How to Cite:
Feddaoui, A. (2024). The role of e-payment tools in fintech industry: Case study of Hong Kong. *International Journal of Economic Perspectives*, *18*(11), 2072–2086. Retrieved from https://ijeponline.org/index.php/journal/article/view/695

The role of e-payment tools in fintech industry: Case study of Hong Kong

Feddaoui Amina
Chadli Bendjedid University, El Tarf, Algeria
https://orcid.org/0009-0001-0150-3772

***Abstract*---**This study aimed to identify the role of E-payment tools in FinTech industry regarding the case of Hong Kong. The study presented the definition of FinTech, its advantages and tools, and the role of E-payment in FinTech industry. The study presented the case of Hong Kong, the present state of FinTech and the creation and features of Octopus Card system in Hong Kong, and its role in FinTech industry. The study concluded that E-payment considered one of the most important modern financial technological tools in Hong Kong, and main tool that play a role in increasing financial services revenues in Hong Kong, Octopus Card plays also a prominent role due to its multiple uses. Therefore, octopus cards limited objective is making everyday life in Hong Kong easier by using innovative payment technology.

***Keywords*---**E-payment, FinTech, Industry, Hong Kong.

I. Introduction:

Financial services considered one of the most important components of services sector. Traditional banks often provide financial services that revolve around paying money, transferring, lending, etc. and various banking operations. After the global financial crisis in 2008 that hit countries around the world and negatively affected economies, researchers realized that the traditional financial system was no longer sufficient to confront crises, and it was necessary to create financial services with advanced and secure technologies that help to reduce costs and speed up operations, here came the idea of financial technology.

Financial technology includes the use of modern technologies and methods that rely on computers and smart devices to replace papers, documents and bank checks; one of the most important means of financial technology is electronic payment, or E-payment methods such as payment cards commonly used in

Corresponding author: *Amina, F., Email: a.feddaoui@univ-eltarf.dz*
Submitted: 27 September 2024, Revised: 18 October 2024, Accepted: 08 November 2024

developed countries. The use of bankcards has developed widely and their types have differed and facilitated the provision of many financial services.

Hong Kong considered one of the developing countries that has been able in a short period to overcome its economic crises and change its development path towards adopting financial technology on a large scale. One of the most prominent means of electronic payment that distinguishes Hong Kong is the Octopus Card, which has developed significantly and played an important role in the FinTech industry in this country, in light of these foundations, and we chose the topic of this paper.

The problem of this paper presented as follows:

What is the role of E-payment tools in FinTech industry regarding the case of Hong Kong?

The study hypotheses were formulated as follows:

- Electronic payment tools play a main role in increasing financial services revenues in Hong Kong.
- Octopus Card plays a prominent role in the FinTech industry in Hong Kong due to its multiple uses.

The importance of this study stems from the importance of FinTech industry and the development of financial services in developing countries. Its importance also emerges in the importance of using bankcards, which have achieved remarkable success in developed countries, while they are still lagging behind in some developing countries, especially Arab countries.

This study aims primarily to shed light on a set of elements, as follows:

- The definition of FinTech, its advantages and tools,
- The role of E-payment tools in FinTech industry,
- The Present State of FinTech in Hong Kong,
- The Octopus Card system in Hong Kong, its creation & types,
- The Octopus Card system Features & its Role in FinTech industry in Hong Kong.

This study were limited to one type of FinTech tools, the E-payment, and the case og Hong Kong, This study also relied on the deductive approach and the case study approach, while it divided into the following elements:

- Background: This item includes the definition of FinTech, its advantages and tools, and the role of E-payment tools in FinTech industry,
- Case study of Hong Kong: This item includes the Present State of FinTech in Hong Kong, The Octopus Card system in Hong Kong, its creation & types, and The Octopus Card system Features & its Role in FinTech industry in Hong Kong.

In the conclusion of the study, we presented a set of results and recommendations regarding the necessity of working to develop digital payment tools to develop financial sector in developing countries such as Algeria.

I. Background:

Technology is the modern goal of all developed and developing countries. Since the end of World War II, many countries have sought to achieve their economic growth and relied on technology in their development path. Among the important functions of technology is the financial services sector, as it has become necessary to dispense with the traditional financial system and replace it with a modern platform in line with the globalization and free market economy goals.

a) Definition of FinTech:

Many advanced economies see banks as an absolute necessity, like schools, transportation, or grocery stores, they are part of the infrastructure of the modern capitalist system, these countries sought to do without them, but after the financial economic crisis in 2008, governments, legal and regulators encouraged competition in financial services system to mitigate risks of that crisis. Financial services gained an alternative ground to traditional banks, and it is called "Financial Technology".[(1)]

Clients, businesses and legal entities around the world have faced FinTech challenges and have opted for new business models in the financial sector that can help by improving access to quality of financial services.[(2)] FinTech, companies defined as companies that leverage new technology to create good financial services for consumers and businesses. Fintech is all parts of technology that help to provide financial services and products to customers, individuals, businesses, or governments. It is also used as an umbrella term for some subcategories, such as WealthTech and RegTech.[(3)]

In 2015 The World Economic Forum (WEF) define FinTech as "The use of technology and innovative business models in financial services"; in 2018 the Basel Committee on Banking Supervision (BCBS) uses also the following definition " FinTech is the technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services",[(4)] we can say also that the term "FinTech" refers to those companies that link financial services with modern technological tools; they generally aim to attract customers by providing modern, easy-to-use financial services.[(5)]

b) Advantages of FinTech:

FinTech has many advantages, the most important of which are the following[(6)]:

- It achieves access to all users by redesigning products directed at low-income customers, unlike traditional financial services that evaluate the customer based on his ownership of assets,
- High flexibility and the ability to bear costs, by setting many payment plans and providing goods and services that suit customers,
- It is speed, using financial technology companies completing transactions within a short period of time based on big data and algorithms, compared to traditional companies that take long periods of time,
- The policy of FinTech is based on the rule "Data and mobile policy is first", through this rule the financial products and services provided are improved,

through which business owners can make the best decision and exploit opportunities,
- Financial technology focuses on designing products in a simple and easy way for all segments of society, and it is also characterized by the fact that the cost of obtaining is less than traditional transactions,
- It helps in achieving financial inclusion, as with the presence of financial technology; financial services can be deliver to poor and extremely poor areas at lower costs.

c) Tools of FinTech:
Some of FinTech tools described below:

Big data and AI:
Big data is a decision-making process that uses people and technological tools to analyze large amounts of data of different types, drawing on a variety of sources, to produce a stream of actionable knowledge, [7] it helps companies to collect, store, manage and process big size of data at the right speed and time to gain the right insights.[8] In financial sector is the petabytes of unstructured and structured data obtained by financial companies online.[9]

Blockchain and cryptocurrencies:
Blockchain technology is one of the new terms in computer technology field; it has the power to change people's lives as the Internet did in the past years, it is also an essential part of Internet.[10] Blockchain is an encrypted information system based on a decentralized information base, i.e. distributed across all the devices organized in the network to record all transaction data and modify it in a way that ensures an approval of all relevant parties on the financial data validity.[11]

Blockchain interacts with FinTech in at least two ways [12]:
- First, it is a main part of all cryptocurrency transactions, as it is the primary processing tool whenever Bitcoin or Ethereum is used for paying online, and all FinTech platforms that integrate cryptocurrencies must interact with some forms of blockchain.
- Second, Blockchain is a powerful path to all future financial transactions using traditional currencies. It has emerged as a transformative force in FinTech, because its decentralized and transparent nature provides greater security, efficiency, and trust in financial transactions, it has also the potential to revolutionize various aspects of FinTech, including payments, remittances, smart contracts, and identity verification.

Digital banking:
The global economic crisis has given rise to a new area of financial services, largely due to the inefficiencies of the traditional banking system[13]. Virtual banks take an important approach, aiming to operate without branches; this way reduces costs, allowing the bank to offer better rates with lower fees.[14] So digital banking today became the front-leading applications of the financial technology revolution.[15]

Robo-advisory services:
The term "Robo-advisor" is a blend of "robot" and "advisor", it means that the customer- interface of the advisory process is no longer a human but a machine.(16) Robo-advisory process has recently emerged within the FinTech space to provide advice or manage private wealth and remove the Mediation between wealth managers according to the traditional system.(17)

Digital payment:
Payment is the process of exchanging monetary values in exchange for goods and services. In this context, electronic payment is the process of exchanging monetary value electronically or digitally between two parties as compensation for goods and services. Through this definition, it becomes clear that any payment without tangible instrument (bond, check, cash, etc.) is an electronic payment. Electronic payment instruments include digital payment cards, such as debit or credit cards or stored value cards, or virtual or digital currencies or accounts.(18)

d) Role of E-payment tools in FinTech industry:
Electronic payment tools play a prominent role in the financial technology industry through the following points:

- It is an effective tool to facilitate operations between dealers through direct electronic communication between them, thus eliminating paper instruments and its expenses,
- It saves general and administrative costs, communication costs, etc.
- It is a unique and unprecedented way to reach all the world's markets at the same time with the least cost,
- It facilitates the exchange of benefits between dealers, sellers and buyers, and it works to rationalize decisions,
- It helps companies to follow the modern manufacturing system that is done with the help of computers.(19)

The forms of E- payment cards vary, each card according to its function, we will present their types as follows:

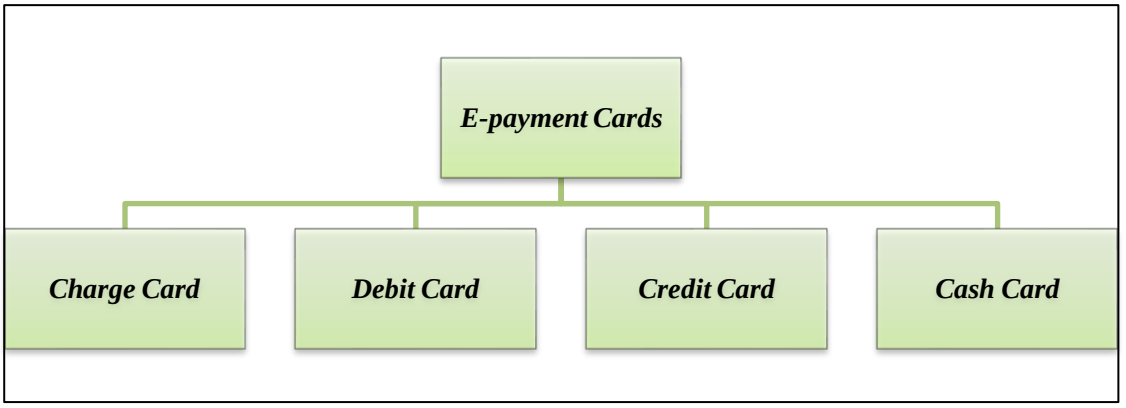

Figure N°1: E-payment Cards Types.
Source: Prepared by the researcher based on: Messaoudi Abdelhadi, **Electronic**

Banking, Electronic Banks, Electronic Money, Electronic Cards, Al Yazuri House for Publishing and Distribution, Jordan, 2016, pp.56-59.

We will explain the figure above as follows:

Charge Card:
It is a monthly debit card, also called monthly payment card or loyalty card, whereby the amount is settled monthly or in installments within the limits permitted for the card. This card is characterized by the possibility of using it locally and internationally, and paying in return for subscription and renewal fees, it is used like ATM cards, and the customer's account must be a creditor for use.

Debit Card:
The debit or ATM card, or direct debit card, the current account card or the deposit card, it represents an only payment instrument, and does not grant credit, but the cardholder pays his dues from the funds deposited with him, and is distinguished by the fact that it is only issued to those who have an account or balance in the bank, and spending is not permitted except within the balance of its holder, it is disbursed without charge and used within the geographical framework of the country or its affiliated branches.

Credit Card:
It is also called loan card, its idea is based on not making advance payments to the bank, and payment is not made monthly, but rather through periodic installments that are proportional to income. It is distinguished by the fact that it is not necessary for the customer to have an account to issue it, payment is made in installments, and the bank lends the customer while paying the subscription fees, membership, or renewal fees and interest on the loans. **(20)**

Cash card:
It is only used to withdraw cash from ATMs or devices that read this card. **(21)**
Electronic payment tools, especially payment cards, characterized by the ease, speed and confidentiality of completing transactions, the ease of sending money, and the speed of payment via Internet. It is not only used on web, but also their use has recently developed in all financial and commercial transactions, such as buying and selling operations, and transferring money, which made it an effective mean in the financial technology industry and changing the course of traditional financial system.

II. Case Study Of Hong Kong:

Hong Kong has a large financial sector that contributes a significant proportion of GDP and employs a large workforce. The country has recently seen an increase in the number of FinTech startups, with around 160 new companies, although most are still very small. It has also seen a main development in business accelerators/incubators and got an early start in FinTech with the launch of the Octopus card in 1997.

a) The Present State of FinTech in Hong Kong:

Although the card was subject to regulatory restrictions, it obtained a Stored Value Facility (SVF) license. The successful Hong Kong FinTech Week in November 2016 provided further momentum. However, FinTech in this country is still in its infancy, some studies rank Hong Kong as the fifth largest FinTech hub in the world, thanks to improved innovation and government support for FinTech. In February 2016, a steering committee from the Hong Kong government submitted a report with five recommendations:

- Promote FinTech by organizing annual events and competitions;
- Facilitate access to FinTech by establishing and supporting incubators;
- Establish contact points within financial regulators to explain current regulations for FinTech companies;
- FinTech funding and disseminate information on funding sources;
- Encourage young people to consider FinTech projects.

In response to these recommendations, the 2016 Ministry of Finance Budget introduced a number of measures to support FinTech, including:

- A dedicated team under InvestHK,
- Greater support for FinTech incubators at Cyberport,
- Dedicated platforms at financial regulators including the Hong Kong Monetary Authority,
- The Securities and Futures Commission (SFC) ,
- The Office of the Insurance Commissioner (OCI, replaced by the Independent Insurance Authority) to enhance outreach to FinTech community; the cybersecurity programs; and the support for Blockchain technologies to develop financial services. **(22)**

The Figure Nº2 presents the technological situation in financial sector regarding users in Hong Kong during the period 2017-2024 and the estimated value to 2028:

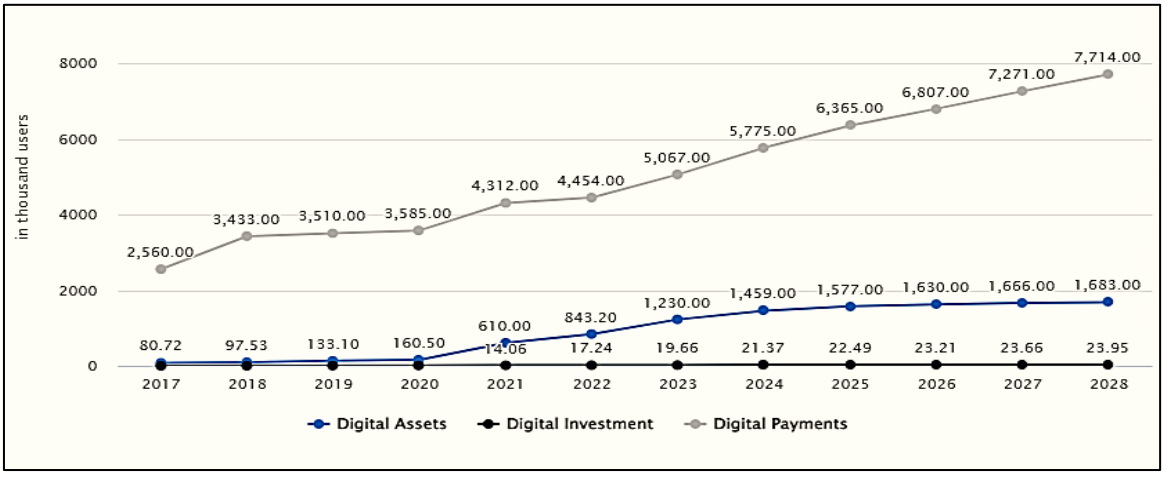

Figure Nº2: FinTech users in Hong Kong

Source: (Statista Market Insights. 2024. FinTech - Hong Kong. https://www.statista.com/outlook/dmo/fintech/hong-kong#transaction-value).

The figure above shows the development of the size of fintech users in Hong Kong in terms of three basic operations, electronic payment operations, electronic investments, and digital assets during the period 2017-2024, and estimates until 2028. We notice from the figure that the highest percentage of FinTech users in Hong Kong was for electronic payment users, and the curve gradually tends towards an increase in the size of users, followed by the curve of digital asset dealers and then in the third path digital investment transactions. What is noticeable from the curve related to electronic payment users is the remarkable development in the number of users, which reached 2,560 thousand users in 2017, reaching approximately 5,775 thousand users in 2024, and the size is expected to rise to 7,714 thousand users in 2028. The use of electronic payment in Hong Kong is limited to the important role played by the electronic Octopus card, as the majority of individuals in Hong Kong conduct all financial transactions through this card, the role of which we will discuss in this study. We can conclude from the above figure that electronic payment methods occupy a significant position in the financial technology industry in Hong Kong.

b) Octopus Card system, Creation & Types:

The Octopus Card is one of the most widely used payment methods in Hong Kong. An E- payment system uses a smart card by touching a reader device known as an "octopus". Octopus cards include several types and various financial services. This card is used to pay on public transport and at a wide range of retailers. Users simply place the Octopus over the reader, and the correct amount is automatically deducted without any hassle. For some residential and commercial buildings, the Octopus is also used to control access.

Hong Kong's public transport network was highly regarded on the international stage in the 1990s. Transport was based on a ticketing system, and the MTR Corporation Limited (MTR) had been running the system since its establishment in 1979. In 1993, MTR took the initiative to review its fare collection technology and develop a future development strategy for the next decade, and contactless smart card technology was later recognized as the most suitable platform for future systems.

In 1994, five major public transport operators, MTR, KCRC, KMB, Citybus, Hong Kong Yumathi Corporation (HYF), established a joint venture, Creative Star Limited (renamed Octopus Cards Limited in 2002), and to oversee the development and implementation of the contactless smart card system called "Octopus system".

After three years of development and trials, the Octopus smart card system was finally launched in September 1997 to allow passengers to travel across multiple modes of public transport using a single card in September 2016, eliminating the hassle of finding exact change for individual trips.

Today, financial services provided by Octopus Card have expanded to almost all public transport in Hong Kong, and Octopus applications also include all payments at car parks, parking meters, fast food outlets, bakeries and cake shops, retail stores, supermarkets, home ware and personal care stores, boutiques, photo finishing services, telecommunications stores, vending

machines, self-service kiosks, photocopiers, photo booths, cinemas, university campuses, entertainment facilities, as well as access control for residential and commercial buildings.
There are four types of octopus cards as shown in the following pictures:

- **On-Loan Octopus**: It is lent to a customer who needs to pay a refundable deposit that covers the card and associated costs,
- **Sold Octopus**: the company sells it to a customer. It holds no deposit.
- **Bank Issued Octopus**: It is a card unction issued by an authorized bank or financial institution.
- **Octopus Mobile SIM**: It is a mobile phone SIM card incorporated with Octopus function. It consists of both function and mobile telecommunication function.

c) The Octopus Card system, Features & Role in FinTech industry:

The Octopus Card has many advantages as follows:

- convenient and fast-operating card,
- It is characterized by security, privacy and reliability,
- Efficiency and accuracy in performance,
- Cost saving and use without touching devices,
- Multi-use, and easy recharging.[23]

The Table Nº1 and the Figure Nº3 present the development of revenues from using Octopus cards and the Net profits achieved by Octopus Company during the period 2016-2022:

Table Nº1: Revenues & Net profit from Octopus operations during the period 2016-2022

Year	Revenues HK$	Net profit HK$
2016	956	403,7
2017	862,8	272,4
2018	1041,8	359,5
2019	1081,2	381
2020	943,6	290,2
2021	1301,4	355,2
2022	1671,8	613,3

Source: Excel Outputs based on statistics of Octopus company, website: https://www.octopus.com.hk/en/corporate/about-octopus/profile/our-announcement/index.html.

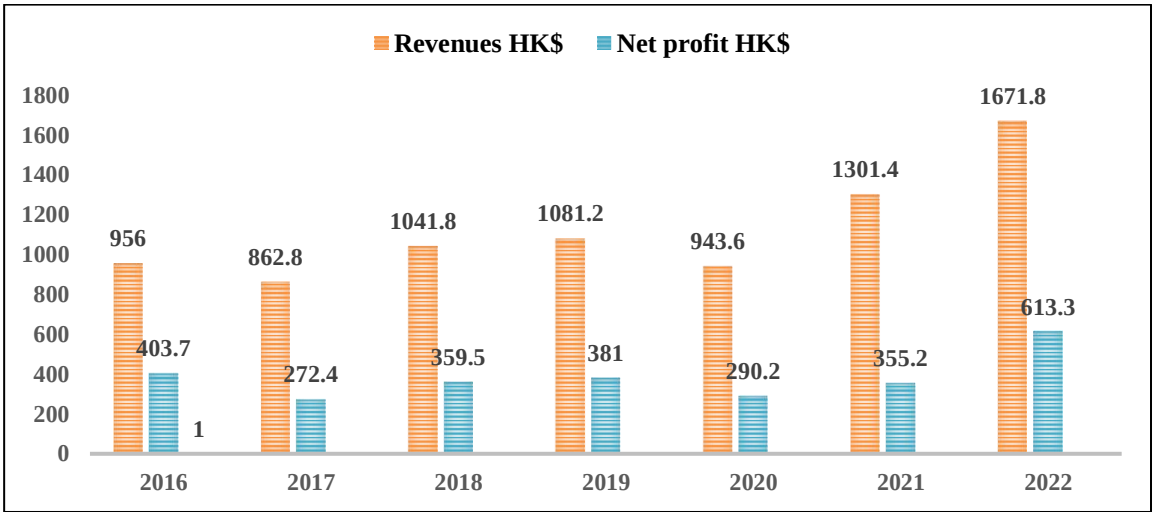

Figure Nº3: Octopus card limited company financial situation during the period 2016-2022.

Source: Excel Outputs based on statistics of Octopus company, website: https://www.octopus.com.hk/en/corporate/about-octopus/profile/our-announcement/index.html

From the figure above, the company achieved significant profits from the use of the Octopus Card, which witnessed a gradual increase during the period 2016-2022, the highest value of revenues in 2022 reached a value of 1671.8 $HK, it also achieved a maximum net profit of 613.3 $HK, and the use of cards decreased in return thanks to The high technology contained in one card is characterized by multiple uses and tools in one smart card, which reduces costs and increases the percentage of net financial profits. Table Nº2 and Figure Nº4 contains data from the Bank for International Settlements, comparing similar smart card-based E-payment technologies across 6 countries/cities by penetration rate in 2003:

Table Nº2: A Comparison of the Top smart Card-based E-payment Systems in 6 Countries/Cities Sorted by Average Daily Transactions (in million)

Country	System Name	Number of cards issued (000)	Average Daily Transactions (000)
Hong Kong	Octopus	10,400	8,140
Belgium	Proton	2,500	4,027
Singapore	CashCard	9,776	1,924
Germany	Geldkarte	60,000	313
Netherlands	Chipknip	17,400	238
Switzerland	Cash	3,692	55

Source: Chun Kit Lok, **The Octopus in Hong Kong: The Success of a Smart Card-based**

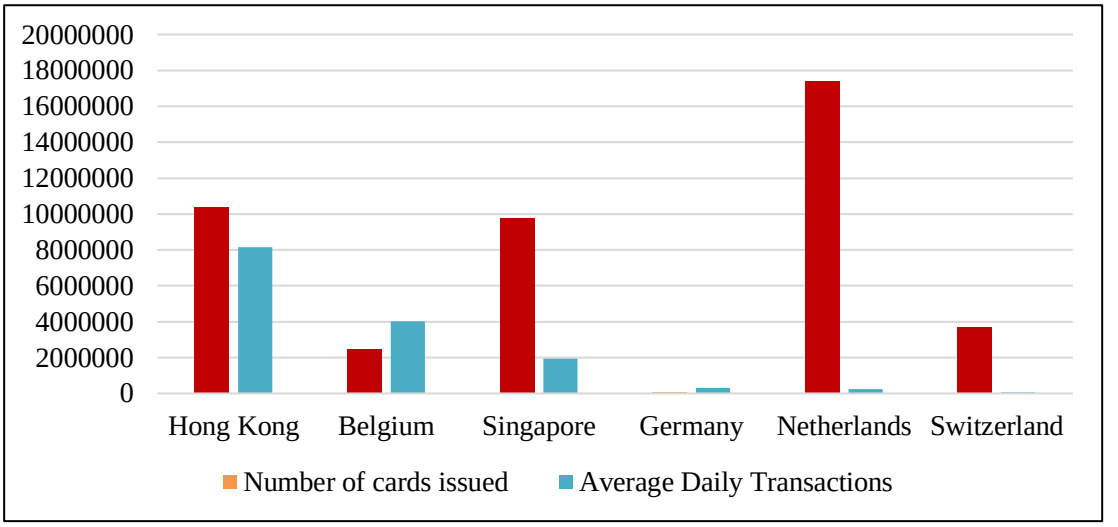

Figure Nº4: A Comparison of the Top smart Card-based E-payment Systems in 6 Countries/Cities Sorted by Average Daily Transactions (in million).
Source: Chun Kit Lok, **The Octopus in Hong Kong: The Success of a Smart Card-based**

E-payment System and Beyond, Communications of the IIMA, Volume 04, Issue 4, 2004, pp86-87.

As shown in the table and figure above, there are over 10 million Octopus cards in circulation in Hong Kong. On average, the daily transaction volume exceeds 8.1 million transactions, generating over US$7 million, the average daily transaction volume of Octopus card is the highest, almost double that of Proton card in Belgium, which comes in second. The table takes into account the population size of each country, which is important since Hong Kong is a small city. Referring to the data in the table, we find that Hong Kong citizens use Octopus very frequently compared to other smart card-based electronic payment systems around the world, the number of average daily transactions per 1,000 inhabitants in Hong Kong is more than 1,000 and is almost threefold of that of the CashCard in Singapore, which follows the Octopus.

From the above table, we can said also that the Octopus system has successfully established financial technology through electronic payment in a closed system. Octopus has also succeeded in adopting the strategy and has become a preferred means of payment for public transportation in Hong Kong.

Today, Octopus provides an unprecedented opportunity to study how the electronic payment system based on smart cards can spread in the retail sector after it has reached a critical mass and been widely accepted.[24]

The following table and figure Nº4 present the volume of Octopus cards in circulation until 2022, as well as the volume of daily transactions of the population through this system:

Table Nº3: Circulation and daily transactions of Octopus during the period 2016-2022 (in million)

Year	Octopus circulation	Daily transactions
2016	32,8	14,1
2017	34,4	14,5
2018	36,1	15
2019	35,9	14,9
2020	34,1	11,6
2021	29,7	14,1
2022	20,7	14,1

Source: Excel Outputs based on statistics of Octopus company, website: https://www.octopus.com.hk/en/corporate/about-octopus/profile/our-announcement/index.html

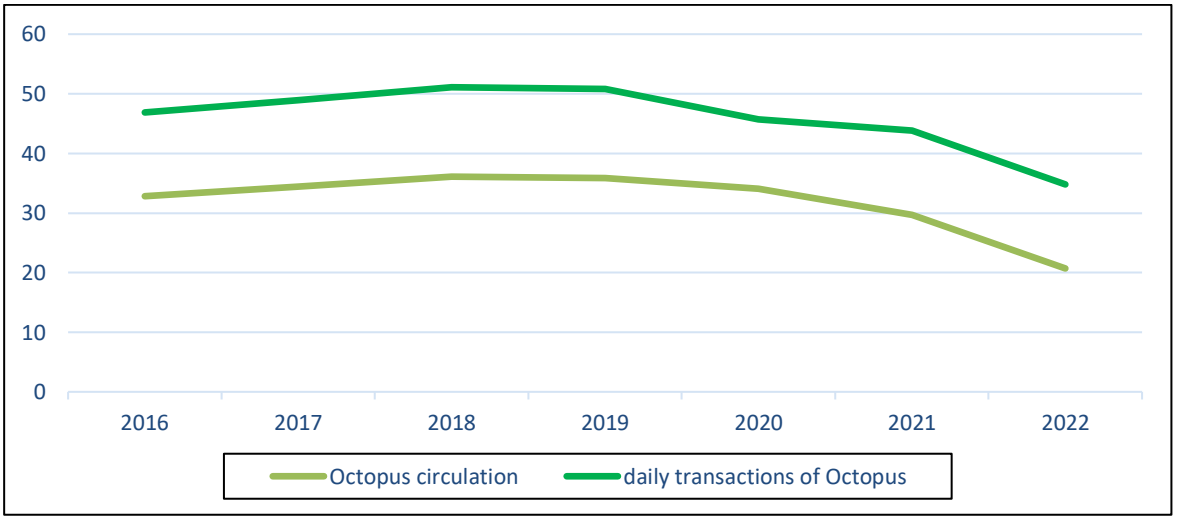

Figure Nº5: Circulation and daily transactions of Octopus during the period 2016-2022 (in million).
Source: Excel Outputs based on statistics of Octopus company, website: https://www.octopus.com.hk/en/corporate/about-octopus/profile/our-announcement/index.html

From the table and figure above, we notice the development of the transactions volume of Octopus card during the period 2016-2022, as the number of cards in circulation developed in 2016 with a volume of 32.8 million cards until 2018 to reach 36.1 million cards, then decreased slightly to 20.7 million cards. This is due to the negative effects of the COVID pandemic, a curfew was imposed, so the volume of cards in circulation decreased. In contrast, the daily transactions using the card reached 14.1 million during the years 2021 and 2022, as the volume of transactions increased significantly.

From above, we note that the Octopus Card has played a prominent role in supporting and developing financial technology and economy in Hong Kong by facilitating electronic payment in many areas.
The main benefits of this company are as follows:
- It is a safe, efficient, flexible and reliable tool for collecting funds,
- It is speed and low maintenance costs,
- It provide a platform that accommodates complex fare collection strategies such as multi-media discounts and loyalty programs, improving the company's image and customer service, and this system is considered a major step towards a cashless society, as it is a healthier, more convenient and faster system.[25]

III. Conclusion

Through this study, a set of results and suggestions can be reached as follows:
- Financial technology has a main role in developing financial sector services, and contribute significantly to increasing GDP.
- Hong Kong has recently been seeking to make it a digital city; it is also seeking to increase technology by encouraging Startups technology and emerging projects in technology,
- E-payment considered one of the most important modern financial technological tools in Hong Kong,
- Electronic payment tools play a main role in increasing financial services revenues in Hong Kong,
- Octopus Card plays a prominent role in the FinTech industry in Hong Kong due to its multiple uses, and its features,
- The Octopus Cards objective is to make everyday life in Hong Kong easier by using innovative payment technology,
- The main features of Octopus cards in developing FinTech in Hong Kong is the following elements; Convenient and fast, Secure and reliable, Efficient and accurate, Contactless, and Multi-usage with one single card/product, Easy reloading, and Discounts/Loyalty programs,

Through the above-mentioned results, a set of recommendations can be presented to developing countries in the world, the most important of which is the need to emulate the experiences of developed countries such as Hong Kong. Among the most important recommendations that can be presented is the need for Algeria to adopt and develop electronic payment technology. Despite the efforts made in using bankcards, the Gold Card and the Baridi Mob application in Algeria, it still suffers from many shortcomings:
- As for bankcards in Algeria, they are limited in use and not open to the outside world (E-Commerce),
- The Gold Card facilitates the processes of withdrawing money and paying through the Baridi Mob application, but it is not secure and requires further development using new technology,
- It is necessary in Algeria to develop cards for automatic payment for buying, selling and Transportation, in order to facilitate financial services for citizens.
- It is also necessary to combine the use of electronic payment cards with secure technology to protect people's money and facilitate the completion of financial transactions.

Footnotes:

(1) Sofie Blakstad, Robert Allen, **FinTech Revolution, Universal Inclusion in the New Financial Ecosystem**, Palgrave Macmillan, Switzerland, 2018, p2.
(2) Frederic De Mariz, Finance with a Purpose, **FinTech, Development and Inclusion in the Global Economy**, World scientific publishing, London, 2022, p7.
(3) Steven O'Hanlon, Susanne Chishti, Brendan Bradley, James Jockle, Dawn Patrick, **FinTech for dummies**, John Wiley & Sons Inc, New Jersey, Canada, 2020, pp8-9.
(4) Suman Lodh, Monomita Nandy, **Corporate risk management after the COVID-19 crisis**, World scientific publishing Europe, Singapore, 2023, p7.
(5) Gregor Dorfleitner, Lars Hornuf, Matthias Schmitt, Martina Weber, **FinTech in Germany**, Springer international publishing, Switzerland, 2017, p5.
(6) Mohammed Ziad Al-Najdawi, Ghassan Salem Al-Talib, **Financial technology in Islamic banks and its applications and its impact on financial performance indicators**, Al-Yazori for Publication and Distribution, Jordan, 2024, pp15-16.
(7) James R. Kalyvas, Michael R. Overly, **Big Data, A Business and Legal Guide**, CRC press Taylor & Francis Group, USA, 2015, p1.
(8) Judith Hurwitz ،Alan Nugent ،Fern Halper ،Marcia Kaufman, **Big Data For Dummies**, John Wiley & Sons Inc, New Jersey, Canada, 2013, p10.
(9) Iryna Bilyk, **The Role of Technology in Financial Services**, published article, 12-01-2023, website: https://youteam.io/blog/the-role-of-technology-in-financial-services/ , Viewed date: 22-12-2023, 11:00.
(10) Dac-Nhuong Le, Gulshan Shrivastava, Kavita Sharma, **Cryptocurrencies and Blockchain Technology Applications**, Scrivener publishing, USA, 2020, p4.
(11) Taha Mohammed Ahmed Youcef, Blockchain, **Principles and Applications**, Homysra Publishing, Egypt, 2022, p13.
(12) Alex Pletnov, **Blockchain in Fintech, Use Cases and Future**, published article, 17-07-2023, website: https://keenethics.com/blog/blockchain-in-fintech , Viewed date: 22-12-2023, 12:30.
(13) Luigi Wewege, **The Digital Banking Revolution, How financial technology companies are rapidly transforming the traditional retail banking industry through disruptive innovation**, Lulu.com publications, 2016, p40.
(14) SCN Education, Electronic Banking, **The Ultimate Guide to Business and Technology of Online Banking**, Vieweg+Teubner Verlag, Germany, 2001, p25.
(15) Iryna Bilyk, Op cit.
(16) Peter Scholz, **Robo-Advisory, Investing in the Digital Age**, Palgrave Macmillan, Switzerland, 2021, p4.
(17) Paolo Sironi, **FinTech Innovation, From Robo-Advisors to Goal Based Investing and Gamification**, Wiley, USA, 2016, p22.
(18) Margaret Tan, **E-payment, The Digital Exchange**, NUS publishing, Singapore, 2004, p3.

(19) Mohammed Al-Fateh Mahmoud Bashir Al-Maghribi, **E-commerce,** Al Jinan for Publishing and Distribution, Jordan, 2016, p18.
(20) Messaoudi Abdelhadi, **Electronic Banking, Electronic Banks, Electronic Money, Electronic Cards**, Al Yazuri House for Publishing and Distribution, Jordan, 2016, pp.56-58.
(21) Op cit, p.59.
(22) HK financial services development council, **The Future of FinTech in Hong Kong**, FSDC Paper Nº29, May 2017, pp17-18.
(23) **Octopus corporation report**, September 2016, Website: https://www.octopus.com.hk/en/document/company_profile.pdf , Viewed date: 22-12-2023, 13:30, pp 1-15.
(24) Chun Kit Lok, **The Octopus in Hong Kong: The Success of a Smart Card-based E-payment System and Beyond**, Communications of the IIMA, Volume 04, Issue 4, 2004, pp86-87.
(25) **Octopus corporation report** , Op Cit.