Analysis of Major Capex and its Impact on Finance and Operations

The Company funds its major capex with internally generated cash flows.

Investment Policies, Reasons for Profit/Loss, Plans for Improvement, and Future Investment Plan

Taiwan Mobile focuses on making long-term and strategic investments. The objective is to strengthen and diversify its core business activities and expand into new fields to create synergies.

In 2019, on a consolidated basis, TWM's investment income from long-term investments under the equity method amounted to NT$10,488 thousand as the operations of said investments stabilized. For future investments, TWM will continue to make decisions based on prudent strategic assessments.

Risk Management

Impact of inflation, interest and exchange rate fluctuations, and preventive measures:

1. Impact of interest rate fluctuations
   Interest rate fluctuations had a minimal impact on TWM's 2019 short-term bank borrowings, as interest rates remained low and stable. The Company has mid-term loan facilities with banks and mid-to-long-term straight bond issuances to lock in mid-to-long-term interest rates and minimize impacts from interest rate fluctuations.
2. Impact of exchange rate fluctuations
   Only some of the Company's payments are denominated in euros and US dollars. To minimize the impact from foreign exchange rate fluctuations, the Company hedges risks through foreign exchange spot market transactions. Overall, exchange rate fluctuations had an insignificant impact on the Company.
3. Impact of inflation
   Inflation had a minor impact on the Company's operating performance in 2019 up to the publication date in 2020.

Investment policy and reasons for gains & losses for high-risk/high-leverage financial products, derivatives, loans to others and guarantees of debts:

1. The Company was not involved in any high-risk, high-leverage financial investment.
2. The Company passed the Rules and Procedures on Lending and Making Endorsement/Guarantees to supervise its financing and endorsement activities. As the counterparties in its loans and guarantees are all its subsidiaries, there is minimal operating risk.
3. Derivatives transaction: None.

Expected benefits and risks from mergers in 2019 up to publication date in 2020:

None.

Future research and development plans

Project name	Objective
Intelligence collection model	Use AI machine learning algorithms to optimize collection process.
M+	Integrate Cloud PBX to enrich voice communication and expand our enterprise customer base.
myVideo	Integrate video service with smart speaker; develop 5G video applications; and provide AR/VR services.
Smarter Home	Provide more localization services and payment mechanisms by integrating smart speakers with smart home appliances.

Expected research and development expenses

The projected research and development expense for 2020 is NT$242,995,000.

Regulatory changes and developments

1. Passage of Telecommunications Management Act and allowing Spectrum and Network Sharing

(1) Status

The Legislative Yuan passed the Telecommunications Management Act (the "Act") on May 31, 2019. Telecommunications enterprises are not mandatory to build their own network, while allowing them to establish either by oneself, with another, or by others. In addition, it allows the sharing and use of the radio frequency, giving them more flexibility and making for more efficient network and spectrum usage.

The Act also allows telecommunications enterprises to provide domestic roaming services in 86 remote areas and outlying areas across Taiwan, allowing users to enjoy better mobile network quality.

(1) Countermeasures

The Telecommunications Management Act is conducive to the effective use of resources. The company will integrate its network and frequency resources in accordance with the law to provide users with better service quality.

2. NCC completes the first 5G spectrum auction, with total bids reaching NT$142.191 billion

Status

Total bids in the 3.5GHz band reached NT$140.5 billion. The Company secured the best 5G spectrum combination, spending NT$30.4 billion on 60 MHz in the 3.5GHz band and NT$206 million on 200MHz in the 28GHz band. With total bids for 3.5GHz exceeding the official target, the government is expected to use the excess budget to assist the industry in accelerating 5G construction.

Countermeasures

The Company obtained sufficient 3.5MHz and 28GHz bandwidth to support high-speed networks for 5G services and various vertical applications in the next 10 years. It plans to invest the remaining funds from its bidding budget to build 5G networks. It will also pursue collaborations with other operators to lease or combine 5G networks and share 5G spectrum.

3. Reduction of wholesale IP peering price

(1) Status

Using the average price in the Asia-Pacific region as a reference, the NCC approved Chunghwa Telecom's new wholesale pricing scheme on April 3, 2019, which lowered the private peering price of IP network interconnections by 30.25% from NT$119 per Mbps to NT$83 per Mbps. This scheme took effect retroactively on April 1, 2019.

(2) Countermeasures

This reduction has lowered the Company's private peering cost, which is beneficial to the Company as it offers various digital economy services to satisfy clients' needs.

4. "A la carte" pricing for basic channels has been postponed until 2021

(1) Status

On June 12, 2019, the NCC Committee Meeting passed a proposed tiered-pricing policy for cable TV subscription, which would require system operators to provide at least two sets of HD or ultra-HD basic channel combinations. However, local governments have not had time to draft supporting measures as they have since August been busy reviewing cable rates. As such, the policy has been postponed to next year.

Countermeasures

The implementation of "a la carte" pricing for basic channels is expected to have a significant impact on the cable TV industry. The Company is closely monitoring the progress of the policy and continues to communicate with the NCC in hopes of creating a more favorable viewing environment for consumers and a regulatory environment for the industry's development.

Technology changes and development

1. Mobile broadband access network

TWM availed of the following opportunities:

a) To improve LTE throughput and capacity, TWM re-farmed another 5MHz of 2100 band spectrum from UMTS to deliver LTE services in 2019. And in densely urban areas, narrow-beam antennas were deployed to split high loading sectors to improve user experience.

b) LTE intelligent power saving function was enabled to reduce base stations' energy consumption during low traffic hours.

c) Guard band NB-IoT technology was introduced to improve spectrum efficiency and throughput.

d) Invested in 5G New Radio technology research and participated in 5G spectrum bidding. This helps ensure that policies are evaluated on the basis of industrial development, consumer demand and operating costs.

TWM will continue to focus on providing mobile broadband services with the best speed, coverage and customer experience to maintain its competitive edge.

2. Network technology development

(1) Status

a) The finalization of 3GPP R15 Non-Standalone/Standalone (NSA/SA) standards provided a solid foundation for the successful commercialization of 5G. More operators started launching 5G networks and services in 2019.

b) 5G will drive new business models and innovative services, as well as give rise to new threats. Safeguarding information security and privacy will be basic requirements on the 5G network platform.

(2) Countermeasures

a) TWM is planning to launch 5G networks in NSA Option 3 configuration in 2020.

b) 5G networks can provide highly valuable critical services. Besides mobile data virtual private network (MDVPN) and network slicing, TWM will provide network-enabled security as a service, such as network enforced security policies, authentication, key management and data security services.

3. IDC and cloud related services

(1) Status

The Market Intelligence & Consulting Institute (MIC) projects that in 2020, IoT, AI, cloud computing, edge computing and 5G will play key roles in the technology industry's development. These technologies interact with one another, such as the cloud and edge computing driving the evolution of computing architecture, fueled by the high bandwidth and low latency of 5G networks. Such technological evolution would lead to the growth of demand for data centers. Security vulnerabilities also led to more stringent requirements for data centers. Organizations will need to adopt more policies regarding data center equipment, services, contractors, suppliers and staff. Climate change also forced a fresh review of resiliency planning.

(2) Countermeasures

In line with the demand for tighter data center security, TWM's infrastructure as a service (IaaS) received ISO 27018 certification for personal information security. TWM also developed a resiliency plan to address the threat of climate change. Its cloud data center received not only ISO 14001 certification for environmental management, but also the Green Grid PUE silver certification for achieving a power usage effectiveness (PUE) of 1.5. TWM's strategy is to cooperate with world-class public cloud vendors and deliver a complete portfolio of public cloud services to enterprises. The Company is also developing AI solutions, enhancing its information security, service quality and cloud services, and complementing them with a world-class cloud IDC infrastructure.

Impact of changes in brand image on the Company's risk management policies in 2019 up to publication date in 2020:

None. The Company has long built up a sound image among investors and customers for its continuing efforts to enhance corporate governance, network communication quality and customer service, as well as to fulfill its corporate social responsibility. These efforts won numerous recognitions and awards in 2019 (please refer to Chapter 1) and should aid the Company in preventing, controlling and managing latent risks that it may face and help it maintain its good corporate image.

Expected benefits and risks from mergers in 2019 up to publication date in 2020:

None.

Expected benefits and risks related to plant facility expansions in 2019 up to publication date in 2020:

Not applicable as the Company is not a manufacturer.

Risks from supplier and buyer concentration in 2019 up to publication date in 2020:

The Company has minimal risks from supplier and buyer concentration (please refer to Chapter 4)

Significant changes in shareholdings of directors and major shareholders in 2019 up to publication date in 2020: None.

Changes in management controls in 2019 up to publication date in 2020: None.

Significant lawsuits and non-litigious matters in 2019 up to publication date in 2020

1. The Company:

(1) Spectrum dispute between Far EasTone Telecommunications Co., Ltd. ("FET") and Taiwan Mobile ("the Company")

Parties Involved: FET is the plaintiff and the Company is the defendant.

Grounds for Lawsuit:

FET filed a lawsuit demanding that the Company: (a) file an immediate application to return the spectrum block 1748.7-1754.9 / 1843.7-1849.9 MHz (hereinafter referred to as "C4 spectrum block") to the National Communications Commission ("NCC"); (b) stop using the C4 spectrum block in any way, (c) stop using the spectrum block 1715.1-1721.3/1810.1-1816.3 MHz (hereinafter referred to as "C1 spectrum block") until it has returned the C4 spectrum block to the NCC, and (d) pay FET NT$1,005,800,000.

Status:

In May 2016, the Taiwan Taipei District Court ("District Court") ruled that: (i) the Company received unfavorable judgment on the claims stated in sections (a) to (c); (ii) FET received unfavorable judgment on the claim stated in section (d); and (iii) FET may file a provisional execution with a collateral of NT$320,630,000 to the favorable portion in the judgment, and the Company may provide a counter security of NT$961,913,313 to be exempted from, or to move for revocation of FET's provisional execution. FET has provided the security to apply for the provisional execution. The Company provided a counter security of NT$962,000,000 to be exempted from the provisional execution. (The counter security provided by the Company was subsequently returned in March 2018). The Company and FET filed their respective appeals with the Taiwan High Court ("High Court").

The High Court in January 2018 ruled as follows:

(1) The District Court judgment in connection with the following items was dismissed:
   (i) "the Company shall apply to return the C4 spectrum block to the NCC immediately," "the Company shall not use the C4 spectrum block in any way," and "the Company shall not use the C1 spectrum block before the C4 spectrum block has been returned to the NCC," and the corresponding portion that FET claimed provisional execution; and
   (ii) the portion of judgment that "rejected the Company paying FET NT$1,005,800,000," the corresponding portion of provisional execution, and litigation expenses.

(2) For the dismissed portion stated in section 1(i), FET's claim and the motion of provisional execution in the first instance were rejected.

(3) For the dismissed portion stated in section 1(ii), the Company shall pay FET NT$765,779,233, as well as a 5% annual interest payment on NT$152,583,658 of the above amount starting from September 5, 2015 to the payment date.

(4) The rest of FET's appeals were rejected.

(5) Regarding the portion of the judgment on the Company's payment, FET may file a provisional execution with a security of NT$255,260,000; and the Company may provide a counter security of NT$765,779,233 to be exempted from FET's aforementioned provisional execution.

(6) The Company and FET shall each bear half of the litigation expenses.

(7) The rest of FET's motions of provisional execution and appeal were rejected.

The Company appealed the High Court's ruling to the Supreme Court. On May 29, 2019, the Supreme Court ruled that: Regarding the portion of the High Court's original judgment (1) dismissing FET's other appeal, (2)

ruling on the Company's payment obligation, and (3) ruling on litigation expenses with respect to above-mentioned two items shall be dismissed and the case shall be remanded to the High Court.
The lawsuit is pending in the High Court.

2. The Company's directors, general manager, executives, major shareholder holding more than 10 percent of the Company's shares: None.

3. The Company's subsidiaries: None

Other major risks and countermeasures

In terms of information security and privacy protection, the telecommunications industry has huge personal privacy information. If it is accidentally leaked, it will be legally responsible and will seriously damage the company's reputation.

Countermeasures:
TWM implemented the ISO/IEC 27001 Information Security Management System (ISMS) and received the latest standards of BS 10012 and ISO/IEC 29100 Privacy Protection certification. The Company has a personal information and security committee that conducts quarterly reviews of all security policies and reports the results to the board of directors. It also provides cybersecurity insurance. To ensure a four-dimensional protection of users' personal data and internal confidential data, the Company has implemented the following:

1. External anti-hackers: build intrusion prevention, network segmentation, firewall, web application firewall, etc.
2. Internal leakage prevention: handling data leakage prevention and gap reinforcement measures
3. System planning and development: incorporating system development security specifications and executing code weakness scanning, etc.
4. Operation and maintenance monitoring: establish an information security monitoring center, check and analyze system records, and report and track if abnormal conditions are found.

Other significant items: None