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# Single Smart Card Technology: Challenges, Prospect and Security Among Students in Taraba State Polytechnic Suntai

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**Abstract:** In this generation, moving with multiple cards by an individual as identification and making various transactions has become a norm to our lives and society. Various method has been adopted by many countries which has its advantages and disadvantages. However, it has been observed that in most cases, a single smart card has a high acceptance by individuals and firms in most countries and Nigeria is left behind. Newly introduced smart card technology is being employed in a number of ways around the world. security has become significant in information technology, especially in those application involving data sharing and transactions through the internet. This paper is mainly concerned with Single smart card Challenges, Prospect and Security, in other to achieve this purpose, a survey was carried out among three hundred (300) students in Taraba state Polytechnic Suntai. To measure the acceptance of the single smart card technology three research questions guided the study. Data for this study was collected through a self-designed questionnaire. The data collected were analyzed using Chi-Square Statistical Distribution. The findings of the study showed that many students go about with multiple cards without the awareness of single smart card technology, while others due to security constrained negate the acceptability of a single smart card. The paper concluded that there is a need for helping the users with important information on the security, challenges and prospect of single smart card technology, considering its benefits and application instead of its challenges.

**Keywords:** Single Smart Card, Data, Technology, Security, Challenges.

## INTRODUCTION

Single smart card technology, also known as integrated or multifunctional smart card technology, represents a remarkable advancement in the field of secure identification, access control, and transactional systems. This innovative technology has gained widespread adoption across a multitude of industries and applications, ranging from finance and transportation to healthcare and government services.

At its core, a single smart card is a compact plastic card embedded with a microprocessor chip with various memory components, capable of storing and processing data securely. What sets it apart from traditional identification or payment cards is its ability to perform multiple functions seamlessly within a single card. This multi functionality has made single smart cards an invaluable tool for enhancing convenience, security, and efficiency in a rapidly evolving digital world. A smart card, chip card, or integrated circuit card (ICC or IC card) is a physical electronic authorization device, used to control access to a resource. It is a flexible credit card with an implanted microchip. smart card is a microchip or circuit that has been integrated into a pocket-size card [2].

The purpose of this technology is to simplify individuals' lives and streamline operations for organizations by consolidating numerous cards, keys, and credentials into one smart, versatile card. By doing so, it addresses a range of contemporary challenges, such as the need for secure access control in buildings, efficient payment methods, robust identity verification, and the protection of sensitive data.

In this era of heightened security concerns, single smart card technology plays a pivotal role in ensuring data privacy and safeguarding sensitive information. It incorporates advanced security features, including encryption, authentication mechanisms, and biometric verification, making it extremely

resistant to fraud and unauthorized access. Moreover, the ability to remotely manage and update smart cards enhances security and adaptability.

Today, organization employees are issued different types of identification (ID) cards, which are used to access organizational facilities and buildings by security personnel. Equally, some of these cards cannot be used for other purposes—such as access computer systems, ATM machines, Library, buildings, and Hotels to mention just a few and some of these cards can be easily forged, stolen, or altered to gain access to a system by others [1].

Single smart card technology refers to the use of a single smart card for multiple applications or purposes. This technology allows individuals to use one card for various transactions, such as accessing buildings, making payments, and storing personal information. Smart card is called 'smart' because it contains a computer chip. Indeed, smart card is often referred to as 'chip card' or 'integrated circuit card'. The smart card looks like a credit card but acts like a computer information, which can be accessed through a card reader. Smart cards are used for a variety of purposes, including identification, access control, payment processing, and transportation [6].

## STATEMENT OF PROBLEM

When considering the implementation and adoption of single smart card technology, there are several potential problems and challenges that organizations, individuals, and society may encounter. Security Concerns: While smart cards offer enhanced security features, they are not immune to hacking or data breaches. Cybercriminals continuously develop new techniques to compromise smart card systems, posing a risk to sensitive data and identities. Cost of Implementation: The initial cost of implementing a single smart card system, including card issuance, card readers, and system integration, can be substantial. Smaller organizations and individuals may find this cost prohibitive.

In the globe, many people go about with different cards in their holders, ranging from credit cards, identification cards, ATM cards, and maybe a few other plastic cards. [4]. Many organizations such as supermarkets, hotels, banks, retail, Healthcare, and Mobile communication to mention a few have introduced smart cards to their services. It has been observed that many students of Taraba State Polytechnic, Suntai were not aware of the usage of a single e smart card, thereby going about with multiple cards. As a result of these multiple cards, there is the likelihood of duplication of data. With the rate of insecurity in the nation also pose a great concern on the acceptability of single smart card. Government and organization end up spending huge amount of money in producing multiple cards for employees. However, with a single card, the only need is to replace the card when lost or stolen. Based on the above-mentioned problems, the researcher tends to find out the level of awareness, challenge, prospects and security of a single smart card among students of Taraba state Polytechnic Sunti. Addressing these problems or challenges requires a coordinated effort from technology providers, organizations, regulators, and users. As smart card technology continues to evolve, finding solutions to these challenges will be crucial to realizing its full potential and ensuring its responsible and secure integration into society

## BENEFITS OF SINGLE SMART CARD TECHNOLOGY

Single smart card technology can provide several benefits, such as convenience, cost savings, and improved security. Instead of needing multiple cards for different purposes, individuals can use one card for everything. This can reduce the need for multiple card readers and infrastructure, which can lead to cost savings. Additionally, using a single smart card for multiple purposes can reduce the risk of lost or stolen cards, as there are fewer cards to keep track of.

Overall, single smart card technology can provide a streamlined and efficient solution for managing multiple transactions and applications. According to [2] smart card is a microchip or circuit that has been

integrated into a pocket-size card. A smart card is a portal device that is used to store several applications which can be accessed by the owner via a centralized database either offline or online.

Single smart card technology is a chip where users' personal information such as students, banks, hospitals, and driver's licenses data are embedded in a single chip. Thus, single smart card technology can be beneficial to societies when many people take advantage of this innovation. This can circumvent the need to carry multiple cards all the time, also this has reduced the stress of recalling access codes for different cards from a different organization. With the benefits that a single smart card has brought, one can make different transactions and pay bills at ease. Consequently, with this technology different organizations including the government can locate and find out the history of their employee, even when the card gets lost it can be traced from the central system. Also, it helps in tracing defaulters, or people with criminal acts from the central system. The application can help in reducing the number of fake licenses, and ghost workers and also acts as a mechanism that will aid the government to have control of its employees. This will go alone way in reducing duplication of data and maintaining data integrity among the employee

According to [3], many western countries among others in the world have adopted smart cards, developing countries are yet to embrace the innovation of smart card technology, developing countries that adopt it are not using it on a large scale because it has not valued its benefits. However, for the technology to gain user acceptance, there is a need for user awareness of the advantages, features, and benefits which is one of the factors that will influence users to accept the innovation of a single smart card. User awareness has a great substantial and direct consequence on user approval of smart card technology. Equally, the knowledge about the technology can motivate users' acceptance of the innovation of a single smart card

## SECURITY OF SMART CARDS

Smart cards are mostly used in security applications. Smart cards offer much higher security compared to basic printed cards, and even magnetic stripe cards. Smart cards are often used to prove identity, control access to protected areas, or guarantee payments. The reason for high security in smart cards is due to the fact that the users of the system are given access to the smart card. The security element is put into the hands of the users, and is therefore open to attacks from hackers, clever outsiders, malicious insiders, or even dedicated and well-funded enemies. The memory technology used in smart cards has an influence on security, both in the card and in the overall system. Some memory technologies have characteristics that make them particularly secure or insecure. Smart cards also include other security measures such as holograms, security overlays, guilloche printing, micro-printing, optically variable printing [5].

## SECURITY FEATURES OF THE SMART CARD CHIP

Testing the microcircuit, during the production, is the necessary act for the smart card chip. After testing the chip, it is converted to a mode. Accessing the internal chip circuit is impossible for this mode. For example, outside can't access the memory directly. To prevent attacks execution of some project is necessary. For example, with interchange the conductor; deduce the function is impossible for firms. The connections between on-chip elements are encrypted. There are circuits in smart card which can detect external tampering. The circuit detects too high and too low supply, too high or too low external clock frequency and too low an operation temperature [5]

## PROSPECT ON SINGLE SMART CARD

The prospects for single smart card technology remain promising, with continued advancements and broader applications expected in various industries and sectors. Here are some of the key prospects for single smart card technology: As technology continues to improve and the benefits of single smart cards

become more apparent, we can expect increased adoption across a wide range of industries, including finance, healthcare, government, transportation, education, and more.

Smart card technology will continue to evolve to provide even higher levels of security. This includes the integration of advanced encryption methods, biometrics, and multi-factor authentication to protect sensitive data and identities in healthcare, smart cards could become central to securely storing and sharing patient information, streamlining access to medical records, and improving patient care.

single smart card technology holds significant prospects for the future. As it becomes more integrated into our daily lives, it has the potential to enhance security, convenience, and efficiency across a wide range of applications and industries, contributing to a more connected and digitally empowered society. Likewise in Government Services, Financial Inclusion etc.

## METHODOLOGY

The study adopted the descriptive survey research design, chi square statistical distribution. The population of the study was 1600 students of the Taraba State Polyethnic suntai. A simple random sampling technique was used to select 300 respondents from the population. A self-designed structured questionnaire was adopted for this study. The instrument was titled the Level Awareness of Single Smart Card among Students of Taraba State Polyethnic suntai.

(LASSCASTSS), Challenges and Prospect of Single Smart Card among Students of Federal Polytechnic Bali (CPSSCASTSS), with 20 items used to collect data for the study. The Questionnaire which was designed on a four-point rating scale of Very High Level (VHL) 4, High Level (HL) 3, Low Level (LL) 2, and Very Low Level (VLL) 1 was validated by two experts.

The questionnaires were administered and collected by the researcher. Data collected were analyzed using CHI SQUARE STATISTICAL DISTRIBUTION at 0.05 significant Level.

## RESULT AND DISCUSSION

Research Question 1: To what level is the awareness of a single smart card among students of Taraba State Polytechnic suntai? N=300

**Table 1:** The level of awareness of single smart card among students of Taraba State Polytechnic suntai

| S/N | ITEMS | VHL | HL | LL | VLL |
|---|---|---|---|---|---|
| 1 | Single Smart Card is easier to make payment of fees, healthcare, public transit etc. | 210 | 45 | 30 | 15 |
| 2 | Single Smart Card is used in changing interaction at the Canteen and Cafeteria | 225 | 30 | 30 | 15 |
| 3 | Smart Card influence on students tracking system | 225 | 60 | 0 | 15 |
| 4 | Single Smart card aid Financial Transaction | 225 | 60 | 0 | 15 |
| 5 | It serves as security authentication & access control | 270 | 15 | 15 | 0 |
| 6 | Its aid the facilitation of personal Identification | 255 | 30 | 15 | 0 |

Sources: Field Survey 2023

**Table 2:** CHI-SQUARE analysis of the level of awareness of smart card among Students

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| ITEM | SA | A | DA | SDA | SL | DF | $X^2c$ | P-Value | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 210 | 45 | 30 | 15 | 0.05 | 15 | 142.10164 | 8.9E-23 | Reject |
| 2 | 225 | 30 | 30 | 15 | | | | | |
| 3 | 225 | 60 | 0 | 15 | | | | | |
| 4 | 225 | 60 | 0 | 15 | | | | | |
| 5 | 270 | 15 | 15 | 0 | | | | | |
| 6 | 255 | 30 | 15 | 0 | | | | | |

The result presented in table 2 above at 0.05 significant level shows that the P-Value is less than 0.05. I thereby reject the null hypothesis which say that here is no significant difference between the group items on students' perception on the level of awareness of smart card among Students. Therefore, there is an association between the usage of smart card technology and the awareness. Hence, effective usage of smart card technology requires adequate knowledge and awareness.

**Research Question 2:** What are the challenges and prospects of usage of a single smart card among students of Taraba State Polytechnic Suntai? N =300

**Table 3:** the challenges and prospect of usage of a single smart card among students of Taraba State Polytechnic suntai

| S/N | ITEMS | SA | A | DA | SDA |
|---|---|---|---|---|---|
| 1 | A single smart card be used for multiple applications | 200 | 90 | 10 | 0 |
| 2 | Students use smart cards in school | 220 | 70 | 10 | 0 |
| 3 | Single smart cards will contribute to the nations' economy | 190 | 85 | 20 | 5 |
| 4 | Single smart card has more advantage over traditional cards | 285 | 15 | 0 | 0 |
| 5 | A Single smart card has high market value in our nation | 210 | 80 | 5 | 5 |
| 6 | A single credit card reader is more secure than traditional cards | 250 | 50 | 0 | 0 |

**Source: Field Survey 2022**

**Table 4:** CHI-SQUARE analysis on the Challenges and prospect in the usage of a single smart card among students

| ITEM | SA | A | DA | SDA | SL | DF | $X^2c$ | P-Value | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 200 | 90 | 10 | 0 | 0.05 | 15 | 147.860733 | 6.4E-24 | Reject |
| 2 | 220 | 70 | 10 | 0 | | | | | |
| 3 | 190 | 85 | 20 | 5 | | | | | |
| 4 | 285 | 15 | 0 | 0 | | | | | |
| 5 | 210 | 80 | 5 | 5 | | | | | |
| 6 | 250 | 50 | 0 | 0 | | | | | |

The result presented in table 4 above at 0.05 significant level shows that the P-Value is less than 0.05. I thereby reject the null hypothesis which say that here is no significant difference between the group items

on students' perception on the challenges and Prospect on the usage of single smart card among students of Taraba State Polytechnic suntai. Therefore, situations or condition where challenges exist, it must be resolve to ensure efficiency of smart card usage within the student community.

**Research Question 3:** What is the security of using a single smart card among students of Taraba State Polytechnic Suntai? N =300

**Table 5:** The Security of using a single smart card among students of Taraba State Polytechnic Suntai

| S/N | ITEMS | SA | A | DA | SDA |
|---|---|---|---|---|---|
| 1 | Smart card technology is reliable | 209 | 54 | 28 | 9 |
| 2 | Smart card system is nothing to be afraid about. | 195 | 63 | 23 | 19 |
| 3 | Smart card technology is Dependable | 269 | 13 | 10 | 8 |
| 4 | Security is significant when using smart card Technology | 243 | 34 | 14 | 16 |
| 5 | The smart card is safe to use | 150 | 85 | 49 | 16 |
| 6 | Threats to security make it cumbersome to be adopted by the society | 65 | 72 | 89 | 74 |

**Source: Field Survey 2022**

**Table 6:** CHI-SQUARE analysis on the Usage of smart card technology with security Challenge

| ITEM | SA | A | DA | SDA | SL | DF | $X^2_c$ | P-Value | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 209 | 54 | 28 | 9 | 0.05 | 15 | 474.291214 | 1.6E-86 | Reject |
| 2 | 195 | 63 | 23 | 19 | | | | | |
| 3 | 269 | 13 | 10 | 8 | | | | | |
| 4 | 243 | 34 | 13 | 10 | | | | | |
| 5 | 150 | 85 | 49 | 16 | | | | | |
| 6 | 65 | 72 | 89 | 74 | | | | | |

The result presented in table 3 above at 0.05 significant level shows that the P-Value is less than 0.05. I thereby reject the null hypothesis which say that here is no significant difference between the group items on students' perception on the usage of smart card technology on security challenge. Therefore, there is association between the usage of smart card technology and security. Hence, effective usage of smart card technology requires good security.

## CONCLUSION

The effective utilization of smart card technology necessitates a sufficient comprehension and consciousness, which can be attained through the dissemination of information, workshops, and promotional campaigns on local radio and television stations, as well as social media platforms. In instances where challenges or predicaments arise, it is imperative to address and resolve them in order to ensure the optimal efficiency of smart card usage within the student community.

However, this necessitates the provision of customer care services to facilitate prompt intervention and resolution, thereby cultivating trust and acceptability among users. The effective utilization of smart card technology also necessitates the implementation of robust security measures. In this regard, it is essential to establish a clearly delineated set of guidelines that will aid users in overcoming any security-related difficulties they may encounter while employing smart cards.

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## RECOMMENDATIONS

Based on the findings and conclusion of this study, the research recommended the following:

- The government ought to disseminate information to the general populace regarding the utilization of the single smart card technology, either through the Nigeria Communication Commission (NCC).
- The administration of the educational establishment should arrange a symposium for students concerning the potential benefits associated with utilizing the single smart card
- Further investigation is needed to explore the security aspects of a solitary intelligent card, in order to facilitate the acceptance and adjustment of its functionality by users.
- Entities operating in the realm of information technology, such as telecommunications service providers, should initiate, instruct, and assist end-users in gaining awareness of the advantages, characteristics, and benefits associated with this technology.

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