-new-employers/
13. abs.org. (n.d.). *PayNow - PromptPay linkage*. abs.org. Retrieved 06 01, 2021, from https://www.abs.org.sg/consumer-banking/pay-now
14. Alliedmarketresearch. (n.d.). *Biometric Technology Market by Type*. alliedmarketresearch.com. Retrieved 06 01, 2021, from https://www.alliedmarketresearch.com/biometric-technology-market
15. asianbankingandfinance.net. (2020). *Singapore card payments market to hit $158b in 2023*. asianbankingandfinance.net. Retrieved 05 20, 2021, from https://asianbankingandfinance.net/cards-payments/news/singapore-card-payments-market-hit-158b-in-2023
16. Binsted, S. (2021). *Credit card statistics Singapore*. Finder.com. https://www.finder.com/sg/credit-card-statistics
17. cia.gov. (n.d.). *Service Sector Singapore*. cia.gov. Retrieved 05 02, 2021, from https://www.cia.gov/library/publications/resources/the-world-factbook/geos/sn.html
18. commisceo-global.com. (n.d.). *Singapore - Language, Culture, Customs and Etiquette*. commisceo-global.com. Retrieved 06 04, 2021, from https://www.commisceo-global.com/resources/country-guides/singapore-guide
19. Doingbusiness. (n.d.). *EASE OF DOING BUSINESS IN Singapore*. doingbusiness.org. Retrieved 06 01, 2021, from https://www.doingbusiness.org/en/data/exploreeconomies/singapore#DB_sb
20. Doing Business. (2019, 10 24). *Doing Business 2020*. doingbusiness.org. Retrieved 06 01, 2021, from https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020
21. Dutta, S., BrunoLanvin, & Vincent, S. W. (2020). *GLOBAL INNOVATION INDEX 2020*. wipo.int. Retrieved 06 01, 2021, from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020.pdf
22. electionguide.org. (2020, 07 10). *Election for Singapore Parliament*. electionguide.org. Retrieved 06 01, 2021, from https://www.electionguide.org/elections/id/3338/
23. EnterpriseSingapore. (n.d.). *Singapore FTAs*. enterprisesg.gov.sg. Retrieved 06 01, 2021, from https://www.enterprisesg.gov.sg/non-financial-assistance/for-singapore-companies/free-trade-agreements/ftas/singapore-ftas
24. globaldata.com. (2020, 08 11). *COVID-19 accelerates shift to digital payments in Singapore, says GlobalData*. globaldata.com. Retrieved 06 02, 2021, from https://www.globaldata.com/covid-19-accelerates-shift-to-digital-payments-in-singapore-says-globaldata/

25. Government of Singapore. (2017, 5). *Intellectual Property Hub Master Plan*. ipos.gov.sg. Retrieved 06 01, 2021, from https://www.ipos.gov.sg/docs/default-source/about-ipos-doc/full-report_update-to-ip-hub-master-plan_final.pdf
26. Govtech Singapore. (2020, 06 08). *30% increase in FY2020 ICT spend to accelerate digitalisation & support businesses*. tech.gov.sg. Retrieved 06 02, 2021, from https://www.tech.gov.sg/media/media-releases/thirty-percent-increase-fy2020-ict-spend-to-accelerate-digitalisation-and-support-businesses
27. Heritage. (2021). *2021 Index of Economic Freedom*. heritage.org. Retrieved 06 01, 2021, from https://www.heritage.org/index/?version=744
28. heritage.org. (n.d.). *Singapore*. heritage.org. Retrieved 06 01, 2021, from https://www.heritage.org/index/country/singapore
29. Hirschmann, R. (2021, 06 03). *Nominal GDP breakdown Singapore 2019 by sector*. statista.com. Retrieved 06 01, 2021, from https://www.statista.com/statistics/1122999/singapore-nominal-gdp-breakdown-by-sector/
30. indexmundi.com. (2020, 11 27). *Singapore Age structure*. indexmundi.com. Retrieved 06 03, 2021, from https://www.indexmundi.com/singapore/age_structure.html
31. ingroupe.com. (2021, 03 29). *What are the advantages of decentralized digital identity?* ingroupe.com. Retrieved 06 01, 2021, from https://www.ingroupe.com/en/advantages-decentralized-digital-identity
32. Kumar, D. (2020, 10 29). *Introducing Amazon One—a new innovation to make everyday activities effortless*. aboutamazon.com. Retrieved 06 01, 2021, from https://www.aboutamazon.com/news/innovation-at-amazon/introducing-amazon-one-a-new-innovation-to-make-everyday-activities-effortless
33. marketline. (2021, 4). *Singapore In-depth PESTLE Insights*. marketline.com. Retrieved 6 1, 2021, from https://store.marketline.com/report/ml00002-024--singapore-in-depth-pestle-insights/
34. mas.gov.sg. (n.d.). *Singapore's Exchange Rate-Based Monetary Policy*. mas.gov.sg. Retrieved 04 01, 2021, from https://www.mas.gov.sg/-/media/MAS/Monetary-Policy-and-Economics/Monetary-Policy/MP-Framework/Singapores-Exchange-Ratebased-Monetary-Policy.pdf
35. McDonald, T. (2020, 10 25). *Singapore in world first for facial verification*. bbc.com. Retrieved 06 01, 2021, from https://www.bbc.com/news/business-54266602
36. mckinsey.com. (2021, 04 17). *Digital identification: A key to inclusive growth*. mckinsey.com. Retrieved 05 29, 2021, from https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-identification-a-key-to-inclusive-growth
37. mda.gov.sg. (2019, 06 11). *Technology Roadmap*. mda.gov.sg. Retrieved 06 02, 2021, from https://www.imda.gov.sg/programme-listing/technology-roadmap
38. Müller, J. (2020, 12 03). *Leading brands in payment cards in Singapore 2018*. statista.com. Retrieved 06 01, 2021, from Source: https://www.statista.com/statistics/895593/leading-brands-in-payment-cards-in-singapore/
39. Müller, J. (2021, 4 7). *Smartphone users in Singapore 2015-2025*. statista.com. https://www.statista.com/statistics/494598/smartphone-users-in-singapore/
40. *Parliamentary elections*. (n.d.). eld.gov.sg. Retrieved 06 01, 2021, from https://www.eld.gov.sg/elections_parliamentary.html
41. Perez, S. (2021, 02 01). *Amazon expands its biometric-based Amazon One palm reader system to more retail stores*. techcrunch.com. Retrieved 06 01, 2021, from https://techcrunch.com/2021/02/01/amazon-expands-its-biometric-based-amazon-one-palm-reader-system-to-more-retail-stores/
42. posb.com. (n.d.). *At a Glance*. posb.com. Retrieved 06 02, 2021, from https://www.posb.com.sg/personal/deposits/pay-with-ease/paynow
43. reports.valuates.com. (2019, 11). *Global Biometrics Market, Premium Insight*. reports.valuates.com. Retrieved 06 05, 2021, from https://reports.valuates.com/market-reports/360I-Auto-5V18/global-biometrics-market-insight
44. Sagar, M. (2020, 6 10). *Singapore Government to spend $3.5 billion on ICT procurement in 2020*. opengovasia.com. Retrieved 06 02, 21, from https://opengovasia.com/singapore-government-to-spend-3-5-billion-on-ict-procurement-in-2020/#:~:text=The%20Government%20will%20spend%20an,businesses%20recovering%20from%20COVID%2D19.
45. sg.finance.yahoo.com. (n.d.). *sg.finance.yahoo.com*. sg.finance.yahoo.com. Retrieved 05 20, 2021, from https://sg.finance.yahoo.com/quote/SGD%3DX/
46. *Singapore GDP - Gross Domestic Product*. (n.d.). countryeconomy.com. Retrieved 06 01, 2021, from https://countryeconomy.com/gdp/singapore

47. SingSaver Team. (2021, 04 21). *Financial News and Advice in Singapore*. singsaver.com. Retrieved 06 02, 2021, from https://www.singsaver.com.sg/blog/mobile-wallets-singapore
48. SingSaver Team. (2021, 04 21). *Mobile Wallets In Singapore: Complete 2021 Guide*. singsaver.com. Retrieved 05 27, 2021, from https://www.singsaver.com.sg/blog/mobile-wallets-singapore
49. singstat.gov.sg. (n.d.). *Singapore Government, the Information & Communications*. singstat.gov.sg. Retrieved 05 01, 2021, from https://www.singstat.gov.sg/modules/infographics/singapore-services-sector
50. Statista. (n.d.). Digital Payments. statista.com. Retrieved 06 04, 2021, from https://www.statista.com/outlook/296/124/digital-payments/singapore#market-revenue
51. Statista. (2021). Mobile POS Payments in Singapore. statista. Retrieved 06 1, 2021, from https://www.statista.com/outlook/dmo/fintech/digital-payments/mobile-pos-payments/singapore
52. Tee, O. C. (n.d.). *An exchange-rate-centred monetary policy system: Singapore's experience*. bis.org. Retrieved 06 01, 2021, from https://www.bis.org/publ/bppdf/bispap73w.pdf
53. ThalesGroup. (2021, 06 06). *Biometric data and privacy laws (GDPR, CCPA/CPRA)*. halesgroup.com. https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/biometrics/biometric-data
54. Valuates Reports. (2021, 01 15). *Biometric Technology Market Size is USD 11490 Million by 2026 at CAGR 11.0% | Valuates Reports*. prnewswire.com. Retrieved 06 01, 2021, from https://www.prnewswire.com/in/news-releases/biometric-technology-market-size-is-usd-11490-million-by-2026-at-cagr-11-0-valuates-reports-858312448.html
55. WatherSpark. (n.d.). *Average Weather in Singapore*. weatherspark.com. Retrieved 06 01, 2021, from https://weatherspark.com/y/114655/Average-Weather-in-Singapore-Year-Round
56. Wong, L. (2020, 04 15). *More people go cashless, e-payment volume soars amid Covid-19 crisis*. straitstimes.com. Retrieved 05 29, 2021, from https://www.straitstimes.com/tech/more-people-go-cashless-e-payment-volume-soars-amid-covid-19-crisis
57. Worldpay. (2018, 11). *Global Payments Report*. fisglobal.com. Retrieved 06 01, 2021, from https://www.fisglobal.com/-/media/fisglobal/WorldPay/Docs/Solutions/Global-Payments-Report
58. worldpopulationreview.com. (n.d.). *Countries By Density 2021*. worldpopulationreview.com. Retrieved 06 04, 2021, from https://worldpopulationreview.com/country-rankings/countries-by-density
59. World Press Freedom. (n.d.). *Ranking 2020*. rsf.org. Retrieved 06 01, 2021, from https://rsf.org/en/ranking/2020
60. Gibbons, M. (2021, 03 02). *List Of Essential HR Policies & Procedures (+ 4 To Avoid)*. peoplemanagingpeople.com. Retrieved 06 01, 2021, from https://peoplemanagingpeople.com/topics/list-hr-policies-procedures/
61. Mapletreecommercialtrust. (21). *Corporate Profile*. mapletreecommercialtrust.com. Retrieved 06 04, 2021, from https://www.mapletreecommercialtrust.com/About-MCT/Corporate-Profile.aspx#
62. MorganMcKinley. (2021). *Singapore Salary Guide Calculator 2021*. morganmckinley.com. Retrieved 06 02, 2021, from https://www.morganmckinley.com/sg/singapore-salary-guide-calculator
63. Nets. (20). *Interchange and Scheme fees*. nets.eu. https://www.nets.eu/en/payments/customerservice/acquiring/unblended-fees/
64. Roberthalf. (2021). *2021 Singapore Salary Calculator*. oberthalf.com.sg. Retrieved 06 03, 2021, from https://www.roberthalf.com.sg/research-insights/salary-guide/salary-calculator
65. Separates. (2021). *ULD Container Types: LD-1*. searates.com. Retrieved 06 02, 2021, from https://www.searates.com/reference/ld1/
66. ShipaFreight. (2021). *Quote*. pp.shipafreight.com. Retrieved 06 01, 2021, from https://app.shipafreight.com/quote?quoteId=512828
67. SPH Media Solutions. (2019). THE MULTIPLE STRENGTHS OF OUTDOOR MEDIA. https://www.imsph.sg/. https://www.imsph.sg/advertising-solutions/outdoor/#digital
68. Sussley, D. (2021, 01 14). *5 HR challenges for fintech companies*. hibob.com. Retrieved 06 03, 2021, from https://www.hibob.com/blog/hr-challenges-for-fintech/
69. T., Q. (21, 02 28). *Top 5 Singapore payment Gateways*. connectpos.com. Retrieved 06 05, 2021, from https://www.connectpos.com/top-5-singapore-payment-gateways/
70. Viaconnects. (2020). Viaconnects. Retrieved 06 05, 2021, from https://www.viaconnects.com
71. VivoCity. (21). vivocity.com.sg. Retrieved 06 05, 2021, from https://www.vivocity.com.sg/about-us
72. Aljouni, A., & Hakim, A. (2019). *Financial Technology in Banking Industry: Challenges and Opportunities.* ResearchGate. Retrieved 05 27, 2021, from https://www.researchgate.net/
73. Dorfleitner, Gregor & Hornuf, Lars & Schmitt, Matthias & Weber, Martina. (2017). *Definition of FinTech and Description of the FinTech Industry*.

74. Singapore Department of Statistics; SPH. (2020, August). *Average number of newspapers circulated daily in Singapore from 2011 to 2019*. singstat.gov.sg. https://www.statista.com/statistics/950259/singapore-daily-newspaper-circulation/

75. VEMINI EU. (n.d.). *Mission and Vision*. HomePage. https://www.vemini.eu/

76. Keller, T. (2021, 04 06). How to Run LinkedIn Advertising on a Small Budget. DELTA MARKETING.

10. Appendix

Appendix 1. Palm Hand Veins Acquisition and Data Elaboration

	ACQUISITION OF THE IMAGE	→	DATA ELABORATION
Step 1	**Acquisition:** VEMINI POS obtain the image of the vein palm through infrared-light camera.		**Device Layer (VEMINI POS - scan):** Contains biometric sensors to collect biometric data of users.
Step 2	**Pre-processing:** The color image is converted into grayscale in order to be computable by our software.		**Communication Layer (VEMINI POS - Terminal):** it transmits the data from biometric sensors and uses communicative technologies like WiFi, RFID,4G, Bluetooth, LTE, and satellite.
Step 3	**Feature Extraction**: the image is overlapped to the others in the database.	→	**Cloud Service:** After the data is collected it is divided in three parts. Two parts will be transmitted to a cloud or a server and the third part will be visible to the user through his smartphone (trusted device).
Step 4	**The pattern matching:** After the image is obtained, the next step is to determine if this pattern matches the one in the database that exists.		**Application Layer**: it uses applications that interface such as Google App Engine. Thanks to API, it is possible to design different applications for, biometrics sensor, healthcare, home security, and the device layer access to application layer directly for getting services - in this case payments.

Source: *(International Conference on Artificial Intelligence and Smart Systems (ICAIS), 2021)*

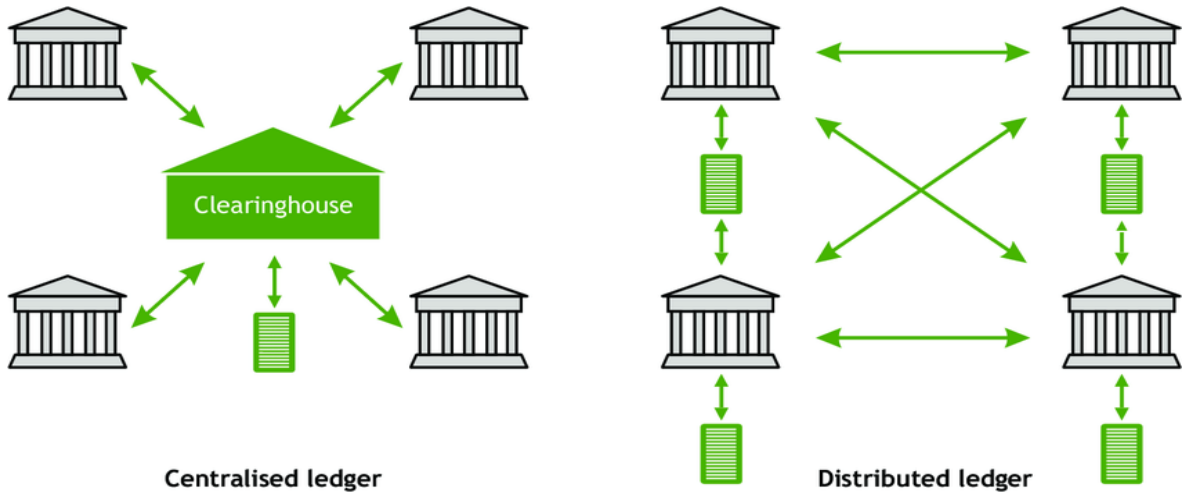
Appendix 2. Ethereum, Decentralization and Data Compliance.

Public Blockchains: Ethereum

Blockchain systems can be private or public. About data management, private blockchain do not differ so much from traditional databases: they are owned or centralized by private institutions who control them (Toshendra, nd). Public blockchains are guaranteed by a decentralized network, composed by nodes - participants to the chain - that can be our computers or smartphones. Public blockchain are also known as Distributed Public Ledger

(DPL). The blockchain system, when implemented in a decentralized manner, makes it impossible to come back to prior chains and change it. That is, when an individual does a transaction using the blockchain, he/she cannot cancel tracks of that transaction. When a block is filled, it becomes a stone that is impossible to remove. Therefore, it is impossible to modify an action that someone decided to take through a blockchain system. Let's say individuals can identify their identity through a public blockchain system in order to access a building. Once he/she is identified, the information of access to the building is stored into the blockchain and is impossible to remove. The most famous examples of DPL are Bitcoin and Ethereum Blockchains. However, in the Bitcoin system, the energy required to verify a network transaction is very high and its interoperability with other blockchains is low. VEMINI blockchain system is Ethereum-based, and works with tokens (ERC-20) and smart contracts (Reiff, 2020). When a token is exchanged, an action (or a transaction) is authorized. The exchange of token is possible thanks to smart contracts while the operation is not controlled by a user, but is deployed and stored in the Ethereum network. Hence, users can submit a transaction that executes a function (pay, access) defined on the smart contract (Ziechmann, 2021).

CENTRALIZED LEDGER VS DISTRIBUTED PUBLIC LEDGER



Source: Research Gate, 2018

Decentralization & Data Safety

A decentralized network means to stop relying on central institutions to guarantee the authenticity or originality of a transaction, or the identity of a person or a document, for example. By decentralizing such identities, it makes it possible to build a unique interoperable network that guarantees the univocity of any document or identity, and the full and exclusive access to your data.

Let's make an example: For travelling, during covid pandemic, countries ask for a covid test during the check-in controls in order to comply with the policy of the country of destination. However, it is possible to make covid test in thousands of different institutions (public hospitals or private clinics). Hence, for the airline operators, it is impossible to verify the authenticity of the various covid tests. Both paper and digital tests are very easy to tamper, since any unique entity guarantees the authenticity of them. By uploading the test results to the blockchain, the uniqueness and originality of that test is impossible to compromise. Immediately, whatever airline operator can access the blockchain and verify the authenticity of the test. In case the test is a copy, they will see that the copy does not exist in the blockchain, or that it does not match to the original.

Another more common example is the one of a bank. Banks hold clients' money. All of them are stored in a single place and a single entity is in charge of such money. Without a bank, people would not be able to execute a transaction. With blockchain, there is no single place or single entity. Here, participants of the peer-to-peer network are the ones that can join and verify the validity of actions or transactions (Ledger Academy, 2020).

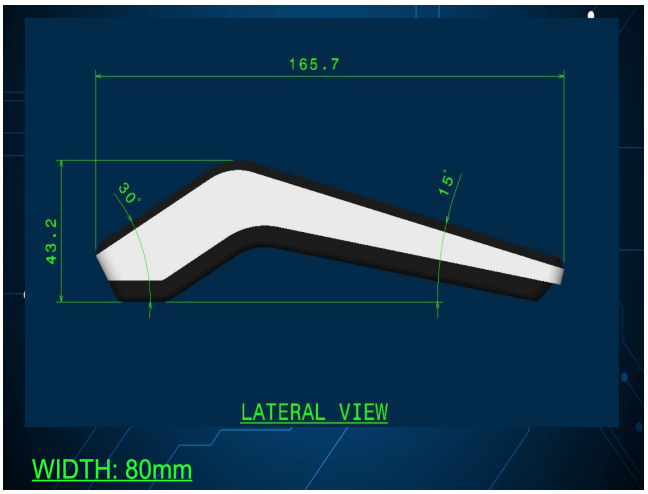
Summing up, identities issued or actions guaranteed by central institutions have serious problems:

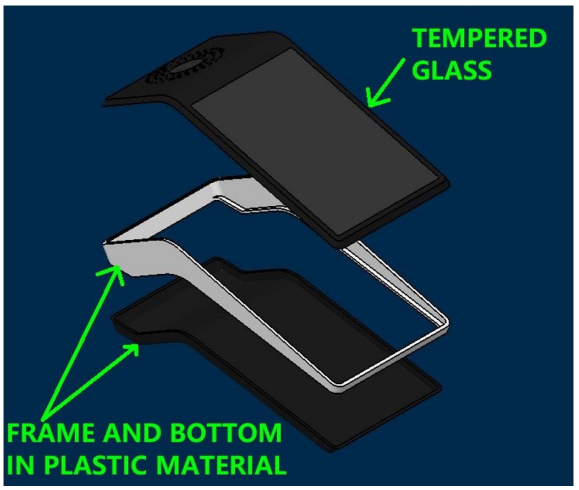
- Possibility to be faked or replicated
- Possibility to theft identities
- Tough or impossible interoperability
- They are not recognized worldwide in some cases

Vemini EU is currently developing blockchain and biometrics technology to authenticate the originality of identities (mainly for employees), of documents (bill of ladings, letter of credits), in order to operate in B2B and B2G channels. In Singapore, we are expanding the usage of VEMINI technology to the B2C segment, allowing people to pay for access to their buildings without the usage of items, badges or devices. To do so and make it rentable, VEMINI uses the identity as a service approach, becoming actually a digital identity provider that guarantees the back end technology and additional services to the VEMINI ecosystem.

Appendix 3. VEMINI POS TERMINAL FACT SHEET

UNPRECEDENTED SECURITY CERTIFICATIONS	INCREDIBLY ADAPTABLE	EXCEPTIONAL PERFORMANCE
• PCI PTS v5 .x • Blockchain Scheme Certification • Data partition • Vemini servers	• Barcorde Reader • Hand Palm Reader • Accept all payments types (included cryptocurrency and credit cards) • Flexible to integrate any business application • Handy dimension (43x80mm 166mm /sec) • Lightweight 496g	• High Security Processor • High speed Quad-Core Processor • Operable under extreme conditions • Android open architecture OS • 5.5” Color LCD color screen • Speaker and 4 Pole audio jack + Microphone





Appendix 4. Ease of doing business ranking, 2020

Rank	Economy	DB score
1	New Zealand	86.8
2	Singapore	86.2
3	Hong Kong SAR, China	85.3
4	Denmark	85.3
5	Korea, Rep.	84.0
6	United States	84.0
7	Georgia	83.7
8	United Kingdom	83.5
9	Norway	82.6
10	Sweden	82.0

Source: Doing Business 2020 (Doing Business, 2019)

Appendix 5. Singapore PESTLE Analysis

POLITICAL FACTORS

- Country's constitution and legal system is inspired by the UK constitution.
- The president and the parliament are elected democratically by Singapore citizens every five years (Parliamentary Elections, n.d.). Despite the several parties present in the country, the political system has been dominated by the People's Action Party (PAP) since Singapore's 1965.
- In 2020 the main government opposition received only 10 seats and the Progress Singapore Party only 2 seats, over 104 in total (electionguide.org, 2020).
- Currently, the Singapore president is Halimah Yacob. The president decides the Prime Minister, Lee Hsien Loong, who led the executive power.

ECONOMIC FACTORS

- Singapore total GDP amounted to $372 trillion in 2019, growing constantly since the independence of 1965 (Appendix 2).
- Population of just 5 million people and a very small country, Singapore is the 35th country in the world per nominal GDP and GDP per capita doubled in 10 years. (Singapore GDP - Gross Domestic Product, n.d.)

Singapore GDP	**2019**	**2009**	**% Growth**
Total GDP (Nominal) **Total GDP (PPP)**	$372 trillion $578 trillion	$194 trillion $330 trillion	91.75% 75,15%
GDP per capita (nominal) **GDP per capita (PPP)**	$65,230 $101,460	$38,930 $66,150	67,55% 53,37%

Source: Our Elaboration; Data: IMF

- The service sector makes up 75.20% of GDP, against 24.80% for the industrial sector (cia.gov, n.d.). Wholesale and retail trade - our first target partners - account for 17.3% of the total GDP (Appendix 3) (Hirschmann, 2021).
- According to the Singapore Government, the Information & Communications sector - Vemini sector - jointly with the financial sector - was the fastest growing industry in the 2013-2018 period, followed by the transport and storage service (singstat.gov.sg, n.d.).
- Singapore currency is the Singapore Dollar (SGD, S$). The monetary policy is managed by the Monetary Authority of Singapore. The MAS is using a unique

approach, it relies only on the exchange rate to regulate the economic growth rather than regulate the overnight interest rate (Tee, n.d.). Singapore's exchange rate regime is an intermediate regime, the currency is managed against a basket of currencies, and it can fluctuate within a small range and the level and direction of exchange rate changes is announced semi-annually to the market (mas.gov.sg, n.d.).

- As a reaction to the COVID-19, the MAS relaxed its monetary policy giving stimulus to investments. In March, the MAS depreciated the currency to S$1.46 USD/SGD, as a reaction to the pandemic and successively got it back to S$ 1.32 USD/SGD in February (sg.finance.yahoo.com, n.d.). Translated, 1€ worth S$ 1.606 and the currency risk is directly related to USD/EUR exchange rate oscillation, while the USD/SGD variation is limited by the peg system and entirely decided by the Monetary Authority (Appendix 4).

SOCIAL FACTORS

- In Singapore people have 100% access to health care services and clean drinking water. Citizens who earn more than $500 a month must contribute 10% to a state fund, which becomes a public pension fund for people with disabilities, adults, death, illness or maternity. (Abbas, 2020)(commisceo-global.com, n.d.).
- In Singapore, approximately 90% of residents have their home with private property. The population density is 8,109 inhabitants per km2, the 3 biggest in the world. (worldpopulationreview.com, n.d.)
- 70% of the population is fluent in English.

Age structure of the population in Singapore:

0-14 years: 12,8% (male 406,983/female 387,665)

15-24 years: 15,01% (male 457,190/female 474,676)

25-54 years: 50.73% (male 1,531,088/female 1,618,844)

55-64 years: 10.58% (male 328,024/female 328,808)

Over 65 years: 10.89% (male 310,123/female 366,259) (indexmundi.com, 2020)

- The Indicator of Economic Freedom is 89.4 points of 100. Not only the best in the asian pacific area, also in the world, Singapore is in first place from 180 countries. (heritage.org, n.d.)
- The Indicator of the freedom of press Singapore is ranked 158/180 in the world. Singapore went down by 7 places to the year 2019. (World Press Freedom, n.d.)
- In e-commerce 68% of the Payments get done through Credit Cards. At least 73% of all Singaporeans own at least 1 credit card but 10% of them have 6 or more credit Cards. Overall there are over 5.6 million Credit Cards in circulation (Binsted, 2021). Because of Covid-19 the push to cashless payments is growing at a fast

pace. The government of Singapore aims to erase cash transactions by 2025 (globaldata.com, 2020).

- Cashless payments include credit card payments but also mobile payment transactions in physical retail stores. Mobile payment transactions are substituting the credit card ones. The number of people owning a smartphone is around 4.7 million in Singapore (globaldata.com, 2020). Mobile POS payments accounted for $2 billions in 2019 and it is expected to grow to $13.9 billions by 2025, surpassing the digital commerce transactions total value by 2024, a tough market segment to target given the strong competitors in the country such Paypal and Alipay. Nevertheless, Mobile POS payments are forecasted to achieve 1.5 millions of users by 2025 (from 0.5 millions in 2019), with an average transaction value per user of 10,217.63 US dollars, way higher than digital commerce average transaction value (Appendix 5, 6 and 7).

TECHNOLOGICAL FACTORS

- In 2020, Singapore was ranked 8th out of 129 countries in the Global Innovation Index (USA 3rd, Germany 9th and China 11th), but Singapore ranks 1st among the 15 economies in SouthEast Asia and Oceania (Dutta et al., 2020).
- Policy moves are shaped in order to attract and give rise to high value industries. Services 4.0 is the vision that will drive Singapore to gather economic opportunities. The next technological transition, the so called services 4.0, will be one of seamless services that are end-to-end, frictionless, smooth and can anticipate customer needs in a new way using cutting-edge technologies (mda.gov.sg, 2019). It is right in this space that Vemini Biometric Authentication System will come to life.
- In 2013, the Singapore government deployed the Intellectual Property Hub for making Singapore the leading country for developing intellectual property. The government proposed the introduction of an IP-Box tax regime similar to the ones in the Netherlands and Ireland. Since 2018, companies that gather qualifying IP income (royalties or other income receivable as consideration for the commercial exploitation of qualifying IP rights) can apply concessionary corporate tax rates from 5% to 10% (mda.gov.sg, 2019). The sovereign government encourages the development and registration of IP through copious financial incentives and a favorable tax regime (mda.gov.sg, 2019).
- Emerging companies are more and more IP-rich but asset-light, the government guarantees assistance and a prosperous environment. For innovative companies there is the opportunity, granted by the government, of using the IP financing scheme to obtain bank loans using patents, trademarks or copyright. (Government of Singapore, 2017) The government is full-time engaged in enhancing Informations and Communications Technologies and leveraging it for economic and social upgrade and modernization (marketline, 2021). Nowadays, the

government is stimulating ICT services by sponsoring a wide variety of programs such as e-governance and e-banking. During 2020, as a recovery plan from COVID 19 to boost the economy, the government invested almost $3.5 billion on ICT supplies, 30% more from 2019 fiscal year (Govtech Singapore, 2020). The investments are focused in five key areas: new tech tools to respond to COVID-19, expansion of digital services, development of cloud systems, modernisation of infrastructure, use of data analytics and artificial intelligence for the public sector, areas that Vemini Project fully exploits (Sagar, 2020).

- Finally, Asia-Pacific market is among the fastest growing markets in biometric technology. Singapore is considering using biometric systems to access airports. Vemini can be easily used as a biometric recognition system in which the government and especially people can rely, since it associates a univoque digital identity to individuals and is in compliance with privacy and data usage concerns (Alliedmarketresearch, n.d.).

ENVIRONMENTAL FACTORS

- More than 60% of the land is urbanized, dedicated to residence, commerce and to a lesser extent, industry, with the rest dedicated to natural parks, swamps and green areas.
- This country is in a privileged place at the center of the trade route between Asia and the Middle East. Singapore has an approximate area of 637.50 km2, in the last 25 years they have managed to grow through land reclaimed from the sea, through movement of land on the island or dredged from the ocean floor. (WatherSpark, n.d.)

LEGAL FACTORS

The legal research relies mainly on the data found in the Ministry of Law of Singapore and the World Bank Reports. The main topics covered will be the judicial system, the tax regulations, the trade regulations, the ease of starting a business and regulation of biometric data.

Business Related

- The regulatory environment is extremely business friendly. According to the WB's 2020 Doing Business Report, Singapore was ranked 2nd in the world in terms of ease of doing business. Foreign investments are welcomed in most sectors and trade barriers are modest.
- The threat of expropriation is non-existent, contracts are valid and recognised from the legal system and the judicial system guarantees the protection of law.

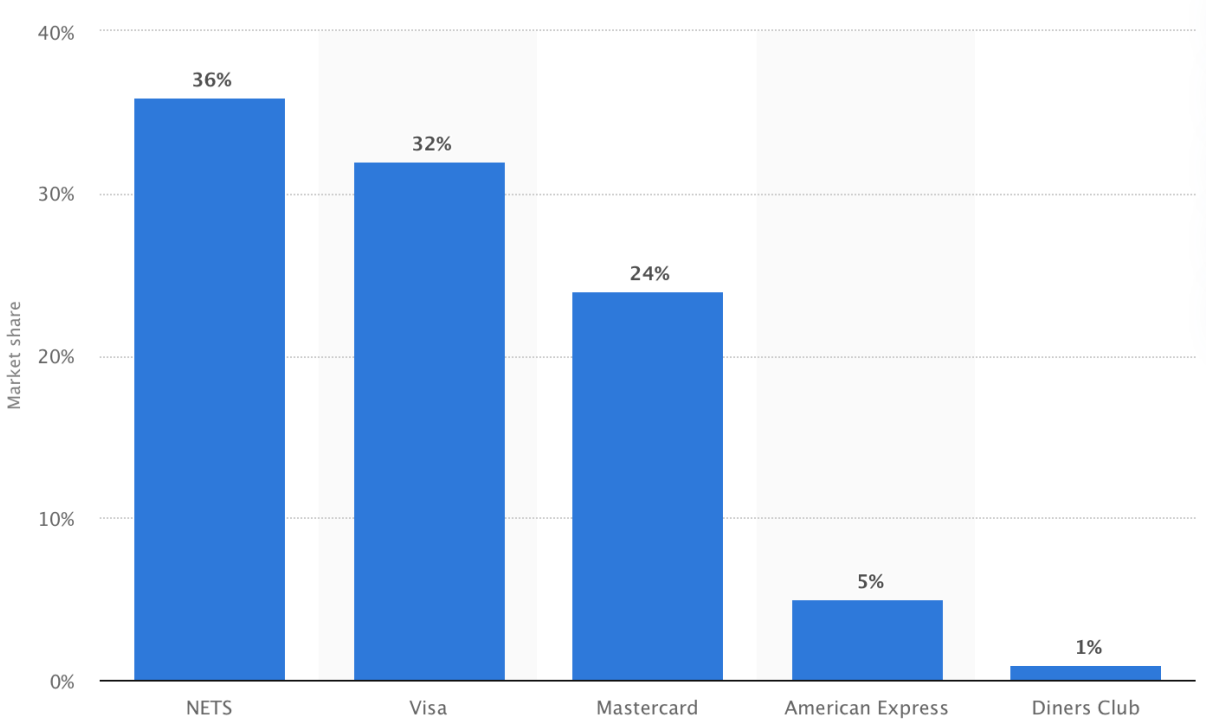
Furthermore, corporate and individual income taxes are among the lowest in the world (marketline, 2021).

- Based on the WB's data, Singapore was ranked 2nd in the world for the ease of doing business and 4th for ease of starting a business. Since 2007, Bizfile+ platform has been providing business assistance and services to customers at the point of company registration (Doingbusiness, n.d.). The procedure is generally carried out online and takes on average less than half a day. Furthermore, the associated costs of starting a new business usually do not exceed SGD 315(EUR 195) (Doingbusiness, n.d.) , SGD 15 for company name fee and SGD 300 the registration fee. Furthermore, paid-in minimum capital is not required.
- About trade and business policies, Singapore is very market oriented and promotes a strongly open economy and free trade. The government encouraged numerous regional and bilateral agreements with foreign partners.
- Singapore belongs to the regional intergovernmental organization ASEAN and to the CPTTP, plus stipulated several bilateral agreements with important economies such as China, India, Japan, EU and US (EnterpriseSingapore, n.d.). According to the Heritage Foundation, Singapore is the first country over 180 in the 2020 Index of Economic Freedom (Heritage, 2021).

Biometrics and Privacy Related:

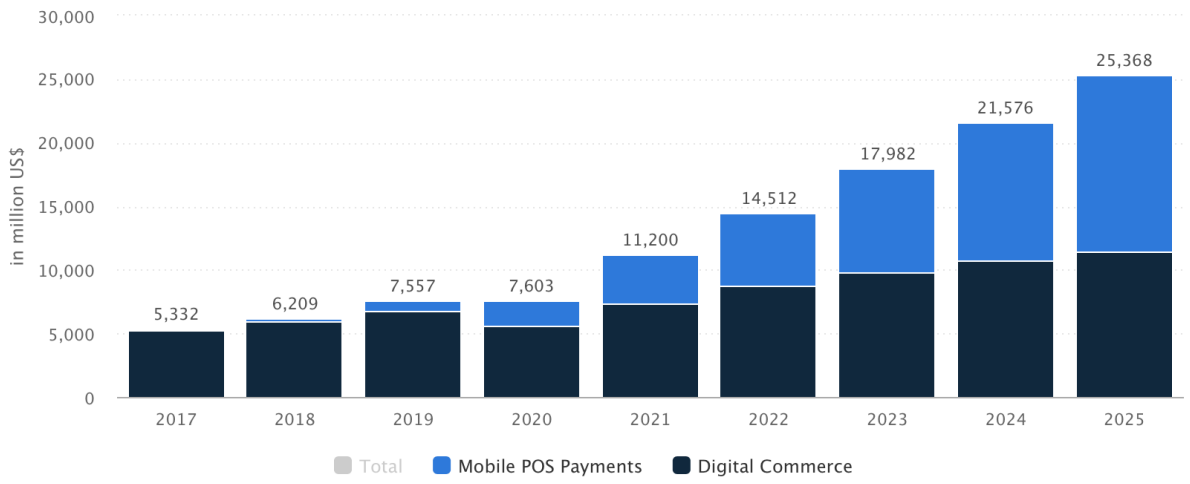
- Since 24 May of 2016 there is an official law of storing biometric data information, biometric data are personal datas of each individual, that's why since the 24 of May the law says that it is not possible to store personal biometric data as a Company (ThalesGroup, 2021). This law has no indirect influence on our Project, because Vemini do not store biometric data, this process is done through Blockchain. So no personal data is stored from the company point of view. Singapore just announced that it will be the first country in the world which will use facial recognition in government services but also in private services (McDonald, 2020). This is a huge step forward of realizing the Vemini project.

Appendix 6. Market share of the leading payment card in Singapore in 2018



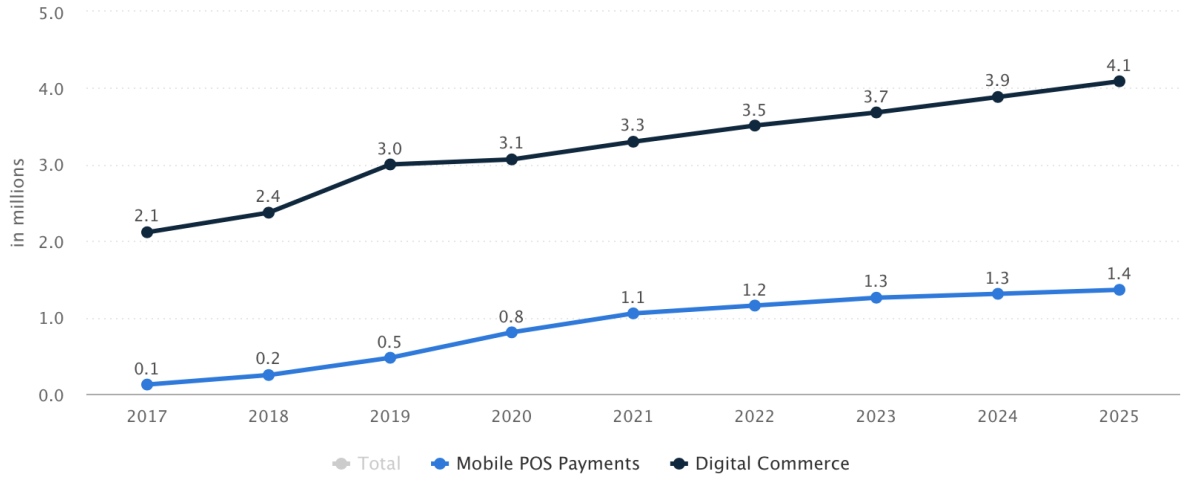
Source: (Müller, 2020)

Appendix 7. Digital Payments Transaction Value Millions of Dollars, Singapore



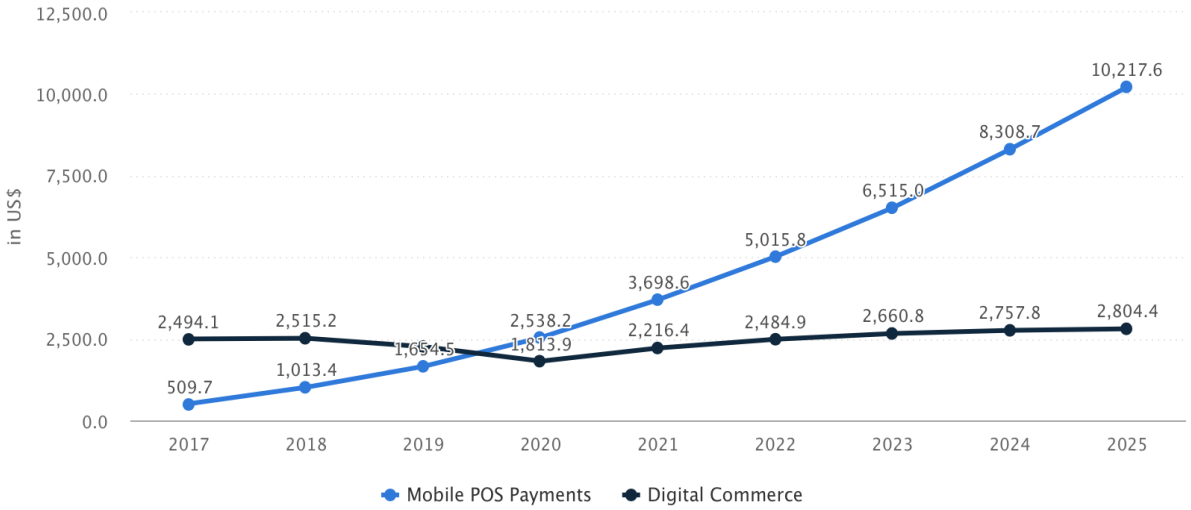
Source: STATISTA 2021 (Statista, n.d.)

Appendix 8. Users in Million, 2017-2025 Singapore



Source: STATISTA 2021 (Statista, n.d.)

Appendix 9. Average Transaction Value per User, 2017-2025 Singapore

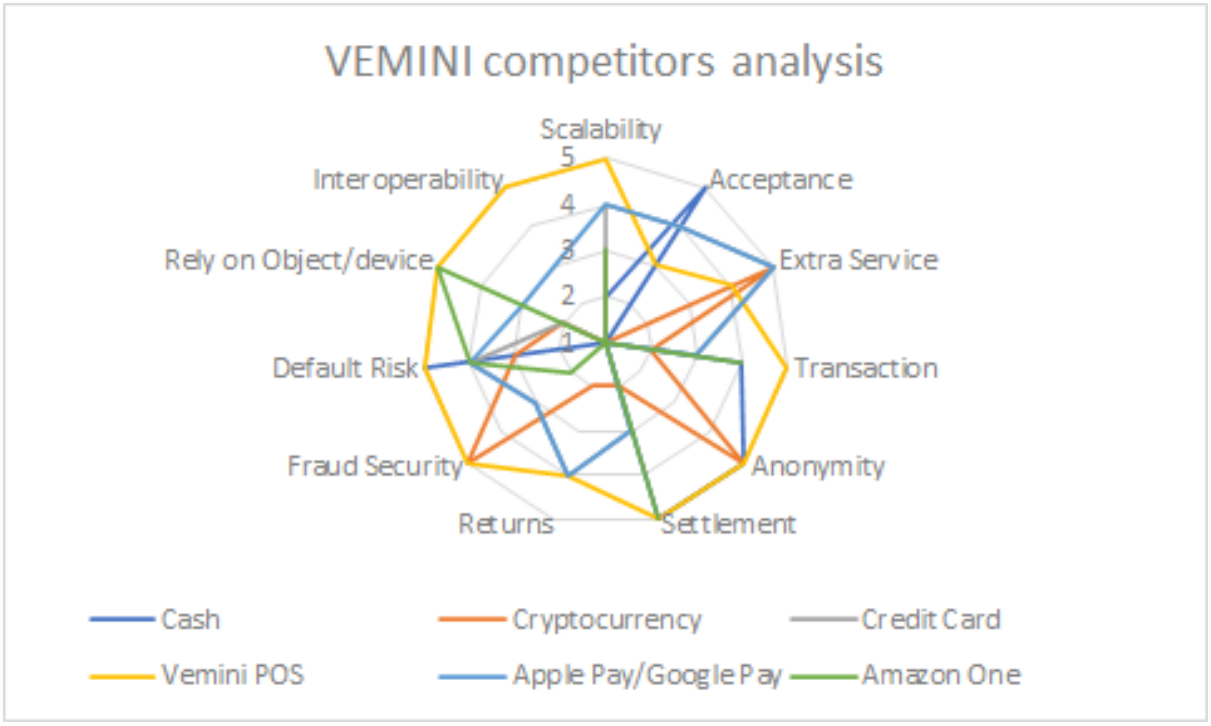


Source: STATISTA 2021 (Statista, n.d.)

Appendix 10. Competitors Analysis

PAYMENT METHODS	Scalability	Acceptance	Extra Service	Transaction	Anonymity	Settlement	Returns	Fraud Security	Default Risk	Rely on Object/ device	Interoperability
Cash	2	5	1	4	5	5	1	1	5	1	1
Cryptocurrency	3	1	5	2	5	2	2	5	3	2	1
Credit Card	4	4	5	3	1	3	4	3	4	2	1
Vemini POS	5	3	4	5	5	5	4	5	5	5	5
Apple Pay/Google Pay	4	4	5	3	1	3	4	3	4	3	3
Amazon One	3	1	1	4	1	5	1	2	4	5	1

Graphic Representation



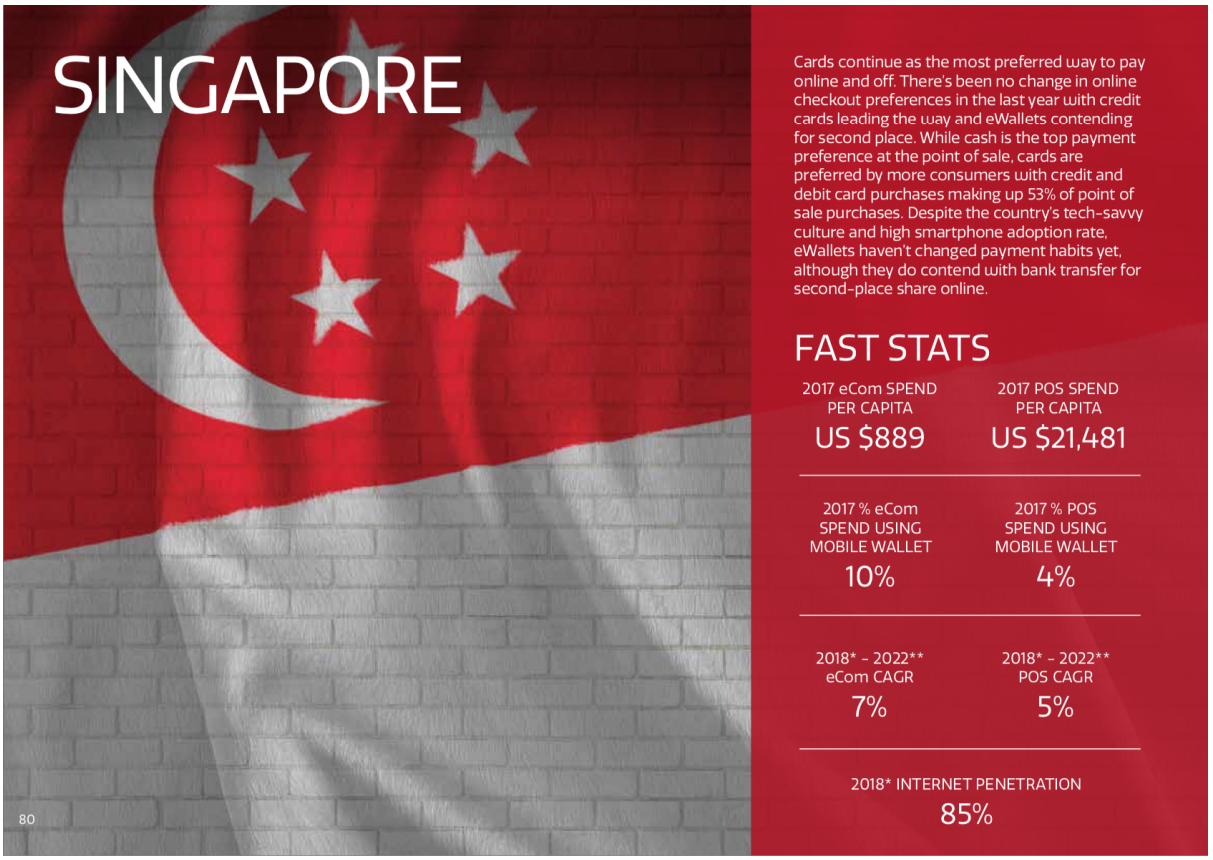
Appendix 11. SWOT ANALYSIS

Opportunities	Threats
Cashless: ● Big trend of cashless payments ● Potential Expansion worldwide ● The market for cashless transactions is high in Singapore ● Low market entry barrier ● Growing Market (e-payments) ● Government involvement ● Health care involvement ● Curbing Black Money ● Tax collection **Biometric & Blockchain:** ● Low number of direct competitors ● Potential expansion in other industries (housing, hospitality,access,logistic) ● Guarding against cyber attacks, phishing, data hacking, data gathering, centralization of private data	**Cashless:** ● Competitors in the e-payment industry ● Attractive market ● Not a long time span for testing and evaluating ● Traditional Banking ● Malware attacks ● SIM swapping ● Phishing **Biometric & Blockchain:** ● Data protection issues ● Legal Threats - Laws, Regulations ● System hacked ● Device's supplier shortage ● Biometric data gathering/storage ● Technological Changes ● Regulation barriers among states

Strength	Weaknesses
Cashless: ● Outsourcing Technologies ● Innovative process that involves and links unique tools of the new tech transformation ● Convenient and fast ● Non Transferable (Security) ● Spoof-proof **Biometric & Blockchain:** ● First mover ● Differentiation to market competition / Uniqueness ● High Security both during transaction	**Cashless:** ● Market newcomer ● Cash is still king in transactions ● Limited experiences ● Weak distribution channels and unconventional value proposition ● Weak brand identity ● Limits privacy for users ● False rejects and false accepts can occur preventing users from accessing systems **Biometric & Blockchain:** ● Lack of infrastructures ● E-literacy gap ● Distrust in decentralised infrastructures

and data processing ● Flexible start-up which is led by strong individuals with idealism ● Hygienic cashless payment ● Blockchain integration ● Passwordless authentication ● Easy to use ● Easy to connect other accounts ● Financial Inclusion	● Shortage of suppliers ● Relying on a already existing third-party platform (blockchain)

Appendix 12. E-commerce payment methods, by value, 2017.

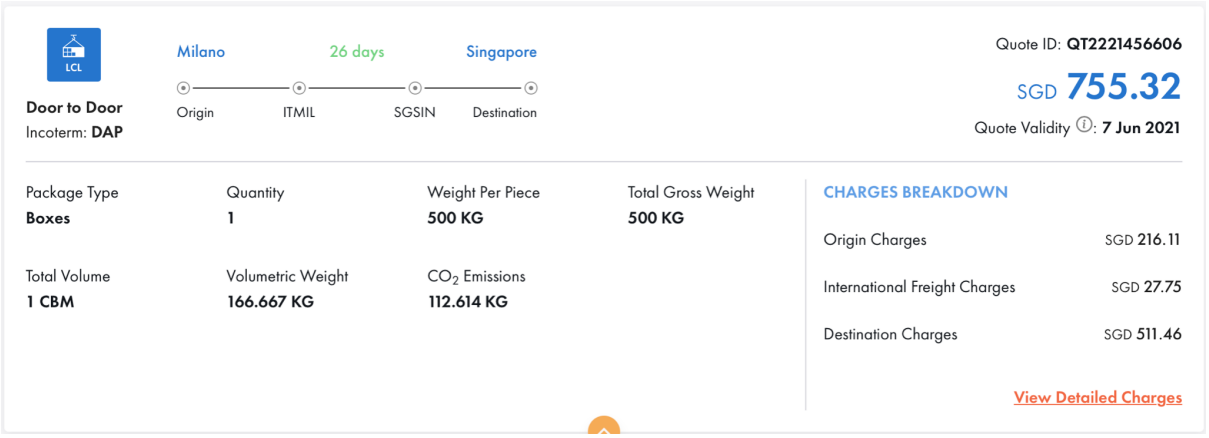


Source: (Worldpay, 2018)

Appendix 13. Balanced Scorecard and Strategy Map

Strategy Map		Balanced Scorecard	
VEMINI Singapore		Measure	Target
Financial Perspective		Total profit growth.	- 20% profit growth - Growth rate of 140% after first year and 244% after the fourth year.
Costumer Perspective		Market share, number of new stores.	- Capture uncontested market space. - 4% of store affiliated after three years. - 8% of transactions per day after five years.
Process Perspective		Brand awareness level, numbers of transactions.	- Raise technology awareness. - Raise brand awareness. - Over 400 stores after year 1. - Over 8000 transactions per day after year 1.
Learning and Growth Perspective		% of Technicians trained, % of users trained.	- 100% trained technicians to install POS. - 100 participants in retailers workshops after 1 year.

Appendix 14. Vemini POS Terminal Shipment, Delivery At Place - Total Cost



LCL

Door to Door
Incoterm: **DAP**

Milano — 26 days — Singapore

Origin — ITMIL — SGSIN — Destination

Quote ID: **QT2221456606**

SGD **755.32**

Quote Validity ⓘ: **7 Jun 2021**

Package Type	Quantity	Weight Per Piece	Total Gross Weight
Boxes	**1**	**500 KG**	**500 KG**

Total Volume	Volumetric Weight	CO_2 Emissions
1 CBM	**166.667 KG**	**112.614 KG**

CHARGES BREAKDOWN

Origin Charges	SGD 216.11
International Freight Charges	SGD 27.75
Destination Charges	SGD 511.46

View Detailed Charges

Source: (ShipaFreight, 2021)

Appendix 15. Vemini POS Terminal Dimension for Shipment - Fact Sheet

POS Terminal Dimension per Unit:	**Pallet Dimension and Shipment Cost:**
- Length: 165.7mm - High: 43.2mm - Wide: 80mm - Weight: 496g *Packaging will include safety space: so one package will be length 180mm, high 50mm, wide 90mm	- Total Number: 1000 POS Terminal. - Total Volume: 0.810cbm (Approx. 1cbm) - Total Weight: 496kg (Approx. 500kg)
Incoterm: Delivery At Place (DAP) From Milan to Singapore Shipment Cost: S$ 755 (Approx. 470€) Forfait Costs (Unexpected Expenses): S$ 160 (Approx. 100€) Total: S$ 915 (Approx 570€, at 1.61 current spot rate S$/€)	

Source: (ShipaFreight, 2021) and (Separates, 2021)

Appendix 16. Logistic Strategy

Year 1 - "Kick off": Import Vemini POS Terminal from Europe:
● Vemini POS is built in-house, by assembling an LCD screen with a Palm Vein Scanner in a customized case built in-house by the Vemini hardware developers. ● Then, the Vemini Firmware (Android based) is installed to the POS Terminal, in order to integrate the DPL (Blockchain) and the back-end software. ● This alternative provides the quicker solution to get the fully developed hardware, however it is not economically efficient in large volume production for the high production costs (difficult to reach economies of scale) and relatively high shipping costs from Italy to Singapore. However, it ensures high quality standards and lower imitation risks. ● This step will be central for the Vemini Singapore launch in Singapore, in the first year.

Following years: Outsource Production - Partnership with Asian Supplier

- Vemini HQ manages the POS Terminal firmware and the Vemini back-end software: Merchants Software, Users Mobile Identity Manager Application and the Vemini Distributed Public Ledger (Blockchain). Vemini Singapore manages the business development, commercialization, marketing and legislation issues in the Asian market.
- Vemini Singapore hardware production will be outsourced to local manufacturers, by closing partnerships with Asian suppliers, with contracts guaranteeing the know-how of Vemini technology. Establishing detailed terms and conditions is crucial to avoid replication risk.
- Vemini Italy developers will help our partners by assisting them on-site in order to ensure a high quality device production, crucial for the success of Vemini, especially with potential future competitors.
- This solution is less costly and less risky for Vemini expansion in Singapore.
- Finally, this solution makes it possible to focus on the software development part and reduce hardware production costs and time consuming.
- The outsourcing contract needs to specify all the terms and conditions in order to avoid the replication risk.

Appendix 17. Job Description and Salary

1. **CEO:**

   The CEO of Singapore Vemini will be the person who is leading the expansion to Singapore. His/Her main tasks include ensuring profitable growth, managing, administering and initially recruiting the new employees. The CEO is responsible for the organisation of budget and personnel. He/she identifies new clients and market opportunities to match the forecast made in the business plan. Furthermore, this person is in charge of the strategic (>1 YEAR decisions and projects) planning of the company.

   Salary:

   A CEO salary in Singapore is around S$250,000 which is 154.656,71€. (Roberthalf, 2021). However, for the first three year at least, one of our members will cover this position and be paid around S$ 50.000.

2. **Head of Sales, Sales Executive, Sales Intern**

   The Head of Sales is responsible for the operational management and coordination of the sales activities in Singapore. Initially, they will cover the Sales Executive

position in order to follow the expansion projects ongoing, the budget, and deadlines. After year one we need to hire an additional employee as Project Manager to plan further expansion with new partners. Additionally, an Intern will be hired to assist the operations.

Salary:

The sales manager will earn S$140,000 which is around 86.607,76€. The related sales executive will earn S$90,000 which is 55.676,41€ annually. The intern will earn S$ 19.000.

3. **IT-Manager & Technicals**

The IT-Manager looks after and controls the entire IT infrastructure of a company. He/she is involved in the optimization of processes and workflows. He/she distributes the assignments that arise to his staff and supports them in developing solutions. IT managers must always keep an eye on the progress of their team. There will be only one IT-Manager, beneath him/her are the technicals which will coordinate the IT and also install the POS for our customers. The two Technicians will have a training at the beginning of their week, how to correctly install the POS in the customer place. After two years we need to hire two additional Technicians. The installation of a device will need 2 hours. In these 2 hours are the Logistics included.

Salary:

The IT manager will earn S$150,000 which is around 92.794,02€, the Technician will earn S$60,000 which is around 37.117,61€.

4. **Marketing Manager, Project Manager and Intern**

The marketing manager is responsible for the coordinated organisation of all advertising measures and the management of a company's marketing projects. This includes the advertising measures incl. measure planning, product and pricing design, but also budget management. He/she works closely with one Project Manager which will help him to ensure that projects will be on time, within budget, and completed the right way. Additionally, we employ an intern from the University of Singapore.

Salary:

The Marketing Manager will earn S$120,000 which is around 74.235,22€. The related project manager will earn S$90,000 which is 55.676,41€ annually. The intern will earn S$ 19.000.

5. Finance

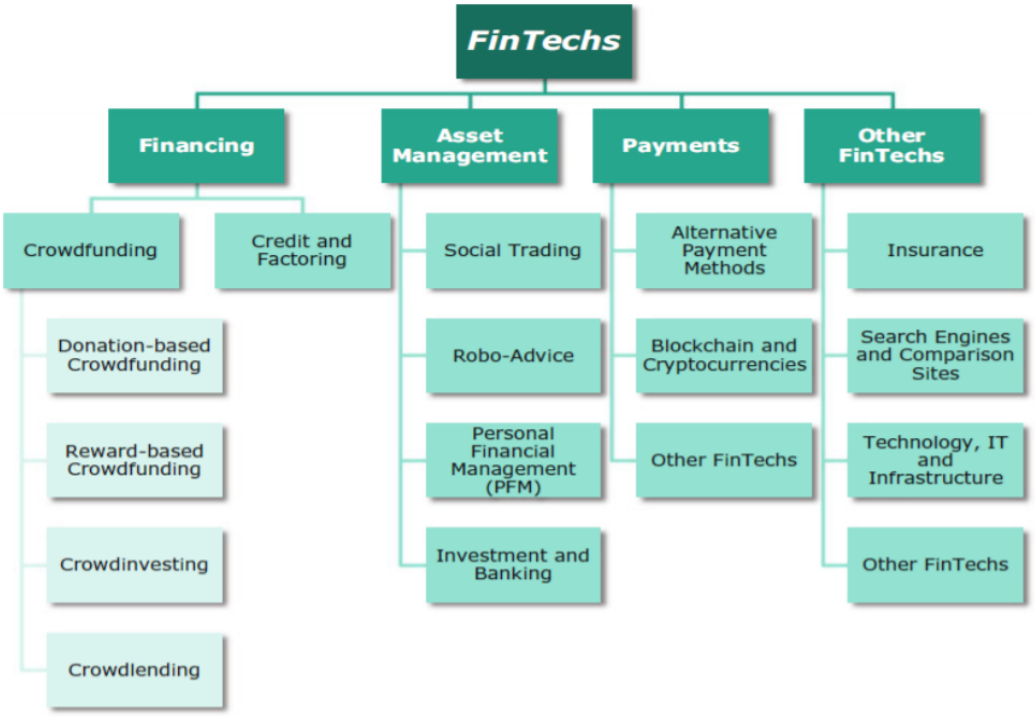
His/her tasks include managing the funds, budget and Report. The expenses allocated and the KPI. He is responsible for turnover, profit and loss.

Salary:

The finance manager will earn S$180,000 which is around 112,000€.

Source: (Morgan McKinley, 2021)

Appendix 18. FinTechs Industries



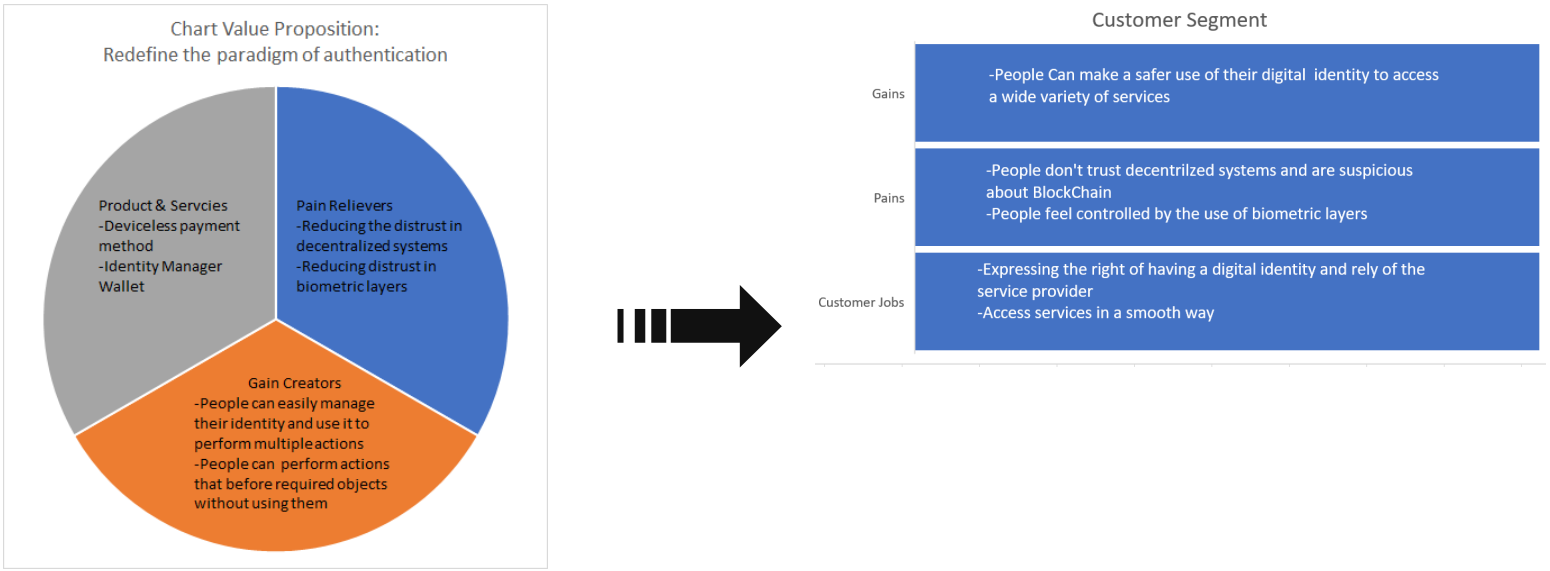
Source: Ajlouni and Hakim, 2019

Appendix 19. B2B Potential Customers

Appendix 20. Vemini Target Group

Target Group:	
Age:	25-34 years is the main segment where POS payments boast the largest diffusion. 35-44 is the second largest segment in Singapore. Lastly, 18-24 years (Statista, 2020).
Gender:	This kind of service is genderless, any human being can access FinTech services.
Income:	Targeting high and medium income people in Singapore.
Location:	Singapore
Computer literacy:	Level 2 - Basic Computing and Applications. Since in Singapore the internet penetration rate is 88%, our service is addressed to the majority of the population. Furthermore, the mobile POS payments increased and kept increasing at a tremendous rate (Appendix 8).
Work life, employment status and job type:	Targeting high and medium income people

Appendix 21. Value Proposition Canvas



Appendix 22. Businesses Subscription Plans

	Basic Plan	Business Plan	Business+ Plan
Total Price	7,99 SGD/month	9,99 SGD/month	99,99 SGD/month
Features Included:	- 1 Device (POS) - Basic Software	- 2 Devices (POS) - Basic Software - Customer Care	- 4 Devices (POS) - Advanced Software - Customer Care+
Transaction Fee 1st Year	0.15 SGD ~~0.15~~ 0.10 SGD	0.15 SGD ~~0.15~~ 0.10 SGD	0.15 SGD ~~0.15~~ 0.10 SGD
Account Managers	1	2	6
Unlimited bookings	✔	✔	✔
24/7 Support	✔	✔	✔
Print shipping labels	-	✔	✔
“Marketing Plan”	-	✔	✔

(Digital Logos,etc)			
Cash-flow report	-	✔	✔
Email Receipts	✔	✔	✔
Advanced Report	-	-	✔
Included POS	1	2	4
Extra POS	130€	100€	80€

Appendix 23. Strategic Qualitative Objectives

STRATEGIC > 1 YEAR	**TACTIC** 3 MONTHS - 1 YEAR	**OPERATIONAL** DAILY
The core project of Vemini is developing five different use cases: **Vemini ID:** offer a highly secure and versatile Identity and Access Management platform, customizable, remotely trackable and integrable with other legacy systems. **Vemini Biosignature:** offer a cutting-edge solution in the field of digital signatures by providing a trailblazing user experience and integrated technologies to guarantee measures of security. **Vemini POS:** Solution designed to redefine the paradigm of payment system	•Collaborating with all the stakeholders •Gather data and develop in-house detailed market researches • Acquiring local know-how about technology •Manufacturing decisions •Transportation and distribution strategy •Customers meetings frequency •Performance Review •Conversion Tracking •Implement strategic initiatives and control the	•Tasks programming •Day-to-day business operations •Sales Operations (B2B and B2C) •Business Development Operations •Strategic and Project Management •Performance Review •Budget Management •Social Media Management •Conversion Tracking •Reporting and Analytics •Align the staff (management and

by providing a cardless solution powered by our core decentralized biometric authentication. **Vemini ATM:** Pioneering new security level for cash withdrawal systems bypassing ostile strategies through technology .Creating a definitive solution to protect customers integrity. **Vemini Goods Tracking:** offer a fast, accurate, effective tracking of raw materials, products, shipments, fleets and containers wherever they are in the world.	ROI and •KPI's monitoring •Identifying strategic risks and opportunities •Using the lever of control to implement strategy	technicians) about the current situation of the company: tasks and goals

Appendix 24a. Online Promotion Format

PLATFORM	AUDIENCE	FORMAT - ASSETS	BUDGET
INSTAGRAM	**(same audience for each platform)** **Location:** -Singapore -Surrounding urban areas within 100km from the borders (outside Singapore)	**Post on feed** **File Type:** jpg or png Image ratio: 1.91:1 **Resolution:** 1080 pixel **Content:** Images that will be easy to understand, clear but impressive. **Text:** under the picture will be placed a small text (max 30 characters) with the link to download the app.	Advertising on Instagram will be mainly useful to improve brand awareness among final users and grow followers on the IG page. The challenge will come if the ad does not produce immediate ROI, but does grow other metrics like followers. In this case, we will need to estimate how follower growth will impact your business in the long run. On average, Instagram advertising costs between $0.20 to $6.70,

	Demographics-Age: 25-34 years is the main segment where POS payments boast the largest diffusion. 35-44 is the second largest segment in Singapore (Statista. (2021). Mobile POS Payments in Singapore.). **-Gender:** this kind of service is genderless, any human being can access FinTech services. **-Income:** Targeting high and medium income people (Statista. (2021). Mobile POS Payments in Singapore.) **-Behavior:** Cashless payment like-minded Fintech services users Users that are about to abandon cash Traditional payment methods	**Ad placement in stories - video clip** H.264 compression, square pixels, fixed frame rate, progressive scan, and stereo AAC audio compression at 128kbps+. **Video Ratios:** 9:16 **Video File Size**: 4GB **Video Length:** 15 seconds **Video Captions:** The world in your palm **Sound:** Optional **Video Thumbnail:** images that consist of 15% text in order to be clear and deliver a direct message to the audience	depending on the bidding model. For CPC, advertisers pay $0.20 to $2 per click. For CPM, or cost-per-impressions, advertisers pay $6.70 per 1000 impressions. The main audience will be 18-29 yo. The initial will be $20k at the beginning of the year, then depending on the results achieved, the KPI's and the conversion rate we can decide to implement the campaign with further $10k per year.
LINKEDIN		**AD Placement - Instant Article** **File type:** jpg or png **Image ratio:** ideal image size is 552 pixels wide by 368 pixels tall (or an aspect ratio of 3:2) **Resolution:** Highest Resolution allowed **Text:** 125 characters **Link:** direct link to download the app	On average, a click on an ad costs between $5-20 depending on the ad type and the target audience. The average click rate is 1.5% - 4%, and can be tied to whether your brand is relatively unknown (1.5%) or has a strong brand following (4%) (Keller, 2021). Realistically, to see significant results is it necessary to spend $20k at the beginning of the year, then depending on the results achieved, the KPI's and the conversion rate we can decide to implement the campaign with further $10k per year.
YOUTUBE		**Bumper Ads (non skippable)**	YouTube Bumper ads are charged by CPM, which means that you only pay each time the ad receives

		Duration: 6 seconds - Before, during or after a video. **Video Codec:** H.264, MPEG-2, MPEG-4 **Audio Codec:** AAC, MP3 **Video Ratio:** 640×360(19:9 aspect ratio) **Frame Rate:** 30 FPS. **File Size:** 1 GB	1,000 impressions. Generally, this type of YouTube ads cost between $1 and $4 per thousand views. We forecast to allocate $500 per day in the first six months for the only area of Singapore for a total of 90k in the first six months.

Appendix 24b. Online Promotion Target & KPI's

	KPI's
Awareness	-Conducting two online surveys per year to actual customers and potential customers -website traffic (organic research, direct research, social and referral) -social listening (volume of mentions, reach and engagement) -backlink success -employee brand advocacy metrics.
Consideration	-KPI's: page views, time spent on website -Engagement with page content and conversion rate of app downloads -Signups (email newsletter) -Bounce rates -Customer journey of the app through surveys via email.
Conversion	-Conversion rate optimization (CRO) -Cost per acquisition (CPA) -Average order value (referred to B2B and which specific subscription plan they adopt) -Customer Loyalty and Retention.

	-Lifetime value (LTV) that indicates the average amount of time a customer spends with the company and the consequent monetary value that this customer represents for the company. -ROI and ROAS of the marketing investment

Appendix 25. Payment Service Fees, in SGD and EUR

PAYMENT SERVICE - FEES FOR MERCHANTS				
Type	**Units**	**2020**	**2021+**	
POS per Store	2			
Transaction Fee		0.10 SGD	0.15 SGD	*(per transaction)*
Subscription Fee	9.99 SGD/month	119.88 SGD	119.88 SGD	*(yearly)*

	2020	**2021+**	
	0.06 EUR	0.09 EUR	*(per transaction)*
	90.82 EUR	90.82 EUR	*(yearly)*

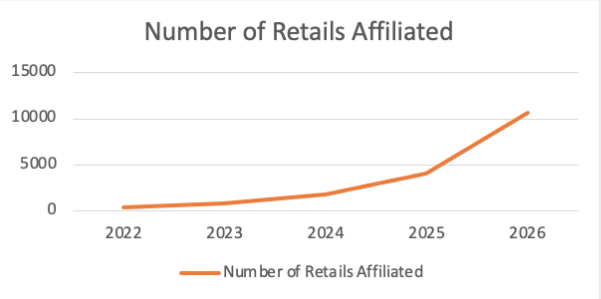
SPOT EXCHANGE RATE	
Forex	**Rate**
S$/€	1.61 SGD
S$/$	1.32 SGD

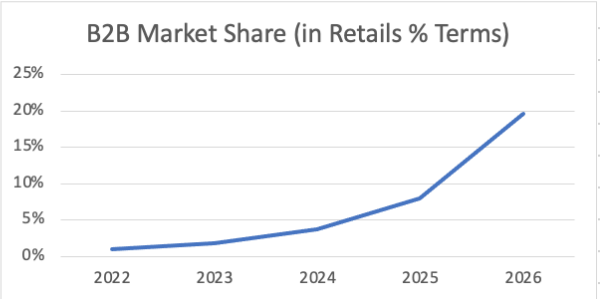
Appendix 26. Retailers Market Share and Sales Forecast

Revenues - Subscriptions	**2022**	**2023**	**2024**	**2025**	**2026**
Subscription (Quantity)	425	850	1785	4106	10674
Subscription (Fees)	50'949.00 SGD	101'898.00 SGD	213'985.80 SGD	492'167 SGD	1'279'635 SGD

TOTAL MERCHANTS			**CAGR 2016-2019**
Restaurants & Bars (2021)	13400	33%	
Other Retails (2019)	27637	67%	5.87%
Total	41037		
VivoCity Mall	*340*	*0.83%*	

STORE AFFILIATED (Forecast)				
Year	**Number**	**Growth Rate**	**Retailers N. in SG**	**B2B Market Share (in Retails N. Terms)**
2022	425		43445	1%
2023	850	100%	45995	2%
2024	1785	110%	48694	4%
2025	4106	130%	51552	8%
2026	10674	160%	54577	20%

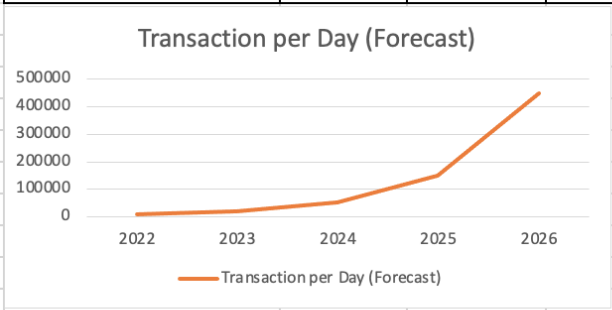


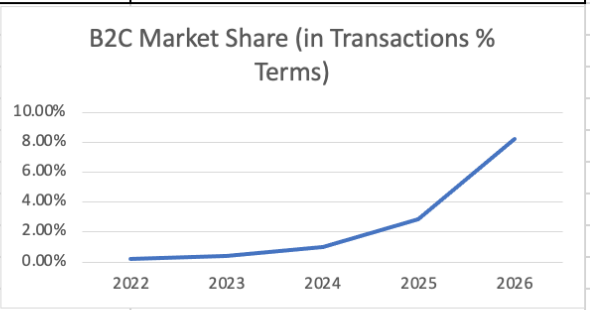


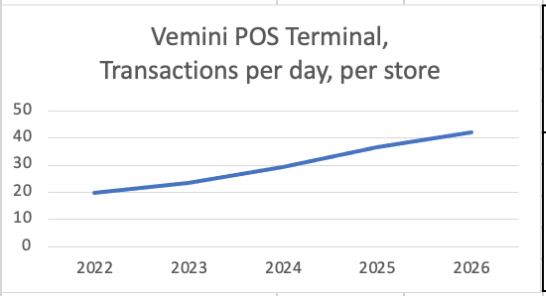
Appendix 27. Transaction Market Share and Sales Forecast

Revenues - Transactions	2022	2023	2024	2025	2026
Transaction (Quantity)	8333.3	20000	52000	150000	450000
Transactions (Fees)	300'000.00 SGD	1'080'000.00 SGD	2'808'000.00 SGD	8'100'000.00 SGD	16'200'000.00 SGD

TRANSACTION PER DAY (Forecast)				
Year	Number	Growth Rate	Transactions in SG	B2C Market Share (in Transaction N. Terms)
2022	8333		4751019	0.18%
2023	20000	140%	4921976	0.41%
2024	52000	160%	5099085	1.02%
2025	150000	188%	5282567	2.84%
2026	450000	200%	5472651	8.22%







Transactions per day, per store (each year)	
20	/at day, per store
24	/at day, per store
29	/at day, per store
37	/at day, per store
42	/at day, per store

Appendix 28. Operative Expenses

OPERATIVE EXPENSES					
	Year 1	Year 2	Year 3	Year 4	Year 5
New POS Installed (Quantity)	425	425	935	2321	6569
Cumulative POS (Quantity)	850	1700	3570	8211	21349
YEAR	2022	2023	2024	2025	2026
Operative Expenses					
COGS	249'050 SGD	361'250 SGD	772'310 SGD	1'831'053 SGD	4'933'169 SGD
- Device Setup	136'850 SGD	136'850 SGD	301'070 SGD	747'201 SGD	2'115'154 SGD
- Device Maintenance	112'200 SGD	224'400 SGD	471'240 SGD	1'083'852 SGD	2'818'015 SGD
Sales & Marketing	400'000 SGD	460'000 SGD	529'000 SGD	952'200 SGD	1'713'960 SGD
Office Rent	2'640 SGD	5'280 SGD	7'480 SGD	11'440 SGD	13'200 SGD
Ammortization & Depreciation	184'557 SGD	321'273 SGD	635'486 SGD	1'379'587 SGD	3'483'351 SGD
Staff	750'000 SGD	834'000 SGD	1'274'000 SGD	2'072'000 SGD	2'331'000 SGD
Total Operative Expenses	1'586'247 SGD	1'981'803 SGD	3'218'276 SGD	6'246'280 SGD	12'474'679 SGD

Appendix 29. Depreciation and Amortization. Cumulative

	Year	2022	2023	2024	2025	2026
INVESTMENTS: Total Amortization and Depreciation	Application	135'997 SGD	135'997 SGD	299'193 SGD	742'541 SGD	2'101'963 SGD
	POS Terminal	2'000 SGD	2'000 SGD	16'000 SGD	16'000 SGD	16'000 SGD
	BOPS	2'000 SGD	2'000 SGD	16'000 SGD	16'000 SGD	16'000 SGD
	IT Equipment	360 SGD	1'080 SGD	2'100 SGD	3'660 SGD	5'460 SGD
	R&D	20000	40000	60000	80000	100000
	Cumulative	**160'357 SGD**	**181'077 SGD**	**393'293 SGD**	**858'201 SGD**	**2'239'423 SGD**

Appendix 30. POS Terminal Break Even Time

BREAK-EVEN TIME FOR ONE VEMINI POS TERMINAL (Time to recover the investment)	
POS Terminal (Android-based)	199.98 SGD
Infrared Scanner, Case, Assembly	600.00 SGD
Set Up	322.00 SGD
Quantity	2
Total Fixed Cost	**2'243.96 SGD**
Transaction per Store in 435 days	
Average of 33 / days / store	2'124.10 SGD
1 year of subscription	119.88 SGD
Total Revenue per Store	**2'243.98 SGD**
Difference	0.02 SGD

Appendix 31. Income Statement 2022 - 2026

INCOME STATEMENT					
YEAR	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Revenues					
Total estimated revenues	**350'949.000 SGD**	**1'181'898 SGD**	**3'021'986 SGD**	**8'592'167 SGD**	**25'579'635 SGD**
Operating Expenses					
Device Setup	136'850 SGD	136'850 SGD	301'070 SGD	747'201 SGD	2'115'154 SGD
Device Maintenance	112'200 SGD	224'400 SGD	471'240 SGD	1'083'852 SGD	2'818'015 SGD
Sales & Marketing	350'000 SGD	402'500 SGD	462'875 SGD	694'313 SGD	1'041'469 SGD
Office Rent	2'640 SGD	5'280 SGD	7'480 SGD	10'560 SGD	13'200 SGD
Ammortization & Depreciation	204'557 SGD	361'273 SGD	695'486 SGD	1'459'467 SGD	3'583'231 SGD
Staff	650'000 SGD	784'000 SGD	1'274'000 SGD	1'892'000 SGD	2'331'000 SGD
Total Operative Expenses	**1'456'247 SGD**	**1'914'303 SGD**	**3'212'151 SGD**	**5'887'393 SGD**	**11'902'068 SGD**
EBIT	**-1'105'298 SGD**	**-732'405 SGD**	**-190'165 SGD**	**2'704'775 SGD**	**13'677'567 SGD**
Financial Expenses	300'000 SGD	300'000 SGD	404'000 SGD	404'000 SGD	404'000 SGD
EBT	-1'405'298 SGD	-1'032'405 SGD	-594'165 SGD	2'300'775 SGD	13'273'567 SGD
Taxes	0.00	0	0	391'132 SGD	2'256'506 SGD
Net Profit	**-1'405'298 SGD**	**-1'032'405 SGD**	**-594'165 SGD**	**1'909'643 SGD**	**11'017'061 SGD**

Appendix 32. Income Statement 2022 - 2026 (% of Revenues)

INCOME STATEMENT (%)					
YEAR	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Revenues					
Total estimated revenues	**100%**	**100%**	**100%**	**100%**	100%
Operating Expenses					
Device Setup	39%	12%	10%	9%	8%
Device Maintenance	32%	19%	16%	13%	11%
Sales & Marketing	100%	34%	15%	8%	4%
Office Rent	1%	0%	0%	0%	0%
Ammortization & Depreciation	58%	31%	23%	17%	14%
Staff	185%	66%	42%	22%	9%
Total Operative Expenses	415%	162%	106%	69%	47%
EBIT	-315%	-62%	-6%	31%	53%
Financial Expenses	85%	25%	13%	5%	2%
EBT	-400%	-87%	-20%	27%	52%
Taxes					
Net Profit	-400%	-87%	-20%	27%	52%

Appendix 33. Cash Flow Forecast 2022 - 2026

		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
OPERATING CASH FLOW	SALES	350'949.00	1'181'898.00	3'021'985.80	8'592'167.34	25'579'635.08
	EXPENSES	1'456'246.60	1'914'303.20	3'212'150.72	5'887'392.66	11'902'068.16
	COGS	249'050.00	361'250.00	772'310.00	1'831'053.00	4'933'168.80
	Sales & Marketing	350'000.00	402'500.00	462'875.00	694'312.50	1'041'468.75
	Office Rent	2'640.00	5'280.00	7'480.00	10'560.00	13'200.00
	Staff	650'000.00	784'000.00	1'274'000.00	1'892'000.00	2'331'000.00
	Operating profit (	- 1'105'297.60	- 732'405.20	- 190'164.92	2'704'774.68	13'677'566.93
	Dep and Am.	204556.6	361273.2	695485.72	1459467.156	3583230.606
	Working Capital	- 20'754.17	- 30'104.17	- 64'359.17	- 152'587.75	- 411'097.40
	Inventory	- 119'997.00	- 119'997.00	- 119'997.00	- 119'997.00	- 119'997.00
INVESTING CASH FLOW	INVESTMENTS					
	POS Terminal	679'983.00	679'983.00	1'495'962.60	3'712'707.18	10'509'817.25
	BOPS Servers	10'000.00	-	70'000.00	-	-
	App	462'000.00	-	-	-	-
	IT Equipment	1'800.00	3'600.00	5'100.00	7'200.00	9'000.00
	R&D	100'000.00	100'000.00	100'000.00	100'000.00	100'000.00
	Total investments	- 1'253'783.00	- 783'583.00	- 1'671'062.60	- 3'819'907.18	- 10'618'817.25
FUNDINGS NEED	Funding needs	- 2'295'275.17	- 1'304'816.17	- 1'350'097.97	71'749.91	6'110'885.89
FINANCING FLOW	TOTAL FINANCING	3'500'000.00	1'000'000.00	1'800'000.00	-	-
	EQUITY (positive -only first year)	1'500'000.00 SGD	1'000'000.00 SGD	1'000'000.00 SGD	0.00 SGD	
	LOANS (positive)	2'000'000.00 SGD	0.00 SGD	800'000.00 SGD		
	DIVIDENDS (negative)					
	LOAN REPAYMENT (negative)	300'000.00 SGD	300'000.00 SGD	404'000.00 SGD	404'000.00 SGD	404'000.00 SGD
TOTAL	TOTAL CASH CHANGE	904'724.83	- 604'816.17	45'902.03	- 332'250.09	5'706'885.89
	CUMULATIVE CASH FLOW	904'724.83	299'908.67	345'810.70	13'560.61	5'720'446.50

Appendix 34. Equity Fundings

EQUITY			
Year	SGD	EUR	Funding Round
Year 1	1'500'000.00 SGD	931'677.02 EUR	Seeding
Year 2	1'000'000.00 SGD	621'118.01 EUR	Series A Funding
Year 3	1'000'000.00 SGD	621'118.01 EUR	Series B Funding
Year 4	0.00 SGD	0.00 EUR	
Year 5	0.00 SGD	0.00 EUR	
SUM	**3'500'000.00 SGD**	**2'173'913.04 EUR**	

Appendix 35. Planned Loans

LOAN						
	SGD	EUR	Interest Rate	Repayment	Total Interests + Loan	Yearly Repayment
Year 1	2'000'000.00 SGD	1'242'236.02 EUR	5%	10	3'000'000.00 SGD	300'000.00 SGD
Year 2						
Year 3	800'000.00 SGD	496'894.41 EUR	3%	10	1'040'000.00 SGD	104'000.00 SGD
SUM	2'800'000.00 SGD	1'739'130.43 EUR			4'040'000.00 SGD	

Year	Year 1	Year 2	Year 3	Year 4	Year 5
Total Financial Expenses	300'000.00 SGD	300'000.00 SGD	404'000.00 SGD	404'000.00 SGD	404'000.00 SGD

Appendix 36. Benchmarks and References for Financials Forecasts

Benchmark	Category	Subcategory	2022	CAGR
Market Share Calculation ; Users , Transaction s, Shops	Mobile Wallet Users:		1100000	10%
	POS Transactions per day	Credi Cards	1213	4%
		Mobile Payments	2262	
	Malls	All	171	
	Merchants Base	Restaurants & Bars	13400	5.87%
		Other Merchants	27637	

- https://www.statista.com/outlook/dmo/fintech/digital-payments/mobile-pos-payments/singapore#analyst-opinion
- https://www.mas.gov.sg/-/media/MAS/Sectors/Payments/H2-2020-Retail-Payment-Statistics.pdf?la=en&hash=F142DF4CB6DF97D7A8BF34FBEDA99176C307D342 (2019, 20)
- http://www.shopping.sg/shopaglore/list-of-shopping-malls-in-singapore/
- https://www.tripadvisor.com/Restaurants-g294265-Singapore.html
- https://www.singstat.gov.sg/modules/infographics/retail (2019)
- https://www.mti.gov.sg/-/media/MTI/ITM/Lifestyle/Retail/Retail-ITM---booklet.pdf (2016

Benchmark	Category	Subcategory	EUR	SGD
Income Calculation	Fees required by Vemini are lower than payments provider in SG	Subscription Fee	€ 74.46	119.88 SGD
		Transaction Fee	€ 0.09	0.15 SGD

- https://merchantmachine.co.uk/online-payment-systems/
- https://www.connectpos.com/top-5-singapore-payment-gateways/

Benchmark	Category	Subcategory	USD / EUR	SGD	
Costs	Office Rent		333.33 €	440.00 SGD	(Monthly, per worker)
	VIAtm Licensee		2'272.73 €	3'000.00 SGD	per year
	Device / Vemini POS Terminal	Set UP	200.00 €	322.00 SGD	(One time only)
		Maintenance	100.00 €	132.00 SGD	(Yearly)

- https://www.regus.com/en-us/singapore/the-signature-3508
- Inquire asked to: https://www.viaconnects.com
- Data provided by Vemini EU

Benchmark	Category	Subcategory	USD / EUR	SGD
Investments	Price for App Development	iOS	$150'000.00	198'000.00 SGD
		Android	$150'000.00	198'000.00 SGD
		Web App	$50'000.00	66'000.00 SGD
	Vemini POS Terminal	POS Terminal	$151.50	199.98 SGD
		Scan, Case, Assembly	€ 373	600.00 SGD
	Local Server	High-End Rack Server	$10'000.00	13'200.00 SGD
		Hyper-converged-infrastructure	$70'000.00	92'400.00 SGD
	IT Equipment	DELL Latitude E7240		300.00 SGD

- https://www.a3logics.com/blog/cost-and-features-of-ewallet-app-development
- https://mypos.eu/es/comprar-datafono/slim?loc=es&utm_campaign=Spain_Shopping&utm_content=Slim&gclid=Cj0KCQjw5PGFBhC2ARIsAIFIMNfCp4EeHLmEqUWwRCuzLaEwqgUwvtIfIdS3cZRVn1RUzVmMxa4LpRcaAqg6EALw_wcB
- Data provided by VEMINI EU (Italy)
- https://www.manxtechgroup.com/how-much-will-a-server-cost-uk/
- https://www.manxtechgroup.com/how-much-will-a-server-cost-uk/
- https://iprice.sg/computing/laptops/

Benchmark	Category	Subcategory	% Rate Min / Max	% Rate Average
Fundings	Bank Loan Rate on Equipmnet / Machinery Loan	Equipment / Machinery Loan	3%	5%
		Commercial / Industrial property loan	7%	

- https://smeloan.sg/business-loan-interest-rate/
- https://eur.weareuncapped.com/

Taxes	Tax in Singapore		17%

- https://www.startupdecisions.com.sg/singapore/taxes/corporate-tax-guide/