

# **A model for evaluating the current condition and future developments of smart phone companies**

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**Keywords:** Market share, Profit ratio, Investment in development, Change in shipment.

**Abstract.** This paper developed a model for predicting the future development of smart phone companies based on their current data. Thus, investors can use the results obtained from the paper to determine whether they can invest in those companies. A model with two specific standards is built to categorize smart phone companies to reveal their value of investment. Also, the advantages and disadvantages of the model will be discussed which may give a direction for future research.

## **1. Introduction**

2018 was one of the most important years for all smart phone companies in China. According to Canalys, a website world-renowned for their research in technology channels and smart phones, “In 2018, smart phone shipments in China fell to a historical low since 2013, at 396 million units.” Such a great fall meant that the average shipment of each company decreased. Thus, compared with 2017, it would be harder for a company to increase its sales. A good case in point is Jinli, a smartphone brand with the 6th highest market share in China in 2017, went bankrupt and disappeared from the market at the end of 2018. Thus investors need a model that can assess a company’s conditions and predict its prospect to decide whether they can make investment[1].

The most important principle of investment is “the matching of returns and risks”, which means “high return, high risk; low risk, low return. We must control the risk within an acceptable range, so as to set the corresponding revenue target” [2]. The aspects to be included in the model should be related to the current condition and future development of a company, including profit ratio, market share, investments in development, and changes in shipment. The reason for selecting these factors will be discussed later in the paper.

The subjects to be included in the paper will be those companies that have a certain influence in the smartphone market in China, and all of them have different characteristics which can be used to differentiate those companies. Xiaomi, Apple, and Huawei are the three companies who meet the requirements. They have different price ranges, different target markets, different marketing strategies, etc. These characteristics would be discussed in detail later in this paper.

## **2. Overview of the three companies**

### **2.1 Apple**

Apple is an American multinational technology company that designs, develops, and sells consumer electronics, computer software and online services. From the beginning, it has been committed to providing customers with the latest technology and the best product experience. Due to the high price of flagship devices, iPhone has always been considered as a “luxury” in China, and people using iPhone are considered rich.

Apple has designed most of its key components for iPhone, including its chips (the A series) and its system (iOS), and only some other non-key components are provided by other companies. For example, its screens are offered by Samsung.

The cheapest smart phone offered by Apple is iPhone 7, starting at 2699 RMB, while the most expensive smart phone is iPhone XS max, with a price of 12299 RMB. The price range of Apple is 9600 RMB[3].

## 2.2 Huawei

Huawei is a Chinese multinational technology company that provides telecommunications equipment and sells consumer electronic products, including smart phones. Huawei offers diversified products, including high-quality, high-priced products and cost-effective products (with high configuration and low cost). Unlike Apple, Huawei has no specific characteristics.

Huawei does not have a distinct operating system (Android), but has invested heavily in its self-designed chips (Qilin series) and its photographic function. The P30 pro has the highest score in the global DXOMARK when published, indicating its prominence in photography [4].

The cheapest smart phone offered by Huawei is Honor Changwan, with a price of 7, 599 RMB, and the most expensive one is Mate 20 RS, at 12999 RMB. The price range of Huawei is 12400 RMB[5].

## 2.3 Xiaomi

Xiaomi is another Chinese electronic company. From the day of its establishment, Xiaomi has been aiming to provide customers with high-configuration but relatively low-price smart phones. It exclusively offers products with high cost-effectiveness, which has caused many people to consider it as a company serving for poor people who cannot afford smart phones with a high price.

Xiaomi does not have any distinctive components. Its chips come from Qualcomm and its operating systems come from Android, its screens come from Samsung and its cameras come from Sony. Xiaomi is more like an assembly plant where all the components come from other companies. The cheapest smart phone offered by Xiaomi is Redmi 7A, starting at 549 RMB, while the most expensive one is Mix 3, at 3999 RMB. The price range of Xiaomi is 3450 RMB[6].

## 3. The Modal

In order to limit the noise in the model, the dimensions of the model are limited to two. The goal is to cover only the two most important factors in the model.

### 3.1 The current model

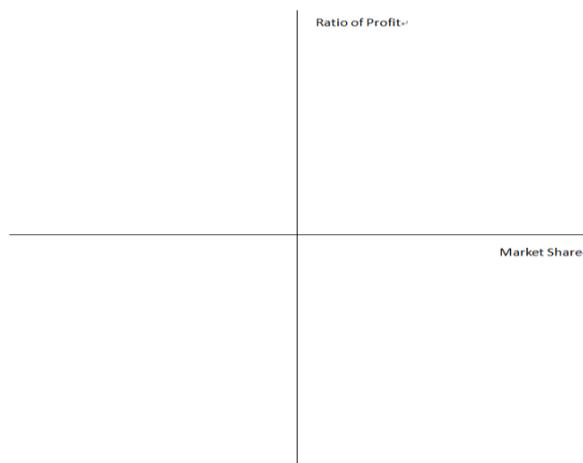


Fig. 1. The model evaluating the current condition of a company

### 3.2 Factors to be included in the model of current conditions

#### 3.2.1 Profit ratio

Rate of profit is equal to the net income divided by the net sales. A higher rate means that the company can keep a higher proportion of its sales as income for later use. The companies with a higher proportion will earn more money than those with the same net sales but lower profit rate. Those extra incomes are really important because it means that the company can take more risks, whether in new technology development or in legal troubles, which can cost billions of dollars and be huge enough to destroy a company with low deposits. When two companies with the same net sales

face the same trouble, the one with higher rate of profit will have greater chances to survive, which in turn reduces the risks of investing in this company.

In order to calculate the rate of profit, the equation of net income divided by net sales was used, so the data of these two factors should be collected.

Table 1 The net sales and net income of the 3 companies

(in millions dollars)	Apple	Huawei	Xiaomi
Net Sales	265,595 [7]	105,191 [8]	23,444 [9]
Net Income	59,531 [7]	8,656 [8]	1,960 [9]

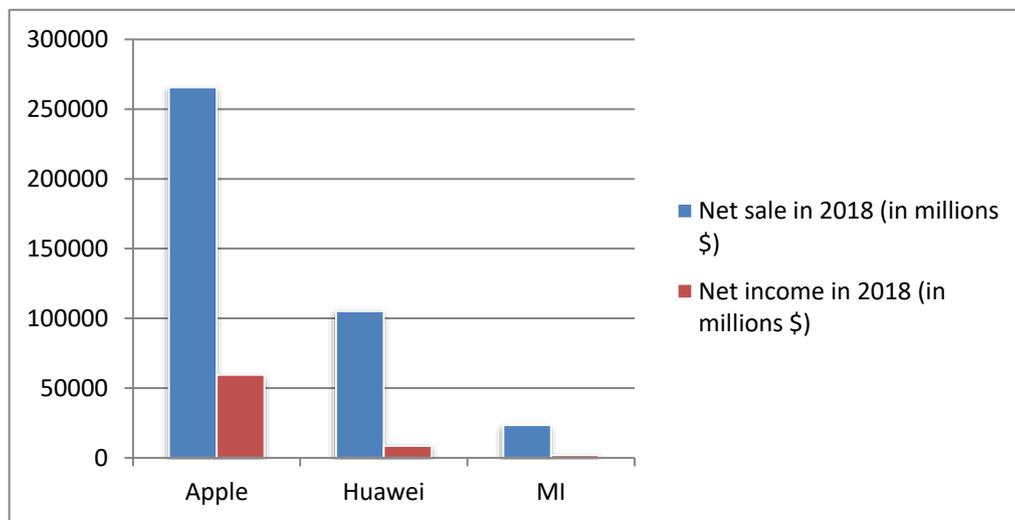


Fig.2. The net sales and net income of the 3 companies

The rates of profit were calculated by the previous data.

Table 2 The rates of profit

	Apple	Huawei	Xiaomi
Rate	22.4%	10.2%	7.7%

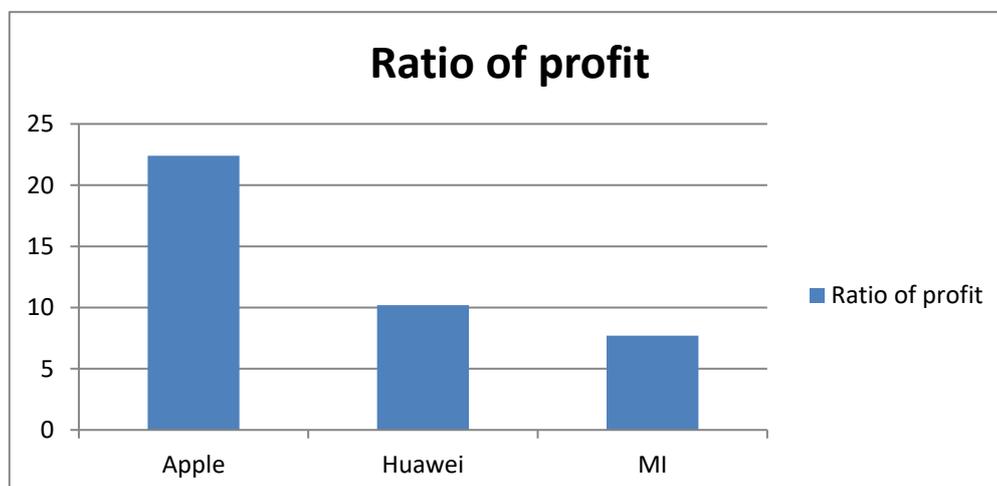


Fig.3. The ratio of profit

The criteria for evaluating the rate of profit should be the weighted average profit rate of all the companies. The formula is as following:

$$\frac{\sum \text{Market Share} * \text{rate of profit}}{\sum \text{Market Share}}$$

This formula will take market share into account because market share can directly affect the net sales, so companies with high rates of profit but low market share have less influence or less “popularity” in this market. By this weighted formula, it can prevent those companies with high rates of profit but low market share from “lifting up” the criteria, or prevent those with low rates of profit but large market share from “pulling down” the criteria. The goal is to give those companies with high market share more weight when calculating the average score, so the results can show the dominant trend in this market.

In this case, with the available data, the criteria should be:

$$\frac{0.102*0.27+0.077*0.12*0.224*0.09}{0.27+0.12+0.09} = 0.119 (11.9\%)$$

The companies with a rate of profit below this score will be put into the 3rd or 4th section, and those above this score will be put into the 1st or 2nd section.

### 3.2.2 Market share

A higher market share means that the company is controlling more of the market, and can reflect the company’s competitive position and good profitability. Thus, they will have more investment value.

Table 3 The market share of each company [1]

	Huawei	Xiaomi	Apple	others
Market Share	27%	12%	9%	52%

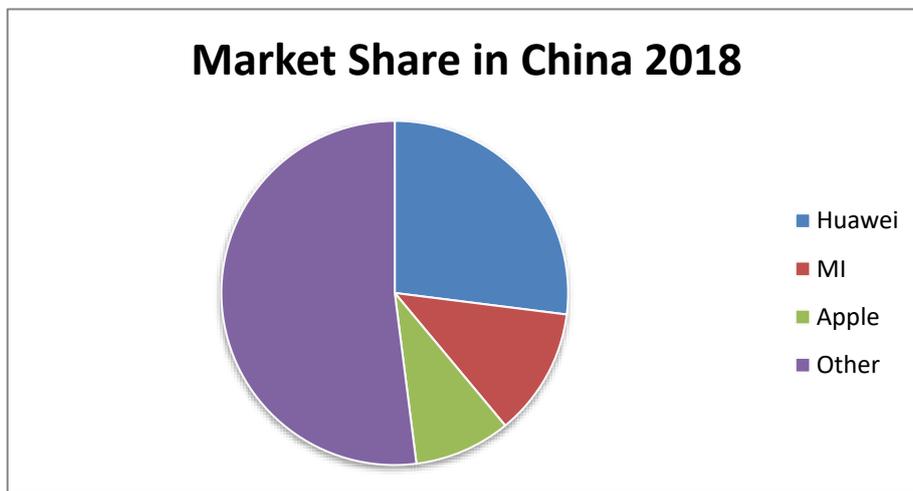


Fig.4. The market share of each company

The criteria for evaluating the market share should be the average of the five smart phone companies with the highest market share. Since the top five companies account for about 88 % of the Chinese market, it would be useless to take other companies into the calculation because they cannot represent the dominant smart phones in China. The calculation formula is:

$$\frac{\sum \text{Top 5 market shares}}{5}$$

According to the data on Canalsy, the top five companies are:



Fig.5. The market share of the top 5 company

The average market share is 17.6%. The companies with a market share below this score will be put into the 2nd or 3rd section, and those above this score will be put into the 1st or 4th section.

### 3.3 The model for predicting the future

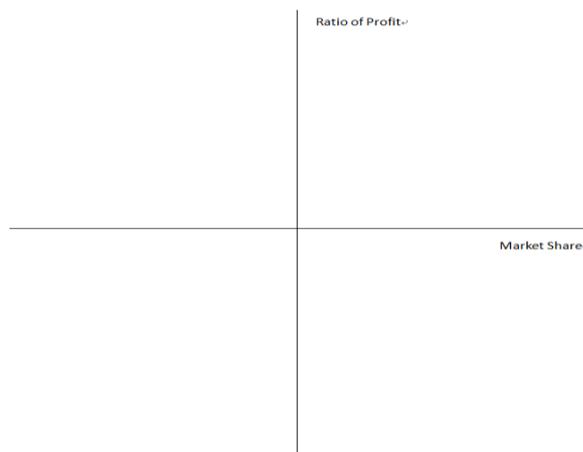


Fig.6. The model predicting the future development of the companies

### 3.4 Factors to be considered in the model for predicting the future

#### 3.4.1 Change in shipments

The change in shipments indicates a change in the company’s competitive position and market share. A positive growth means that the company will become more and more competitive and gain more customers, so they will be more likely to thrive in the future. A negative growth means that the company is losing customers and will be more difficult to develop in the future. Therefore, the change in shipments strongly implies a future change in the value of investment.

Table 4 The change in shipments [1]

	Huawei	Apple	Xiaomi
Change in shipments	16%	-6%	-13%

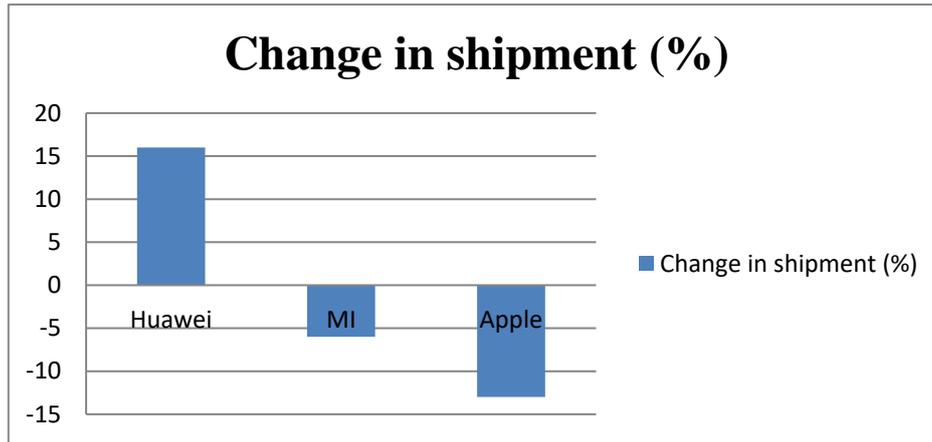


Fig.7. The change in shipments

All companies with an increase in shipments will be put in the positive part, while those with a decrease in shipments will be put in the negative part.

### 3.4.2 Investment in technology development

The investment in technology development is positively related to the novelty of new smart phones. If a company spends a lot of money to develop new technologies for smart phones, customers would be more likely to be attracted by new products. Therefore, spending more money on technology development will make it likely to attract more customers, thus ensuring the future prominence of the company.

The criteria will be the average of the weighted investments in the companies; the formula for calculating the weighted investment is as below:

$$\text{Investment} * \frac{2}{1+e^{-x}} \text{ (x is the change in shipments)}$$

The graph of  $\frac{2}{1+e^{-x}}$  is as follow:

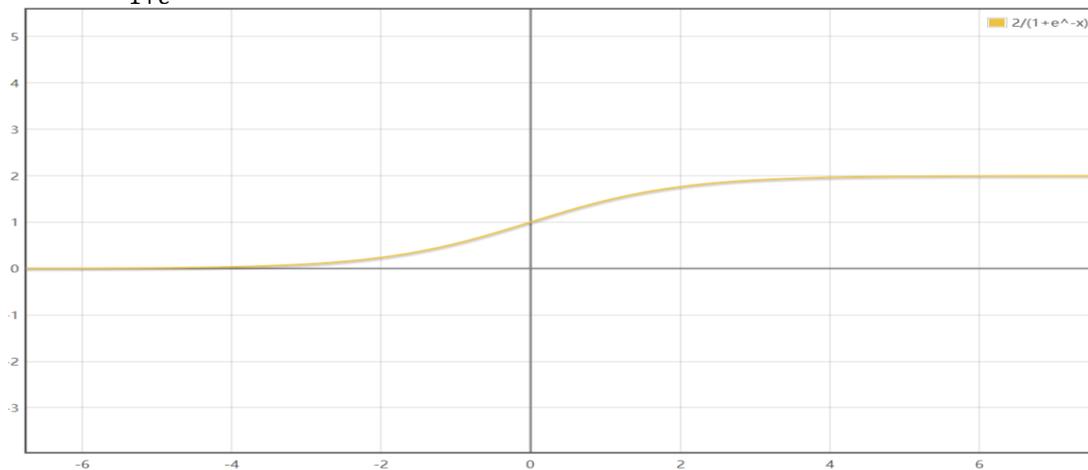


Fig. 8. The graph of  $\frac{2}{1+e^{-x}}$

If the change in shipments (x) is positive, the outcome will be greater than 1, so when the investment is multiplied by it, it will be greater than the original value. This means that the investment brings a positive growth, indicating that the investment is effective.

If the change in shipments (x) is negative, the outcome will be less than 1, so when the investment is multiplied by it, it will be smaller than the original value. This means that the investment does not bring a positive growth, indicating that the investment is ineffective.

For example, both Apple and Huawei spend about 14,500 million dollars on developments. If Huawei’s shipments increase by 16% and Apple’s shipments decrease by 13% , the Huawei’s investment is more valuable, while Apple’s is not quite valuable.

After calculation, the results are showed as below:

Table 5 The weighted investments in development

	Huawei	Apple	Xiaomi
Weighted investments	15928.6	13312	817.61

The average should be 10,019.4 (in millions dollars). For all companies, the weighted investment above this score is considered as high investment, while the weighted investment below this score will be considered as low investment.

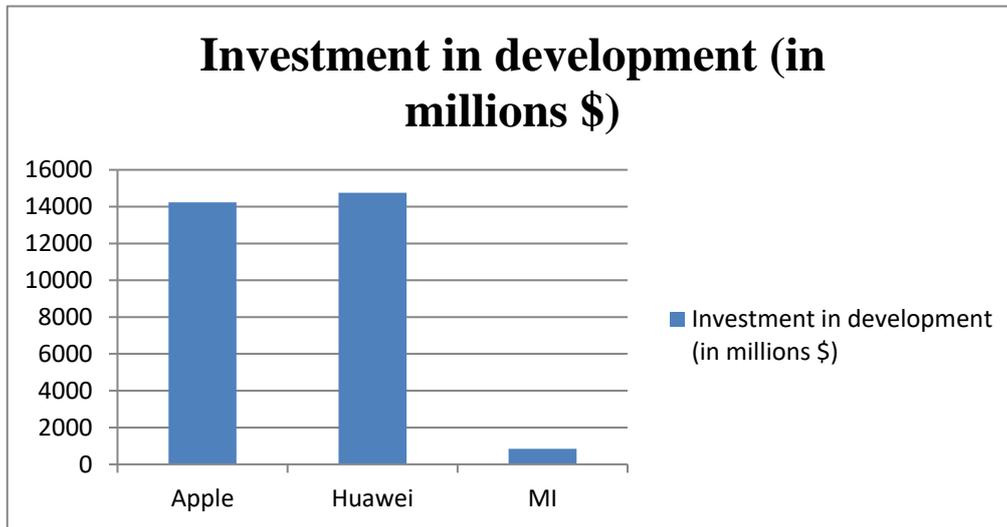


Fig.9. The weighted investments in development

#### 4. Analysis

Section 1 includes companies with a high investment in developing new technologies and an increase in shipments. These companies are likely to make major breakthroughs in technology regularly. In other words, each time they release a new flagship smart phone, they will bring customers with a new astonishing product with wonderful new technologies. At the same time, their shipments will also increase, which means that the outcomes of their investment in development have indeed attracted more customers. These companies are growing, meaning that they are selling more and more products and spending enough money to sustain their growth. For investors who want a long-term profit growth, they should consider investing in such companies.

Section 2 includes those companies with a high investment in developing technologies but having a negative growth in shipments. Although they spend a lot of money on development, their investments is useless because they have failed to attract more new customers and been actually losing customers. In this case, the companies have not grown, so their incomes might be stable and have no significant growth every year. As a result, the investors in these companies are unlikely to see returns grow over the next few years. They should not consider investing in such companies unless they do not care about the annual stable returns.

Section 3 includes those companies who do not spend a lot of money in developing new technologies and are experiencing negative growth in shipments. These companies have not spent enough money to develop new technologies, which led to a decrease in shipments. These companies are falling down, meaning that it will be more difficult for investors to see positive returns. Investors should not consider investing in such companies unless they are confident that their investments can reverse the declining tend of the company.

Sections 4 includes those companies who have not spent enough money in developing new technologies but are still growing in shipments. Unlike other companies who use new technologies to attract new customers, such companies may use some other strategies to attract more customers, such as celebrity endorsements. These strategies are not safe in the long run; if the celebrity is caught in scandals and their reputations are damaged, it may have a negative impact on the sales of the

company's products. Although the company is currently in prosperity, it still faces huge risks in long-term developments. For those investors interested in investing such companies, they should keep their assets in the company flexible, so as long as the company no longer grows, the investors can immediately withdraw their assets in the company.

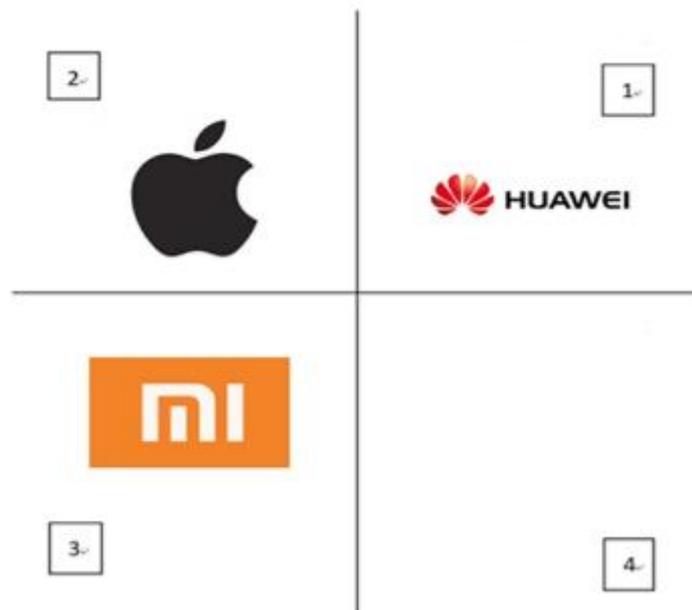


Fig.10. the final result of the categorization

## 5. Conclusion

“Details determine success or failure, ideas determine results, perspectives determine direction, and wisdom determines income[1]”.By using the previous model, investors can determine which company is best suited to invest. This is especially useful for those investors who lack professional knowledge or experience of investment. Furthermore, the model can also be used as a reference for those who are interested in buying stocks of the smart phone companies. Via using the previous models, the investors can determine which company is best suited for investments. This can be especially useful for those investors who lack of professional knowledge or experience in investing. Furthermore, the model can also be used as a reference for those who are interested in buying stocks of the smart phone companies. However, there are still some defects in the model; for example, the business cycles, which including depressions, recessions, and expansions [10]. All these periods can have some substantial effects to the operation of a company. However, the uncertainty of such factors cannot be included into the model. So the model can only evaluate the investing value in normal times.

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