

Banking technology's contribution to enhancing the efficiency of government subsidies with reference to Pantawid Pamilyang Pilipino Program (4Ps)**Hani Meriem ^{1♦} , Ishak Khadidja ²**¹ Tamanrasset University (Algeria), m.etud.eco@gmail.com² Tamanrasset University (Algeria), khadidja_ishak@hotmail.com**Received:** 15/05/2024**Accepted:** 12/10/2024**Published:** 19/11/2024**Abstract:**

This study aims to explore the contribution of banking technology to enhancing the efficiency of government subsidies by discussing, on one hand, its role in improving the transparency and efficiency of the distribution of government subsidies, and, on the other hand, to clarify the challenges and obstacles to the use of such technology in enhancing the efficiency of government subsidy (costs, growing informal labor, cyber risks, regulatory issues). In the context of government subsidy, mention was made of the Filipino experience through the Poverty Reduction Strategy implemented by the Ministry of Social Welfare and Development, Pantawid Pamilyang Pilipino.

Finally, we have come up with a series of findings that indicate that banking technology has significantly enhanced government support to individuals, as governments can provide financial subsidies in more effective and rapid ways, using cloud computing techniques and artificial intelligence, automated learning, and blockchain technology. Banking technology improves the distribution of government subsidies and reduces costs. The Filipino experience has proven that through the program. (Pantawid Pamilyang Pilipino).

Keywords: banking technology, government subsidies, Pantawid Pamilyang Pilipino.**JEL Classification:** H24, H71, O33, O38, I10.

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1. Introduction:

The lack of efficiency of the generalized government support has driven governments to the necessity of shifting towards the programs of direct cash transfer to beneficiaries through banks, thereby benefiting from the advantages offered by banking technology. This technology is considered among the most important innovations of the modern digital age and has significantly impacted the financial services sector as it radically transforms the way banking services are provided. Banking technology is based on the use of modern technologies such as internet and smartphone applications to facilitate access to banking services and execute transactions with ease and speed. The importance of banking technology is manifested in enhancing the customer experience by saving time and effort to obtain banking services, as well as contributing to enhancing transparency and security through organizing payment operations and enabling digital payments. The role of banking technology is not limited to improving the customer experience only; it also contributes to enhancing the efficiency and effectiveness of the performance of banks and financial institutions, and achieving a balance between the financial needs of consumers and financial institutions.

1.1. Research Problem:

In this research paper, we will explore how banking technology contributes to enhancing government support by improving the transparency and efficiency of government support distribution. We will also discuss the challenges and obstacles associated with using this technology in enhancing government support through the following main research problem:

How does banking technology contribute to enhancing the efficiency of government support?

1.2. Research Questions:

To address the main research problem, we posed the following secondary questions:

- How can the techniques used in banking technology contribute to improving the transparency and efficiency of government support distribution more accurately and effectively?
- What are the main challenges and obstacles facing the application of banking technology in enhancing the efficiency of government support?
- How can the application of banking technology contribute to improving the implementation of the **(4PS)** program and increasing its efficiency in distributing government support in the Philippines?

1.3. Research Hypotheses:

- Using banking technology can increase the accuracy in identifying the needs of individuals for government support, thereby improving the effectiveness of distributing this support and reducing poverty rates.

- The absence of awareness-raising about banking technology and the inability to access modern banking technologies are among the main challenges facing the enhancement of the efficiency of government support.
 - Using banking technology can help improve the efficiency of implementing the **(4PS)** program in the Philippines by improving distribution processes, monitoring, and analyzing financial data more accurately and effectively.

2. Theoretical Framework for Banking Technology:

The theoretical framework for banking technology forms the foundation that aids in understanding this technology. It includes the definition, importance, challenges, and different forms of banking technology.

2.1. Definition of Banking Technology:

Banking technology refers to the use of technology in the banking sector to improve and simplify banking operations and services. It allows customers to conduct banking transactions and access services remotely, without the need for physical visits to bank branches. Customers can check account balances, transfer money, pay bills, buy/sell stocks, and make online purchases using their bank accounts¹. Banking technology encompasses a wide range of technologies, including telephone banking, internet banking, digital payments, blockchain, artificial intelligence, and automation of machine processes².

2.2. Features of Banking Technology:

Banking technology has become increasingly important in recent years, which led to changing the way banks operate, due to its characteristics consisting in³:

- **Security:** Banking technology provides high levels of security and privacy for client data and transactions using a variety of means and technologies. These means include data encryption, multi-factor authentication methods, and advanced technological tools for protection against fraud and unauthorized access to banking services.
- **Convenience:** Banking technology aims to provide banking services to customers through various electronic media such as online banking, telephone banking, ATMs, and digital payment systems, which enables customers to manage their financial transactions comfortably and easily from anywhere and at any time.
- **Efficiency:** Banking technology helps simplify banking operations and transactions, increasing operational efficiency for banks. This includes automating routine tasks, managing digital documents, and analyzing data, which contributes to better decision-making and improved banking performance.
- **Innovation:** As a result of ongoing technological advancement, banking technology strives to keep banks up to date with developments. This progress includes the adoption of innovative technologies such as artificial intelligence and blockchain technology, enhancing banking services and creating new opportunities for customers and banking institutions⁴.
- **Crisis Management:** Adopting technology in banking increases its resilience and ability to better withstand crises⁵.

2.3. Types of Banking Technology: Here are some of the main types:

- **Biometric Authentication**⁶:

Biometric authentication, such as fingerprint, face, and voice recognition, is attributed an increasing importance in the banking industry. Among the positive aspects of these technologies is the significant increase in the security levels it provides. By using unique biological traits, a user's identity can be accurately identified and authenticated, which reduces the risks of fraud and unauthorized access. Moreover, these technologies allow users to access their accounts and conduct transactions easily without needing complex passwords. The application of biometric authentication in the banking sector is diverse, including securing access to online banking applications and validating financial transactions. They can also be used effectively in customer reception to verify identities, thus enhancing security and building trust between customers and banking institutions.

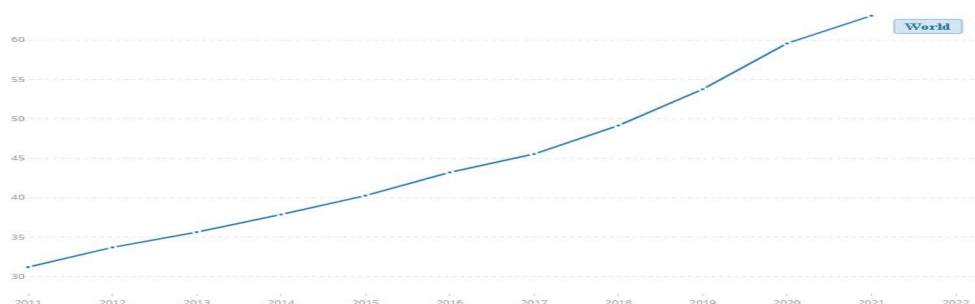
According to statistics from the website **Statista**, the biometric authentication market is expected to grow to \$55.42 billion by 2027. This rapid growth is partly driven by the speed and feasibility of using biometric technologies in various authentication processes, such as online payments, which is a significant benefit for participants. Additionally, it is expected that spending in the identity verification market will reach \$18 billion by 2027, with an estimated growth of \$13 billion over ten years (2017-2027)⁷.

However, these technologies must be handled with caution, and a proper balance between security and privacy rights for users must be ensured. Implementing these biometric technologies requires the development of effective procedures for managing and protecting users data.

- **Digital Banking**: Digital banks are a new form of banks that transform traditional banking services into digital applications using technology⁸. Digital banks can be defined as those banking services that enable customers to conduct transactions using the internet and telephone technology to meet customer needs⁹. The following figure illustrates the use of the internet in the world during the period (2011-2022).

Figure Number (01): Internet usage rates in the world (2011-2022)

%

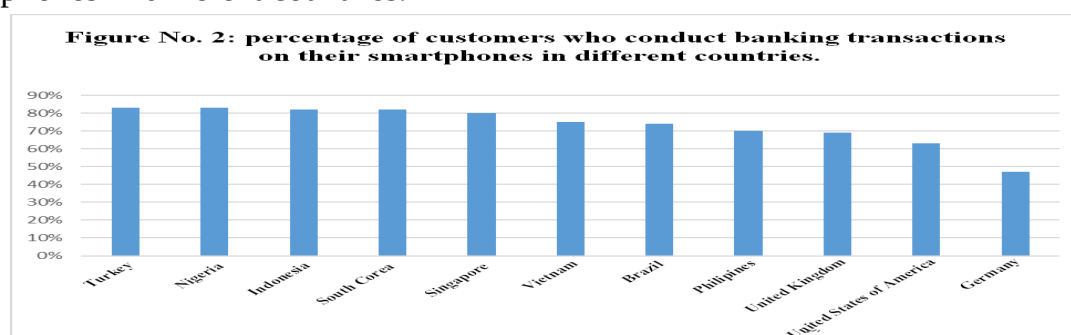


Source: World Bank Open Data, individuals using the internet, available on:
<https://data.albankaldawli.org/indicator/IT.NET.USER.ZS?end=2022&start=2011>

The Figure N0.1 above illustrates the evolution of internet usage rates worldwide among individuals during the period from 2011 to 2022, showing a continual increase. In 2011, about 30% of the world's population used the internet, and this percentage reached around 60% in 2022. This increase in internet usage rates can be attributed to several factors, such as improvements in internet infrastructure, reduced costs of accessing the internet, the emergence of smart devices, and the proliferation of digital services.

The increase in internet usage rates globally is directly linked to the growth and development of digital banks. With this increase, digital services, including digital banking services, become more widespread and common. Customers can manage their transactions easily, and this rise contributes to making financial and banking services more accessible to individuals worldwide.

- **Telephone Banking:** With the evolution of banking services around the world, banks have established telephone banking services to facilitate customers' management of their banking operations and to avoid queues. This service operates 24 hours a day¹⁰, and this type of banking technology allows for financial transactions and access to bank services through a mobile device, such as a mobile phone, smartphone, or tablet¹¹. The following figure shows the percentage of customers who conduct banking transactions on their smartphones in different countries.



Source: Statista, Percentage of customers using smartphones for banking transactions in various countries, <https://www.statista.com/>.

The Figure No. 02 shows the percentage of customers who conduct banking transactions on their smartphones in various countries. The countries are ranked by percentage, starting from the highest (Turkey and Nigeria at 83%) to the lowest (Germany at 47%). This means that 83% of customers in Turkey and Nigeria use their smartphones for banking transactions, while only 47% of customers in Germany do so. These percentages indicate a global trend towards using smartphones for banking transactions. However, these rates can vary significantly between different countries, which may reflect differences in telecommunications infrastructure, trust in online banking, local laws and regulations, and other factors.

The variety of banking technology forms is wide and not limited to the types previously mentioned but includes a wide range of financial technologies used in banking activities. These include machine learning technologies, blockchain, artificial intelligence, big data sets, cloud computing technologies, smart contracts, biometrics, and other types.

2.4. Challenges of Banking Technology: Banking technology challenges include multiple aspects, the most important of which are as follows¹²:

- **Using Old Systems:** One of the biggest challenges facing banks is their outdated systems. These systems were implemented years ago and are difficult to update or replace. Banks often lack the flexibility and agility necessary to keep up with the rapidly evolving customer needs and technological advancements. To address this challenge, banks should consider investing in more flexible, scalable, and adaptable modern cloud-based systems.
- **Customer Adoption of New Technology:** Customers may face barriers to adopting new banking technologies, potentially related to factors such as awareness, trust, and usability.
- **Increasing Cybersecurity Risks:** Cybersecurity is a significant concern, as cyber attacks continue to grow in frequency and sophistication. Banks must ensure that their systems are secure and protected from data breaches, phishing attacks, and other threats. To achieve this, it is essential to invest in advanced cybersecurity solutions such as multi-factor authentication, encryption, and real-time network activity monitoring.
- **Lack of Compatibility and Integration Among Banking Systems:** Many banks use different systems for various functions such as accounting, customer relationship management, and loan processing. This can lead to inefficiencies and difficulties in integrating data across systems. To overcome this challenge, banks can use Application Programming Interfaces (APIs¹³) to enable interoperability and integration between different banking systems, allowing for seamless data exchange and real-time data analysis.
- **Lack of Skills and Competencies:** Rapid technological change requires banks to have a competent technical team capable of understanding and implementing new technologies. However, there is a shortage of IT professionals specialized in the banking industry. Banks can address this challenge by investing in training and development programs for their current employees.
- **Difficulty Keeping Up with Regulatory Changes:** Banking technology outpaces regulatory change, making it difficult for regulators to respond quickly to technological change, understand new business models, and develop adequate policy responses. Some countries lack the necessary regulatory infrastructure for technology and digital banking services, leading to increased regulatory risks for monetary authorities¹⁴.

Despite these challenges which are considered a major obstacle facing the banking sector, research shows that banks' investment in modern technological infrastructures, such as cloud systems and advanced security solutions, in addition to APIs and digital transformation, can be key to overcoming these obstacles. Focusing on training and development programs for employees is essential to enhance efficiency and effectiveness. Through these strategies, the success of banks in adopting banking technology not only depends on meeting customer expectations for fast and

personalized services but also on enhancing operational efficiency and competitiveness of banking institutions.

- 3. Theoretical Context for Government Support:** The government support system emerged as a form of social protection after consolidating the concept of the welfare state, which took on the responsibility of providing education, health care, retirement benefits for the elderly, and various programs aimed at supporting those who are unable to support themselves, including children, the disabled, the unemployed, the poor, and others.

3.1. Definition of Government Subsidy:

- Government subsidy is defined as a set of government measures whereby producers earn higher returns than those proposed by the competitive market "producer subsidies", and consumers obtain goods or services for less than their economic cost "consumer subsidies"¹⁵.

Government subsidies take the following forms¹⁶:

- **Cash Subsidy:** Includes direct government cash transfers to producers and consumers.
- **Credit Subsidy:** Consists of government guarantees, interest rate reductions, or preferential rates for investors in certain sectors.
- **Tax Subsidy:** Referred to as tax expenditure, it represents the state's waiver of part of its tax claims in the form of reductions or exemptions for certain categories or projects.
- **Contribution Subsidy:** The government's contribution to the capital shares of private sector companies.
- **In-kind Subsidy:** Provision of goods and services at less than market prices.
- **Purchasing Subsidy:** The government purchases goods and services at above market value.
- **Regulatory Subsidy:** The government enacts a set of laws to control prices by setting maximum or minimum limits (to stimulate competition), or imposing restrictions on the quantity produced of a particular good or service.

3.2. Objectives of Government Support:

The primary goal of the government support system is to provide social protection for vulnerable groups in society by making goods and services affordable, in addition to the following objectives:

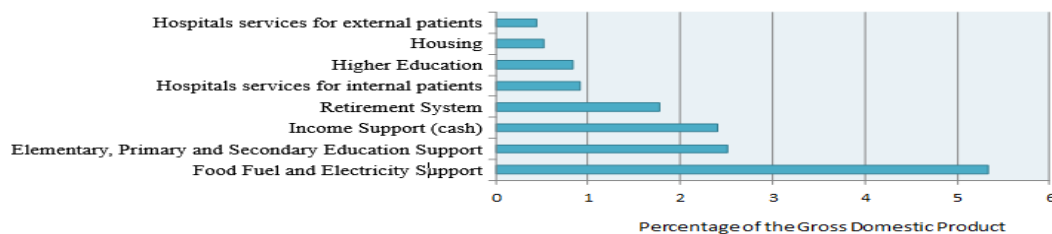
- It serves as a tool for redistributing income and national wealth and reducing social disparities.
- Acts as a mechanism for redistributing rentier wealth to the population in resource-rich countries.
- Controls prices and combats inflation, particularly imported inflation.
- Encourages vital sectors in the economy and enhances the competitiveness of local industries.
- Achieves sectoral and regional investment balance through discriminatory tax treatment to direct production factors towards these sectors.

3.3. Negative Effects of Government Support:

Despite the "noble" goal pursued by the state through this system, which is the redistribution of wealth among members of society, the following flaws mar its attempts:

- **On the Economic Level:** Government support disrupts and distorts the price mechanism and creates problems in competitiveness; it can impose restrictions on public resources, exacerbate debt levels, and encourage activities that waste resources. From a social perspective, the intensity of support for some products leads to creating incentives for smuggling to neighboring countries; support encourages overconsumption and wastage and accelerates the depletion of resources¹⁷.
- **On the Social Level:** Most forms of support have a regressive nature, meaning the richer one is, the more they benefit from the support; thus, it benefits the rich more than the poor¹⁸. Additionally, the cost of government support competes with some necessary spending areas that support growth, as some countries spend more on energy and food subsidies than on public health and education.

Figure No. 3: Cost of Government Subsidies in Arab Countries for 2019



Source: Economic and Social Commission for Western Asia (ESCWA), UNICEF, Arab Countries Social Expenditure Monitor, accessed on November 20, 2023, at: <https://www.unicef.org/mena/ar>

The data indicates that Arab countries support a diverse set of programs, but heavily rely on food and energy subsidies, exceeding 5% of the Gross Domestic Product (GDP). This is considered a primary tool for social protection due to its ease of administrative implementation compared to other programs that require precision in targeting and allocation. In oil-rich countries, it also serves as a means of distributing rentier wealth. This cost has exacerbated imbalances in the fiscal stability of these countries and crowded out spending in essential sectors connected to development and investment in human capital, such as health and education.

- **On the Environmental Level:** Subsidies cause environmental harm as low energy prices have led to a rapid increase in local energy consumption, exacerbating pollution and local traffic congestion. Fuel subsidies can also hinder the transition towards adopting renewable and clean energy technologies, such as solar and wind power, which find it difficult to compete with subsidized fuels¹⁹.

4. Role of Banking Technology in Improving the Transparency and Efficiency of Government Subsidy Distribution:

The considerable cost associated with generalized government subsidies and the multidimensional consequences they entail have compelled states to reform these subsidies with the aim of rationalizing them and directing them to the deserving groups. This reform allows the release and redirection of significant financial resources towards investment in vital growth-supporting sectors. Most countries have adopted the model of direct cash

transfers as an alternative method of distribution to the rightful beneficiaries. These are financial payments transferred directly from the state to the needy groups via mediums such as banks.

Banking technology has thus played a crucial role in enhancing the transparency and efficiency of government subsidies. It has enabled precise identification of eligible beneficiaries and verification of their information by matching data from various sources to ensure comprehensive coverage of the targeted population and prevent fund leakage and duplication of payments. Technology-based services, such as online banking, mobile banking, and ATM transactions, provide immediate access to customer account information. This transformation reduces the scope for human error and manipulation, thus enhancing transparency in financial operations and ensuring a more just and effective distribution of government subsidies. Additionally, banking technology enables banks to maintain accurate and comprehensive records of transactions, which assists in effectively tracking and monitoring financial activities. In the same vein, the implementation of information technology systems has allowed banks to maintain comprehensive transaction records, facilitating the tracking and monitoring of financial activities and thereby enhancing transparency in the distribution of government support²⁰.

Moreover, banking technology contributes to the transparency and efficiency of government subsidy distribution by²¹:

- Digitalizing banking processes, allowing for faster and more accurate transactions;
- Providing real-time access to financial data, ensuring transparency in the allocation of government subsidies;
- Enhancing the security of financial transactions, thereby reducing and limiting the risks of theft and fraud;
- Ensuring timely delivery of subsidies to beneficiaries and monitoring their distribution.

5. Challenges and Obstacles to Using Banking Technology in Enhancing the Efficiency of Government Subsidies

Despite the important role that banking technology has played in enhancing the efficiency of government support, especially in terms of transparency and proper distribution to the deserving group, its use presents a series of obstacles primarily related to cost issues, the growth of the informal economy, security, and regulatory matters.

5.1. Costs:

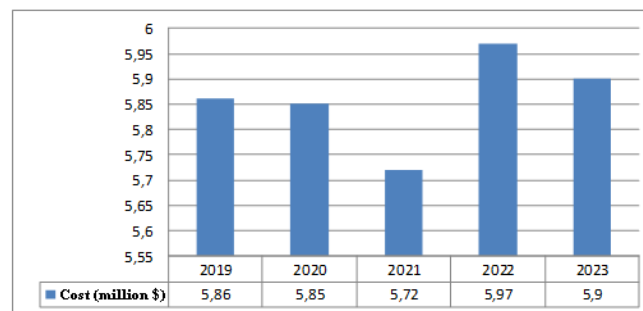
The shift towards using banking technology to distribute social transfers in cash form incurs costs borne by the beneficiaries on one hand and burdens assumed by the distributing bank on the other.

- **For the Beneficiaries:** Transaction fees and the initial costs of maintaining a minimum balance to open and keep an account impose additional costs on the poor, especially those living in rural areas²², which often lack electronic payment channels. This may compel them to travel to banks, incurring additional costs.
- Possibility of Smart Cards Being Stolen, Damaged, or Forgotten, sometimes due to the low level of awareness among beneficiaries and their lack of proper attention to their cards, involves the cost of reissuing new cards.

- **For the Distributing Bank:** Establishing and expanding the electronic infrastructure in the bank to the areas where the beneficiaries live requires a significant budget allocation, which remains nonetheless less than the costs of establishing new bank branches²³. However, the problem of controlling the cost of establishing this infrastructure, which varies according to the infrastructure facilities from one area to another (electricity networks, security availability, etc.), may lead service providers to significantly inflate their estimates based on unknown probabilities about the needs for new infrastructure in each area.

- In the Context of Growing Cyber Threats and Crimes, where the cost of data breaches in the financial sector alone was estimated at \$5.90 million in 2023, the second-highest cost after the data breach costs in the healthcare sector, which were estimated at \$10.93 million for the same year²⁴, it has become imperative for banks, in order to ensure the safety of their electronic work environment, to move towards building a cybersecurity strategy that ensures the protection of data, networks, technical systems, and users. This necessary approach requires allocating sufficient resources to cover its costs, thereby increasing the bank's burdens.

Figure No. 4: Average Total Cost of Data Breaches in the Financial Sector per Year for the Period (2019-2023)



Source: Average total cost of a data breach in the financial industry worldwide from 2019 to 2023, <https://www.statista.com>.

5.2. Growth of the Informal Sector:

The main principle of government support systems is to sustain and assist individuals who are unable to earn an income or those whose income is insufficient for a decent living. Therefore, income and its level are crucial criteria for determining the group eligible for government support. However, monitoring and tracking income levels pose a real problem in collecting data on the needy population in developing countries, where the informal sector, constituting more than 90% of the workforce²⁵, is growing. Due to various motivations such as the lack of employment opportunities in the formal sector, the desire to earn additional income alongside formal employment, tax evasion, and others, individuals turn to the informal sector which is not subject to taxes or government oversight to secure employment opportunities that could yield significant gains. These are assumed to disqualify them from certain government support programs; however, due to the difficulty in tracking the financial capacity of those engaged in informal activities, their access to government aid continues.

5.3. Cyber Risks:

Cybercrimes occurring in cyberspace, especially data breaches and cyber fraud, pose real threats to the efficiency of targeted government support. Unauthorized access to personal information and its use to acquire funds or make fraudulent online purchases using someone else's credit cards can lead to support being diverted to undeserving parties. For instance, in 2014, JPMorgan Chase in New York suffered an attack resulting in the data breach of 83 million clients, including names, email addresses, postal addresses, phone numbers, etc²⁶.

Moreover, cybersecurity challenges increase with technological advancements, particularly with the development of artificial intelligence. Cybercriminals have numerous options for creating powerful AI platforms, where attackers harness AI²⁷ and its tools for criminal purposes by developing complex algorithms that exceed standard cybersecurity strategies, making them difficult to detect and exploit vulnerabilities.

5.4. Regulatory Issues:

This involves a range of arrangements starting from the selection process of the intermediary bank between the government and individuals to the disbursement of cash support, which could face the following problems:

- **Corruption:** Financial institutions in an increasing number of countries compete to tender for the right to disburse government payments to individuals, including cash transfers, all attracted by the prospect of a reliable and recurring income source in the form of fees paid by the government²⁸. However, the prevalence of corruption can cast a shadow over the integrity of the government's tender processes to select the distributing bank that offers the best quantitative (lowest cost) and qualitative (availability of necessary infrastructure and equipment) bid. The process may deviate from its course and be based on personal interests, political inclinations, or manipulations and falsifications in the bids submitted, without regard for actual efficiency, ultimately affecting the safe delivery of funds to their rightful recipients.
- Requirement to provide proof of residence (address) for opening a bank account often poses a barrier for the poor living in informal areas;
- The limited functional features designed into electronic cards, which compel the beneficiary to withdraw funds within a specified period, and if this period is exceeded, the funds will be reclaimed by the government. Thus, recipients cannot use these cards as a savings mechanism or a deposit facility²⁹, depriving them of using smart cards for saving which prevents them from building financial reserves to address emergencies such as price increases or sudden illnesses.

6. Case of the Pantawid Pamilyang Pilipino Program (4Ps) in the Philippines:

The Pantawid Pamilyang Pilipino Program (4Ps) is currently the fourth largest conditional cash transfer program in the world in terms of population coverage³⁰, designed to reduce poverty and improve the social status of the poor in the Philippines.

6.1. Program Overview:

The Pantawid Pamilyang Pilipino Program (4Ps) is one of the national government's human development measures that provides conditional cash transfers to the poorest citizens

in exchange for their commitment to improving the health, nutrition, and education of children aged 0 to 18.

6.2. Program Objectives:

4Ps has two main objectives as a leading poverty alleviation program³¹:

- **Social Assistance:** Provides financial support to very poor families to meet their immediate needs.
- **Social Development:** Aims to break the cycle of poverty across generations by investing in the health and education of poor children through programs such as health check-ups for pregnant women and children from ages 0 to 5, deworming for children aged 6 to 14, and enrollment of children in kindergarten, primary, and secondary schools.

6.3. Cash Transfer Packages:

4Ps offers two types of cash grants to beneficiary families³²:

- **Health Grant:** 500 pesos per family per month, totaling 6000 pesos annually.
- **Education Grant:** 300 pesos per child per month for ten months, totaling 3,000 pesos per year (a family can register a maximum of three children for the program). For a family with three children, they may receive 1,400 pesos per month, or a total of 15,000 pesos per year for five years, from both types of cash grants provided to them.
- **Rice Support:** This grant is provided to each family for 600 pesos per month. It is available to beneficiaries who meet the education or health conditions. The maximum amount per year is 7,200 pesos. This grant was not originally part of the program benefits and was only added starting in 2017 with the aim of improving the food security situation of the beneficiaries.

6.4. Payment Methods:

After identifying the category eligible for cash support through a program called NHTS-PR (**National Household Targeting System for Poverty Reduction**), the cash grants are delivered to beneficiaries through two payment methods³³:

- **Via Banking Cash Cards:** Where withdrawals are made through ATMs;
- **Direct Transactions without Intermediary:** Where grants are directly provided to the beneficiaries in cash.

The payment delivery system is currently managed by the Land Bank of the Philippines (LBP) as the authorized government depository bank. In areas with ATMs, beneficiaries are registered to open card accounts at the Land Bank and their cash grants are transferred to their cards/accounts according to bimonthly payment schedules.

Conversely, in areas where access to banks or ATMs is difficult or limited – usually rural areas – the Land Bank (LBP) hires payment channels like rural banks and cooperatives to pay the beneficiaries.

Leveraging the advantages offered by banking technology, the program now possesses one of the most comprehensive poverty targeting databases in the world, covering 75% of the country's population. It has been widely used to identify poor beneficiaries for national and local government programs³⁴.

7. Conclusion:

Banking technology has significantly enhanced the government support provided to individuals. Through banking services offered by digital and internet banking, and telephone banking, governments are now able to deliver financial support more effectively and quickly, benefiting from cloud computing technologies, artificial intelligence, machine learning, and blockchain technology. Banking technology can improve the processes of distributing government support and analyzing financial data more accurately, thereby helping to reduce the cost of government support. The Philippine experience through the Pantawid Pamilyang Pilipino Program (4Ps) has demonstrated how banking technology contributes to identifying actual beneficiaries and verifying their information, achieving the most comprehensive database on poverty data in the world.

However, using banking technology as a tool to enhance the efficiency of government support faces a range of challenges centered primarily around the costs borne by the distributing bank and the beneficiaries, the difficulty of establishing databases for targeting the poor due to the vast size of the informal sector, cyber threats, and issues of corruption that jeopardize the safe delivery of government support funds to their rightful recipients.

Based on our research findings, we propose the following solutions:

- **Facilitate the transition to the formal economy:** This can be achieved by increasing investments in infrastructure, which encourages formal companies to move closer to the poor workers; combating administrative bureaucracy that hinders the establishment of formal projects; reducing taxes that burden businesses, and leveraging technology to reduce informal work by adopting electronic wage deposit systems;
- **Necessity to build a cybersecurity strategy in banks:** Starting from understanding all current and future risks, assessing them, and knowing how to deal with them;
- **Compliance with regulatory controls and instructions related to cybersecurity:** This is not just a precautionary measure but can protect the bank from legal and financial consequences.
- **Equip smart cards with functional features:** Such as saving, to enable families to accumulate productive assets and build financial reserves to cope with emergencies such as price increases or sudden illnesses;
- **Necessity to shift from payments through bank branches to branchless distribution channels:** Using electronic means that carry transaction-related data, to reduce the cost of establishing and maintaining physical bank branches.

8. References:

- ¹ D. Murugun, **Technology Adoption in Indian Banking Sectors – 2023**, East Asian Journal of Multidisciplinary Research, vol. 2, n° 2, PT Formosa Cendekia Global, Feb 2023, P: 569.
- ² BAYRAKTAR, Dorin, et al, **STREAMLINING BANKING PROCESSES BY IMPLEMENTING RPA**, Revista Economica, vol. 74, no. 2, Lucian Blaga University of Sibiu, Sept 2022, P: 7.
- ³ Kitigin, Beatrice, et al, **E-Banking Technology Characteristics and Performance of Micro and Small Enterprise in Kenya**, SEISENSE Journal of Management, vol. 4, no. 1, SEISENSE Private, Jan. 2021, PP : 13–30
- ⁴ Sultan, Abid, et al, **Internet of Things Security Issues and Their Solutions With Blockchain Technology Characteristics: A Systematic Literature Review**, American Journal of Computer Science and Information Technology, vol. 06, no. 03, Scitechnol Biosoft Pvt, 2018, P: 1.
- ⁵ Pierri, Nicola and Timmer, Yannick, **The Importance of Technology in Banking During a Crisis**, ESRB: Working Paper Series 2021/117, Available at SSRN: <https://ssrn.com/abstract=3816599>
- ⁶ 15+ Banking Technology Trends to Watch Out for 2023. 2 Nov. 2023, available at the link: <https://kissflow.com/solutions/banking/banking-technologies/>
- ⁷ <https://www.statista.com/statistics/1263886/significant-developments-biometrics-industry-opinion/>
- ⁸ Pham, Duy Khanh. "Digital Banking Adoption in Vietnam: An Application of UTAUT2 Model." Webology, vol. 19, no. 1, NeuroQuantology Journal, Jan. 2022, pp. 3243–62.
- ⁹ ndriasari, Elisa, et al. "Digital Banking: Challenges, Emerging Technology Trends, and Future Research Agenda." IJEER vol.18, no.1, 2022, P: 5.
- ¹⁰ إياد منصور حسن، إدارة العمليات البنكية والنقدية، ابن النفيس للنشر والتوزيع، 2019، ص: 207.
- ¹¹ Tiago, Oliveira. "Literature review of mobile banking and individual performance", International Journal of Bank Marketing 35 No. 7, 2017. P: 07.
- ¹² B. Bhargav, **The Tech Challenges Faced by Banks and How to Solve Them**, 18 Nov 2023, available at the link: www.linkedin.com/pulse/tech-challenges-faced-banks-how-solve-them-bhargav-bhatt.
- ¹³ Application Programming Interface.
- ¹⁴ Felix I Lessambo, **Fintech Regulation and Supervision Challenges Within the Banking Industry**, Palgrave Macmillan, United Kingdom, 2023, P: 28.
- ¹⁵ Benedict Clements, Re jane Hugounenq, and others, **Government Subsidies: Concepts. International Trends, and Reform Options**, reviewed on 17/10/2023, <https://www.imf.org/en/Publications/WP/Issues/2016/12/30/Government-Subsidies-Concepts-International-Trends-and-Reform-Options-1359>
- ¹⁶ Ibid
- ¹⁷ Bassam Fattouh, Laura El-Katirim, **Energy Subsidies in the Arab world**, reviewed on 20/10/2023, <https://www.undp.org/publications/energy-subsidies-arab-world>
- ¹⁸ أحمد مسعود، دعم الأسعار – أحببنا الدعم أم كرهناه، دقة التوجيه هي الأفضل، تم الاطلاع عليه بتاريخ 2023/10/20 ، <https://www.imf.org/external/arabic/np/vc/2011/051011a.pdf>
- ¹⁹ Bassam Fattouh, Laura El-Katirim, op.cit .
- ²⁰ Amrishi, Kumar, Choubey, Brajesh, Rawat, "A Study on Effective Role of Technology in Improving Banking System in India", The International Journal of Management, 2018, P:72, doi: 10.18843/IJMS/V5I4(1)/11
- ²¹ Halyna, Matvienko. "Digital transformation of public finance in ukraine", 2021, P: 136, doi: 10.32782/2304-0920/1-86-21
- ²² مارك بيكنز، ديفيد بورتيسوس، سارة روتمان، تقديم الخدمات المصرفية إلى الفقراء عن طريق المدفوعات الحكومية للأفراد ، تم الاطلاع عليه بتاريخ 2023/11/11 ، <https://www.findevgateway.org/ar/paper/2009/12/tqdy-m-alkhdm-at-alm-srfyt-aly-alfqra-n-tryq-almdfwat-alhkwmyt-llafrad>
- ²³ مارك بيكنز، ديفيد بورتيسوس، سارة روتمان، مرجع سابق.

²⁴ IBM security, **Cost of a Data Breach**, reviewed on 20/10/2023, <https://www.ibm.com/reports>.

²⁵ مجموعة البنك الدولي، الطبيعة المتغيرة للعمل. واشنطن، 2019، ص 26 .

²⁶ كريس ويلش، الجانب المظلم للتكنولوجيا ، تم الاطلاع عليه بتاريخ 2023/11/17 ،

<https://www.imf.org/external/arabic/pubs/ft/fandd/2016/09/pdf/wellis.pdf>

²⁷ Zarina I. Khisamova, Ildar Begishev, E. L. Sidorenko, **Artificial Intelligence and Problems of Ensuring Cyber**, International Journal of Cyber Criminology, vol 13, Issue 2 July, United Kingdom, 2019, p 570.

²⁸ مارك بيكنز، ديفيد بورتيوس ، سارة روتمان، مرجع سابق.

²⁹ مرجع سابق.

³⁰ FAQs about the Pantawid Pamilyang Pilipino Program (4Ps), available at the link:

<https://www.worldbank.org/en/country/philippines/brief/faqs-about-the-pantawid-pamilyang-pilipino-program>

³¹ <https://www.officialgazette.gov.ph/>

³² Ibid.

³³ Pantawid Pamilyang Pilipino Program Third Wave Impact Evaluation (IE Wave 3) Regression Discontinuity Report

<https://pantawid.dswd.gov.ph/wp-content/uploads/2020/11/4Ps-Impact-Evaluation-Wave-3-RDD-Report.pdf>

³⁴ FAQs about the Pantawid Pamilyang Pilipino Program (4Ps), available at the link:

<https://www.worldbank.org/en/country/philippines/brief/faqs-about-the-pantawid-pamilyang-pilipino-program>