Abstract

**Purpose:** This study aims to explore a new market called fintech, a combination of finance and technology; analyze Toss Corporation’s innovation strategy, which secured high innovation performance and market share; and present ideas that can be applied to the military based on a simple remittance technology.

**Method:** To analyze Toss’s management strategy, we examined its profit-making model that helped maintain a competitive advantage and analyzed the market. In addition, the new innovative technologies for the promotion of fintech enterprises and security of the remittance technology were analyzed, along with applicable improvements.

**Results:** Toss maximized user convenience with its innovative “remittance technology” and achieved low-cost, high-efficiency promotion through Social Network Services. It has also proven to be a very safe system through its innovative security features that can also be applied to military organizations. On the system side, a user-centered security regulation and system construction method that combines security enhancement and convenience through the need for a more convenient working environment, the applicability of bio-certification systems, and security accountability were proposed.

**Conclusion:** The analysis of Toss’s innovation strategy shows that in order to succeed, a company must either explore new markets through idea development and innovation or provide customized services in a fully specialized user-friendly manner. The military also needs to take immediate and flexible action, such as continuing to find ways to reduce inefficiency due to various security regulations and corresponding materials through such case studies.

**Keywords** Fintech, Toss, Biometrics, Innovation, Security Responsibility

1. Introduction

As many things around us have been digitized by the 4th industrial revolution, various technologies are emerging to ensure that going cashless does not cause inconvenience in daily life. With the aim of realizing such new technology, the government is searching for tasks that require innovation in society and life through Information and Communications Technology (ICT), and as part of its efforts, various policies such as “Realization of a paperless society,” “3D printing life,” and “Ransomware responsiveness” have been reviewed and confirmed. The Bank of Korea launched phase 1 of its pilot project “Society without Coins” in April 2017, and it has been implementing phase 2 of the project from 2018 to 2020.

In June 2018, various efforts have been initiated, such as the exploration of methods to create a coin-free society, at the debate organized by the Democratic Party Yoon Ho-Jung and the Consumer Rights Forum. Companies and public institutions are recognizing the needs of consumers and are changing to survive in the market. The Toss Corporation discussed in this
paper, is one of the leading companies in pursuing digital innovation while providing convenience to consumers through new ideas. The cumulative downloads of Toss exceeded 6 million in the Google Play Store, and it was selected as the 2016 App of the Year. In addition, it set an incredible record by exceeding 3 trillion won in total remittances. Toss is an application service from Viva Republica, led by Lee, Seung-gun. It entered the smartphone banking market as a simple money transfer service in February 2015. By then, the market was already saturated by big banks such as Kookmin, Shinhan, Woori, Nonghyup, Industrial Bank, and Hana Bank. However, Toss pioneered a new market called fintech (financial + technology) by offering financial services on IT based technology platforms. It provided easy remittance via smartphones when the banking market required public certificates, account numbers, and passwords. Toss has grown to be the number one company in the simple money transfer market by rapidly gaining market share before the big banks turned to these markets, sending 230,000 remittances in the second quarter of 2015, 53 million remittances in the fourth quarter of 2017, and 3.2 trillion remittances from 53 companies. However, despite successful attempts to innovate, Toss faced a management crisis followed by the launch of NaverPay, which started its service four months after Toss, launch of KakaoPay in March 2017, the introduction of simple remittance service by other major banks, and the abolition of Active by the new government in markets where security was a barrier to entry. These changes intensify competition in the market.

Therefore, this study intends to examine changes that the military needs to adopt and suggest methods to overcome Toss’s crisis by changing its innovative growth.

2. Toss Management Innovation Strategy

2.1. Innovation in remittance technology

In February 2015, Toss entered the market with an innovative remittance technology called “simple remittance technology,” which was different from other smartphone banking applications. The remittance process that was used in applications that already existed in the smartphone banking market is shown in <Figure 1>.

![Figure 1](Original smartphone banking transfer method.)

If users missed any of these three steps, they would be unable to transfer money. For example, if they did not have an OTP card, they would not be able to transfer money until they have one. The certificate is authenticated using a 13-character password consisting of alphanumeric and symbols. Hence, it was forgotten easily and the process of obtaining a password again was more complicated because it required the input of personal information and a bank ID that is seldom used after registration. However, Toss’s remittance process was relatively easy and increased customer convenience and satisfaction.

Users signed up with Toss after entering the ID and password of the public certificate. Toss accepted input of the recipient information either by entering the account number or the contact store din the phonebook. If the recipient was also a Toss member, the user was able to transfer money with in seconds. In addition, normally a corresponding fee is charged when a
bank transfers money to another bank, but Toss cooperates with 18 banks and does not charge a fee for money transfer between Toss accounts, and for the first five times in a month in case of transactions between other banks. After five times, the fee charged is as low as 500 won to attract the attention of consumers and differentiate itself from other smart banking applications. Toss was able to grow rapidly in the smart banking market based on consumer expectations from this innovative remittance method. However, at the same time, many consumers expressed concern about the security of the simplified remittance method, which omitted two authentication steps: a public certificate and an OTP card.

The Toss transfer process is as follows: First, when A remits to B, the bank automatically withdraws the amount from A's account through the bank's automatic withdrawal from Toss's operating company, Viva Republica. This service allows for withdrawals without a certificate and OTP card, and allows users to access it with a simple password. In order to withdraw money this way, the company must be a registered with the approval of the Financial Supervisory Service and the Financial Services Commission, have an official business partnership with the bank, and the owner of the account must agree to the automatic withdrawal. In other words, there is no difference between Toss's remittance system and the existing smart banking systems in terms of security because, the user performs the security authentication procedure in Toss. In addition, Toss further strengthened its information security posture by acquiring PCI DSS Level 1 certification, which is mandatory for institutions handling credit card information, after achieving ISO 27001 international information security certification in May 2017. As a result of aggressively addressing consumer concerns about security, Toss achieved no security incidents and attained the number one position in hacking defense levels among 25 banking apps as of March 2018. This proved the stability of Toss's services to consumers and increased its market share.

2.2. Innovation in publicity and security

In 2015, Toss's remittances amounted to 5.6 billion won, which was a mere 1/571 of the remittances in the fourth quarter of 2017. The number of remittances was 230,000 in that year, and was only 1/234 of those in the fourth quarter of 2017. With these numbers it can be identified that Toss has achieved remarkable growth in a short period. Toss’s growth was not merely because of the innovative transfer technology. Toss, which had a market share of nearly 0% in 2015, was able to rapidly gain an edge in the market share due to aggressive promotion strategies. Toss was first released as a small money transfer application and gained popularity among young office workers and college students who had frequent small transfers. Toss began to promote itself on Facebook by targeting the Social Network Service's (SNSs) main customers—young people in their 20s and 30s. Through SNSs, Toss actively appealed to the target customers as a simple and easy to understand application, thus gaining an advantage in the simple money transfer app market.

Toss raised many doubts about security by simplifying the authentication process in the remittance system, but achieved top security among 25 domestic smart banking applications. Toss had no security incidents in 16 trillion won worth transfers in May 2018. It significantly surpassed the Financial Supervisory Services' IT Supervision 557 Regulation, which recommends investing at least 5% of the total IT staff and at least 7% of the IT budget to information security.

3. Toss's Monetization Model

3.1. Profit generation through financial data analysis

Toss's annual sales have not been disclosed to date, but net profit declared in 2015 was less than 9,900 million won. The reason was that when Toss was first launched, as a promotion strategy, up to 30 remittances per month were free of charge, and 500 won per transaction
was charged thereafter. However, from April 2017, the number of free remittances was reduced to five times a month to generate revenue, and the scope of free services was changed. Toss is an innovative financial services company that allowed customers to transfer money in 10 seconds without the need for an accredited certificate and security card. This has helped the company secure a large number of customers in a short time, and its efforts have enabled the company to continue to grow. Toss, whose cumulative remittance is more than 3 trillion won, analyzed users’ financial data patterns and found that they mainly used its services to quickly borrow and repay small amounts to acquaintances. Based on the demand pattern analysis, Toss launched a ‘small loan’ service to lend money up to 500,000 won to customers with a loan period of 30 days. The interest rate is lower than that of commercial banks. Small loans can be reimbursed for up to 20 days in advance, in which case an additional fee will be incurred. Despite seeming expensive, it is a very useful service for customers in urgent need of small amounts of money. Toss strives to expand its profit structure by launching this new business with the help of financial data analysis beyond simple payment and settlement systems. This development potential of the company has attracted an additional investment of 55 billion won.

3.2. Profit generation through expansion of payment service

Toss provided a free remittance service and secured a large number of customers in two years after the start of the business. The absence of a proper profit structure, stressed the need for a new revenue generation structure. Hence, the company sought a new profit structure to further increase its revenues based on analysis of financial data of more than 1.5 million users. It earned good profits in the payment market because of its largest market size in fintech business areas.

The growth trend of the mobile payment market is shown in <Figure 2>. The penetration rate of smartphones increased from 2010, and hence the mobile payment settlement service market began to grow rapidly. The payment service area reached a market size of approximately 7 trillion won in 2015 and continued to grow to over 8 trillion won in 2017. Additionally, it can be seen that the portion of investment in financial data analysis and finances of software, by 2013 remained approximately 50% but has grown substantially in the following years. The payment service sector is still the largest fintech market and to generate revenue, Toss diversified in to the sector.

**Figure 2.** Mobile payment market growth.

<table>
<thead>
<tr>
<th>Size for market for global mobile payments</th>
<th>Investment proportion per global fintech’s business area [Unit: %]</th>
</tr>
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<tbody>
<tr>
<td>105.9 billion 2011</td>
<td><strong>Finance software</strong></td>
</tr>
<tr>
<td>163.1 billion 2012</td>
<td><strong>Financial data analysis</strong></td>
</tr>
<tr>
<td>235.4 billion 2013</td>
<td><strong>Payments</strong></td>
</tr>
<tr>
<td>721 billion 2017</td>
<td><strong>Platform</strong></td>
</tr>
</tbody>
</table>

3.3. Global spread of mobile payments

Mobile payment service is the most used service in payments business area. As the penetration rate of smartphones has risen above that of personal computers, many companies are
now competing to enter the mobile payments business. The Near-Field-Communication (NFC) payment method, which makes automatic payments when a card is placed at the back of a mobile phone has been in the spotlight, especially in payments for public transportation. In addition, various mobile payments using Bluetooth technology are gaining popularity. Environmental factors also play a major role in expanding the mobile payment service market. Unlike Korea, where credit card penetration exceeds 90%, China's credit card penetration rate is only 10%. Therefore, the demand for mobile payment methods is high. The United States, which accounts for about 47% of global financial fraud, is also witnessing a growing demand for secure and reliable mobile payment systems. Alipay, Weirbao, and ApplePay provide additional services thereby increasing the attractiveness of mobile payment systems. Alipay and Weirbao users are able to pay for public transportation like taxis or buses and other utility bills using their smartphones. Apple Pay is growing in conjunction with various services by adding biometrics authentication such as fingerprint recognition.

4. Toss Risk Factor Analysis

4.1. Regulation of domestic fintech business

As Internet-based services are increasing worldwide and as work is becoming dependent on mobile devices, fintech is integrating more into people's daily lives. Currently, there is a spike in the demand for investment in the fintech business as “fintech” becomes one of the keywords in the financial industry[1][2][3][4]. <Figure 3> shows the amount of the global mobile traffic and the size of the global mobile payment market provided by Cisco and Gartner, respectively. It is observed that global mobile traffic is increasing by 61% every year. The amount of mobile traffic—15.9 Exabyte in 2018 (1 Exabyte equals the storage capacity of 250 billion DVDs)—shows that the fintech business can grow further. The size of the world's mobile payment market in 2018 also increased more than three times compared to 2013 and can be seen growing rapidly.

Figure 3. Global mobile traffic volume, global mobile payment market size.

<table>
<thead>
<tr>
<th>Amount of global mobile traffic (EB)</th>
<th>Size for market for global mobile payments (0.1 billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013: 1.5</td>
<td>2011: 1,059</td>
</tr>
<tr>
<td>2014: 2.6</td>
<td>2012: 1,631</td>
</tr>
<tr>
<td>2015: 4.4</td>
<td>2013: 2,354</td>
</tr>
<tr>
<td>2016: 7.0</td>
<td>2017(E): 7,210</td>
</tr>
<tr>
<td>2017: 15.9</td>
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</tbody>
</table>

With rapid growth in the fintech industry, investments in related industries in the global market continue to rise. Despite the boom, Korea is still in early stages of development with respect to the fintech business. This is the result of existing laws and regulations. For example, the Prohibition of Similar deposit-taking Act prohibits companies that are not authorized by financial institutions from raising money from an unspecified majority. This law was enacted to
counter financial fraud. Such regulations are so strong that they prevent the growth of companies that are likely to have a positive effect in fintech markets. Only if formally authorized by the government, a company can be recognized under the Similar deposit-taking Act, and can expand its business. Even small and medium-sized enterprises that are formally licensed have significant barriers. The evaluation of the government's ability to recover from disasters, i.e., assessing whether damages can be compensated in case of security problems, is an important criterion in recognizing companies. Hence, companies are faced with the need to increase capital and build additional personnel and systems to pass e-financial registration and security screenings. In addition, the mandatory use of programs such as Active X inconveniences individuals who use payment services and makes it difficult for the fintech business to develop in the Korean market.

4.2. The emergence of competitors

Naver Pay was launched in May, shortly after Toss in February 2015, but did not significantly affect Toss's expansion in market share. However, in February 2016, the launch of Kakao Pay by Kakao Corp, a stronger competitor than Naver Pay, threatened the expansion of Toss despite the latter being a market leader. Kakao Pay which was an easy money transfer technology similar to Toss was an additional service to KakaoTalk. Thus, nearly 100 million KakaoTalk users became potential customers of Kakao Pay at its launch. Kakao Pay acquired an equal number of app users as Toss in July 2017 and overtook it in the following month.

With the increasing competition from Kakao Pay, Toss was hit by a crisis and envisioned the need for change in the service provided. Toss began providing free credit rating inquiry/management services in February 2017. By successfully diversifying into the small funds service, Toss increased the credibility of its e-commerce with customers who were switching to Kakao Pay. Hence many potential customers who were interested in real estate or fund investment, but hesitated due to complicated procedures, were attracted and as of November 2017 the number of users increased. In January 2018, it outperformed Kakao Pay and ranked first in terms of its market share.

4.3. ACTIVE X abolished

In 2017, President Moon Jae-in made a pledge to abolish the accredited certification system and ACTIVE X in financial transactions when he was a presidential candidate. Keeping the promise, his government introduced a restriction on the mandatory use of accredited certificates in electronic financial transactions to improve the stability and reliability of e-commerce. However, ACTIVE X is a security software plug-in that is automatically installed with Microsoft Internet Explorer which many use when making financial transactions. Even Microsoft stopped using ACTIVE X because of its security flaws. Despite these problems, according to Article 9 of the existing Electronic Financial Transactions Act, major banks have been exempted from having to indemnify the ir customers if they suffer damages while having security measures, like accredited certificate, or if they suffer damages due to security problems arising from the use of technology which is not as advanced as the accredited certificates. This led to the continued use of accredited certificates in remittances. However, the Moon Jae-in government attempted to improve the simplicity and security of e-commerce by abolishing irresponsible security policies that blame corporate customers and abolish ACTIVE X, the foundation of accredited certificates that complicate e-commerce. As a result of the government's policy, companies that adopted the accredited certificate and OTP card authentication system in the existing smart banking market are expected to provide services comparable to Toss's simple yet highly secure system. It is expected that major banks with large capitals will enter the easy remittance market and pose a threat to Toss. However, Toss not only used a highly secure automatic bank withdrawal system, but also established a security system based on biometric information, such as fingerprints, in June 2016, and was prepared to combat such threats.
particular, by extending the amount of remittances per day from 500,000 won to 2 million won, it was able to solidify its market share by attracting customers who were prone to make remittances above 500,000 won and used applications of major banks to do so.

5. Exploring Military Applications

5.1. User-oriented security regulation and system establishment

Security in the military is a key factor capable of changing the flow of victory in war. Secrets exist in individuals as well as in society and nations, but the concept of information security is of paramount importance to corporations and the military, especially in times of competition or war. In Article 2, Paragraph 1 of the Military Confidentiality Protection Act, secret is defined as “military documents, drawings, electronic records, special media records or items that are not made known to the public and if leaked may pose a clear threat to national security and are marked or notified as military secrets, and are protected with necessary measures.” Exposing allies to opponents may result in the destruction of all units. Historically, military security is crucial and there is ample information that can control a battle. Hence, it should also be noted that a system forcing users, who handle security data as part of their work, to take full responsibility for any security failures, can trigger excessive work stress and hamper users’ efficiency. For example, in the military, the security regulations require that passwords for PCs and various systems be changed every month, and this password includes letters, numbers, and special characters. Noting down the password for reference can also pose a security threat to the user. In case of the usage of public computers, an increasing number of security vulnerabilities will be exposed, trapping itself rather than safeguarding the security of the unit. To address these concerns, we will look at some possible alternatives from Toss’s case that can be implemented in the military.

5.2. Use of bio certification

The number of Samsung-Pay users surpassed 88.6 million in July18 and continues to increase, with the majority of users replacing identity verification with security measures, such as passwords, fingerprints, and iris verification. Among them, in terms of user convenience, fingerprint or iris verification are the most preferred, because it is possible to authenticate oneself by touching or looking at the mobile phone, and is not as vulnerable as a password that needs to be changed every month. Because of such convenience, many customers switch to simple payment services. According to the data released by the Bank of Korea in August 18, the average amount of simple payment service usage in the second quarter of 2007 was 3.63 million per day and the cumulative amount of transaction was 177.7 billion KRW. Introducing biometrics in electronic devices used by the military can eliminate various security regulations, such as the need to change the password every month that burdens users with continuous management of passwords in addition to their duties. Damages, such as punishment for security violations, will be eliminated. Alternatively, instead of biometrics, authentication can be performed by inserting an ID card into the device, like the system that is adopted in the US military. It is important to note that a user-centered security method is required to ensure that the users do not suffer any additional burden or inconvenience[11][12].

5.3. Security responsibility is on the system, not the user

Toss only requires a 5-digit password to be entered by the user. There are no compulsory monthly password changes or requirements to mix and match special characters. Users believe their money is in a safe system and Toss’s internal system protection ensures this. For example, when an unusual access is perceived, the Toss protection system identifies these anomalies and notifies the users to undertake necessary actions. In other words, the system assumes the responsibility of security for the user[13][14][15].
The military strongly prohibits the insertion of smartphones or unauthorized USB into computers as this act is a violation of security regulations. Although the occasional use of unauthorized storage media in the military and punishment for it is a matter of personal error, making security the personal responsibility of users will not prevent these accidents. If such mistakes persist, it can be covered by blocking the system from automatically recognizing media contained in an unauthorized USB or smartphone inserted into the laptop or military computer system. Therefore, efforts should be made to have a user-oriented system that does not sacrifice user convenience while enhancing security.

6. Conclusion

Although Korea is a challenging market for fintech companies, Tos8 continues to grow by incorporating brilliant ideas and a unique corporate culture. Tos8 is considered to have grown more dominant through technological and promotional innovations. Simple remittance technology based on a highly secure technology provides convenience and reliability to consumers and at the same time has become a decisive factor in competition for market share. In particular, Tos8 was ranked high in various security indices and recorded a monumental figure of zero security incidents as of March 2018. Further, the advantages of using Tos8 were highlighted through SNS by targeting those in their twenties and thirties—the majority of information technology users. Tos8 was able to quickly win the competition by impressing consumers with its merits and strong image. In addition, when consumers recognized the need for a credit rating service with the emergence of Kakao Pay, Tos8 added this service and provided other services that users did not earlier have access to, such as real estate micro-investments and micro-fund services. Through this diversification, Tos8 was able to persuade consumers who were in conflict between Tos8 and Kakao Pay, and attracted potential consumers who did not participate in the simple money transfer app market, maximizing the number of app users. In addition, the Moon Jae-in government abolished ACTIVE X and restrictions on the use of accredited certificates by major banks who were the big players of the smart banking market. Additionally, by using latest security policies ahead of these major banks and by increasing the amount of remittances allowed from 500,000 won to 2 million won, Tos8 secured a high growth trend as it was able to attract customers who made big remittances.

For a company to grow, it must not only predict future market changes but also build a sustainable and profitable business model. Therefore, Tos8 should improve its current profit structure and become more competitive. Though Tos8 has a relatively stable reputation with 6 million downloads in the Play Store, the current business structure cannot ensure sustainable profits, especially with the advent of competitors and the emergence of new technologies. As a countermeasure, Tos8 entered the financial data analysis sector. Tos8, whose cumulative remittance amount exceeded 3 trillion won, generated profits by providing “small loan service” so that users can easily borrow money when needed. The company should start a full-fledged competition in the “Payment Service” the largest area in fintech sector, with a market size of about 8 trillion won to stay profitable. Currently, many companies are making profits by providing mobile payment services such as the NFC method, and Tos8 will be able to build long-term and steady profit structures by developing and providing this service.

By examining Tos8’s growth process and its business analysis, it can be learnt that new companies should avoid intense competition, by opening new markets with new ideas and innovations, or provide customized services to customers in a completely specialized way. In addition, any external competitive threats must be addressed promptly and flexibly through diversification of services.
7. References

7.1. Journal articles


7.2. Thesis degree


8. Appendix

8.1. Authors contribution
<table>
<thead>
<tr>
<th>Initial name</th>
<th>Contribution</th>
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</table>
| WSK          | - Set of concepts ☑️
|              | - Design ☑️
|              | - Getting results ☑️
|              | - Analysis ☑️
|              | - Make a significant contribution to collection ☑️
|              | - Final approval of the paper ☑️
|              | - Corresponding ☑️
|              | - Play a decisive role in modification ☑️
|              | - Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑️
|              | - Participants in Drafting and Revising Papers ☑️
|              | - Someone who can explain all aspects of the paper ☑️ |

8.2. Funding agency

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