

# Research on the Impact of Managers' Tenacity on the Innovation of High-tech Enterprises in the VUCA Era

## --Take iFLYTEK as an Example

Wenxuan Zhang<sup>1,\*</sup>, Zejiong Zhou<sup>2</sup>

<sup>1</sup>School of Accountancy, Anhui University of Finance and Economics, Bengbu, Anhui, China

<sup>2</sup>School of Economics, Anhui University of Finance and Economics, Bengbu, Anhui, China

\*Corresponding author: zhangwenxuan0204@126.com

### Abstract

iFLYTEK is a representative high-tech industry. During the period of 2020-2022 epidemic, the management of iFLYTEK has made the overall development of iFLYTEK better by virtue of high psychological resilience and ability resilience, breaking through many industries such as medical treatment and finance, and the number of patents reached 835 in 2020. This paper takes iFLYTEK as the research object, uses correlation analysis to explore the impact of its managers' resilience on enterprise innovation in the VUCA era, and analyzes the enterprise strategies and measures taken by its managers in the face of the epidemic situation, so as to put forward relevant development ideas for other high-tech industries and make China's high-tech industry develop well.

### Keywords

Manager's resilience; Innovation performance; High-tech enterprises.

## 1. Introduction

Innovation is the lifeblood of China's economy. The sudden epidemic has made the global information technology anxiety tense. Under the situation that the epidemic continues to affect enterprise innovation, the state vigorously supports the recovery and stable development of enterprise innovation. In 2020, the Ministry of Finance issued the Announcement of the Ministry of Finance and the State Administration of Taxation on Supporting Tax Policies for the Prevention and Control of the Pneumonia Epidemic Caused by novel coronavirus, which clearly pointed out that the longest carry forward period of difficult enterprises affected by the epidemic could be extended to 10 years if they suffered losses in 2020 and had the qualification of high-tech enterprises or technology-based SMEs. The introduction of a series of policies provides new development opportunities for enterprise innovation in the era of epidemic. Adhering to the development of innovation becomes a feasible way for enterprises to recover their own power.

With the development of the fifth wave of IT industry, AI industry has penetrated into many industries. iFLYTEK is a well-known intelligent voice and AI listed company in the Asia-Pacific region. As a "leader" in the exchange of AI technology with foreign countries, although affected by the impact of the epidemic, a series of its managers not only help prevent and control the epidemic, but also improve the economic strength and technological practice ability of the company itself. Therefore, the study of the impact of iFLYTEK managers' resilience on enterprise innovation is of exemplary significance for other AI enterprise managers to identify risks, adjust themselves and ensure the sustainable development of enterprises in the face of emergencies.

At present, there is not much research on the relationship between managers' resilience and the innovation and development of artificial intelligence in China, and there are relatively few foreign literatures, mainly focusing on the measurement of managers' psychological resilience. Huang Peiyi et al. (2018) pointed out that different psychological resilience will lead to different behavior of managers when dealing with crisis and risk [1]. Therefore, when faced with the sudden situation of epidemic situation, managers of different enterprises will have different attitudes towards enterprise innovation, which will also determine the development momentum and direction of enterprise innovation. In addition, there are relatively few studies on managers' resilience, but most of the existing views believe that managers' resilience can drive the growth of enterprise resilience and improve the profitability of enterprises. For example, Liang Lin et al. (2022) believed that leaders' resilience can lead the formation of team resilience [2]. Li Jing et al. (2021) put forward a hypothesis study on the relationship between managers' ability and the efficiency of corporate investment, and made it clear that managers' ability can inhibit environmental uncertainty [3].

Therefore, the study of the impact of iFLYTEK's managers' resilience on enterprise innovation in the VUCA era has basic theoretical support and can provide reference value for the innovation and development of AI enterprises.

The measurement of managers' psychological resilience is based on the CD-RISC scale, which uses the scoring method of three evaluators proposed by Qiao Penghua et al. (2022), that is, two scholars will score first. If the scores of the two are not different, the average value of the two will be selected as the score; If there is a big difference between the two items, the third place will be introduced for evaluation, and the average value of the two similar items will be taken as the score; If the three are significantly different, the video will be re-selected for evaluation [4]. On this basis, this study uses Python to crawl and analyze the key words in the interview process of managers in the video text. The data of managers' psychological resilience constructed by this method is more objective and can quantify the psychological resilience of enterprise managers. As for the ability and resilience of enterprise managers, the current research and measurement methods are less, and the main method is case analysis, which is a comprehensive analysis based on the education background, professional experience, and relevant measures taken in the face of emergencies.

With the arrival of the VUCA era, managers and enterprises are facing more unknown risks. As an AI multinational enterprise, adhering to enterprise innovation, improving the level of technology research and development, and ensuring the efficient use of research and development expenditure will become the continuous driving force to ensure the stable development of the enterprise. As a representative multinational AI enterprise, iFLYTEK adheres to development and innovation in the VUCA era and applies technology to epidemic prevention and control. Its managers' ability to reduce risks and identify opportunities and experience reserves are worth learning from other AI enterprises. Therefore, taking iFLYTEK as the research object and analyzing the impact of its managers' resilience on enterprise innovation will provide reference value for other enterprises of the same type to face risks. This study will study the impact of iFLYTEK managers' resilience on enterprise innovation based on the existing data from Wind and Oriental Wealth, as well as interviews and related videos of iFLYTEK managers from 2020-2022, and put forward corresponding suggestions.

## 2. Overview of iFLYTEK

iFLYTEK Co., Ltd. (002230) was listed on the Shenzhen Stock Exchange in 2008. It focuses on the education market with software information services, and constantly infiltrates into the medical and automobile industry, gradually becoming the industry leader and occupying the leading position in the industry market.

In 2017-2021, after the ups and downs of the epidemic and the turbulence of the domestic and foreign markets, iFLYTEK has always maintained a high profitability level, and its net profit and operating income showed a significant upward trend. The operating income reached 18.314 billion yuan in 2021, and even in the severe period of the epidemic in 2020, the net profit of the enterprise people reached 1.611 billion yuan. According to the published industry data, the average net interest rate of iFLYTEK in the three years from 2019 to 2021 was 9.74%, which was 7.20% higher than the industry average net interest rate. The plans and strategies adopted by the enterprise managers not only ensure the normal operation of iFLYTEK during the epidemic period, but also make the profitability of the enterprise burst into vitality, and provide sufficient financial support for the patent development and technological innovation of iFLYTEK. Relevant data are shown in Figure 1:

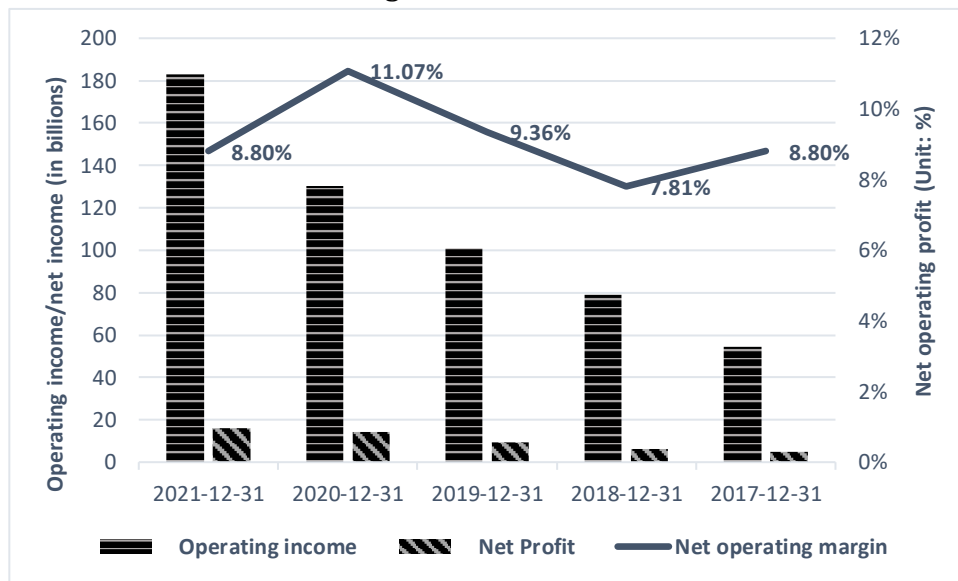


Figure 1. Profitability of iFLYTEK in 2017-2021

iFLYTEK has adhered to the development strategy of "platform+track" for a long time. On the basis of the platform, iFLYTEK has continued to expand other industrial fields, such as the promotion of smart services in consumer, smart education, smart city, smart justice, smart services, smart cars, smart medical care, operators and other fields. The results of TOB+TOC two-wheel drive have emerged. Due to the epidemic period and the implementation of the "three reductions" policy, a large number of students, teachers and parents have transferred educational resources to the cloud, providing opportunities for intelligent service enterprises such as iFLYTEK.

From 2020 to 2021, in addition to the stable and substantial increase in the main revenue of the open platform and consumer business, the smart service education sector also has a faster growth rate, with the main revenue rising from 4.187 billion yuan in 2020 to 6.232 billion yuan in 2021. It can be seen that the management of iFLYTEK can identify opportunities in time, adjust the direction of innovation and development of the enterprise, so that the enterprise can obtain the maximum benefits. The main revenue composition of iFLYTEK is shown in Figure 2.

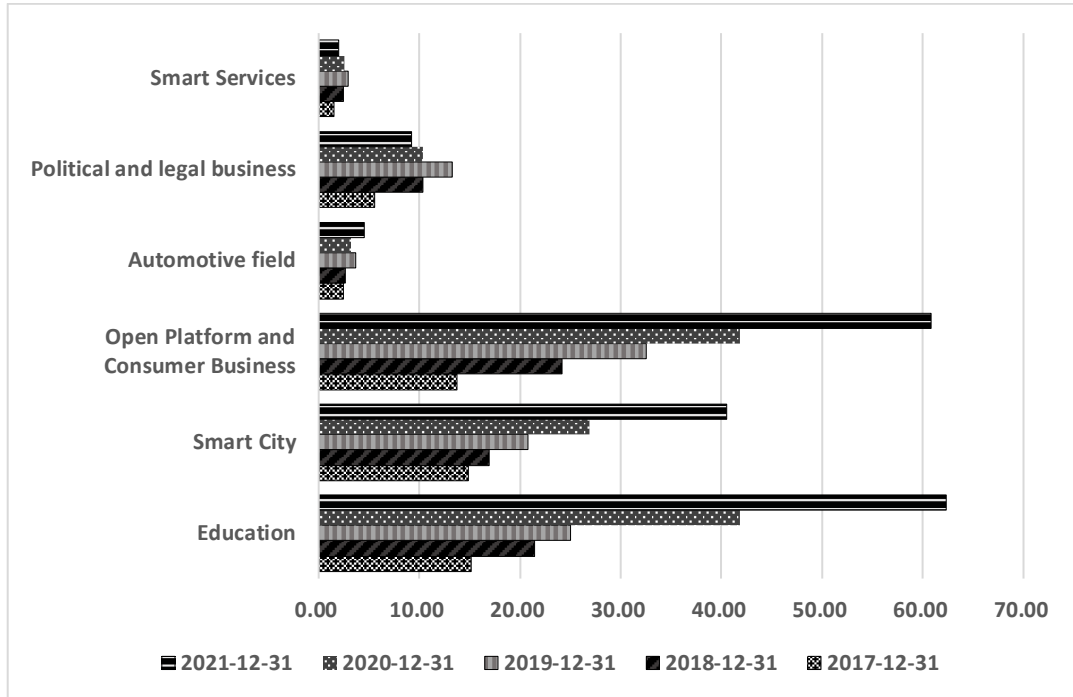


Figure 2. Main revenue composition of iFLYTEK in 2017-2021

In addition, the senior management structure of iFLYTEK has a relatively high overall education level. The number of 17 managers and doctors reaches 8, nearly 50% of the total number, and the minimum education level is undergraduate. The high knowledge management system structure of iFLYTEK is extremely capable of providing correct solutions for enterprises in the face of unexpected epidemic and other uncertain disasters. In addition, in addition to the accumulation of talents with academic qualifications, the turnover rate of iFLYTEK talents has been stable at a low level since the listing, and none of the more than 30 senior executives above the director level has left; Under the equity incentive, the turnover rate of about 700 core technology backbone personnel is less than 1%. Among the key talents of the 2017 restricted stock incentive plan, none of the key employees who were awarded more than 100000 shares left. The highly stable talent structure provides strong technical support for enterprises in the face of emergencies, and also means that managers can establish a united corporate culture and effective incentive measures to enable enterprises to develop for a long time. The educational background of iFLYTEK enterprise managers is shown in Figure 3.

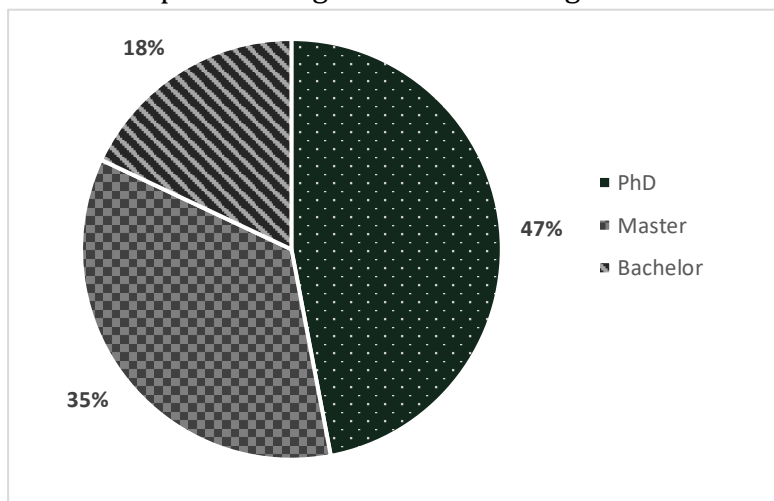


Figure 3. Pie chart of corporate managers' education

### 3. The Analysis of iFLYTEK Enterprise Managers' Resilience on Enterprise Innovation Ability

The resilience of enterprise managers can enable high-tech industries to face unknown risks in a timely manner, and make correct judgments and choices, so as to ensure the continuous innovation of enterprises. This paper aims to analyze and explain the excellent impact of iFLYTEK's managers' tenacity on enterprise innovation through the comparison between iFLYTEK's managers' tenacity and the number of enterprise patents, and the enterprise strategy implemented by iFLYTEK in 2017-2022.

#### 3.1. Managers' psychological resilience and number of enterprise patents

According to Yu Xiaonan et al. (2007) [5], the Chinese-revised CD-RISC scale was revised, and the psychological resilience of managers was scored by collecting interview videos and news of iFLYTEK enterprise managers. A total of 25 topics were selected from the scale, including three dimensions of tenacity, strength and optimism, and 50 psychological professional volunteers were found based on the concepts, attitudes, micro-expressions and habitual expressions of managers in the video, The CD-RISC scale was graded from 1-10 (completely disagree - completely agree) to different degrees, and the average score was finally obtained as the score of psychological resilience of the enterprise. The specific problems of managers' psychological resilience are shown in Table 1:

Table 1. CD-RISC Scale

Title item	Representation
1	He is able to adapt to constant change
2	When faced with stress, he has someone close to him who can help him
3	There are times when he believes that God or fate will favor him
4	No matter what happens he can handle it
5	Past successes give him more confidence to face new challenges
6	When he faces problems, he tries to think of the good side of things
7	He has become stronger as a result of his experiences
8	He recovers quickly from hardship or illness
9	He believes that problems arise for a reason
10	He is able to give his best no matter what the situation is
11	He has the ability to achieve his goals
12	He doesn't give up when things seem hopeless
13	He knows where to go for help
14	He is able to focus and think clearly under pressure
15	He likes to take the lead in solving problems
16	He doesn't get discouraged easily when faced with failure
17	He sees himself as a strong person
18	He can make unusual or difficult decisions
19	He acts on his intuition as a last resort
20	He has the ability to deal with unpleasant emotions
21	He has a strong sense of purpose

22	He is in control of his life
23	He enjoys challenges
24	He will work tirelessly to achieve his goals
25	He has a sense of pride in his accomplishments

In order to test the internal consistency of the sample CD-RISC scale, this paper calculates the Cronbach's alpha (0.703) of the sample, which is higher than the threshold of internal consistency of 0.70, confirming the validity of the scale.

According to the correlation coefficient between the psychological resilience of enterprise managers and the number of patents in 2017-2022 was 0.7075, showing a strong correlation. At the same time, it can be seen more intuitively from the scatter chart that the psychological resilience of iFLYTEK enterprise managers and the number of patents in 2017-2022 changed roughly the same.

In 2020, at the initial stage of the epidemic and the stage of development impact, iFLYTEK enterprise managers have the highest resilience, and the number of patents of enterprises has also maintained a high level. Therefore, it can be simply inferred that iFLYTEK enterprise managers' psychological resilience has a positive impact on enterprise innovation.

Table 2. Managerial Toughness Score and Patent Count Statistics

Years	Score	Patent Number
2017	6.23	436
2018	6.354	708
2019	6.334	726
2020	6.693	835
2021	6.627	614
2022	6.87	842

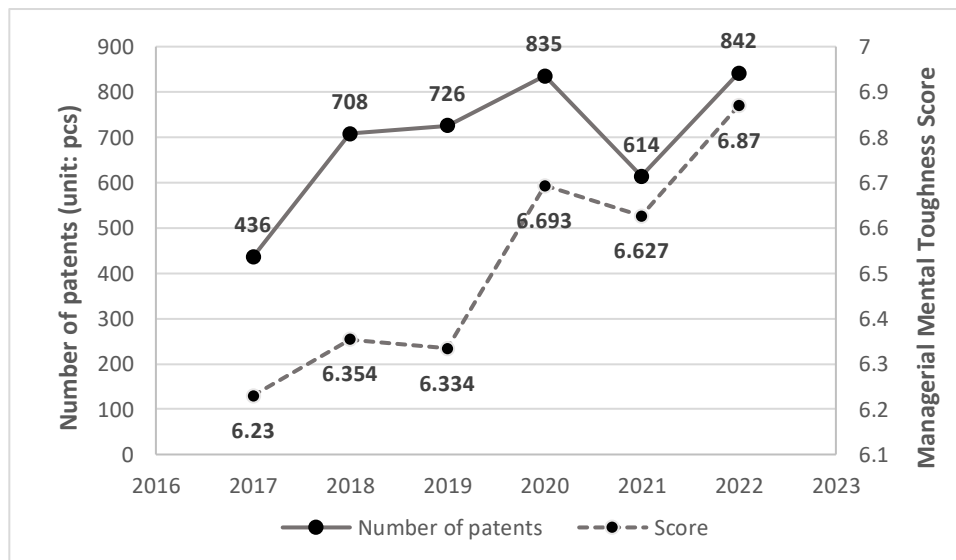


Figure 3. Managerial resilience score vs. number of patents line graph

### 3.2. Resilience of managers and number of enterprise patents

The resilience of enterprise managers is mainly expressed by their working years, educational level, and most importantly, a series of measures taken and achievements achieved when faced with risks and difficulties. Based on the 2020-2022 epidemic, this paper uses the data

consulting databases such as Wind and Oriental Fortune to collect the relevant policies and evaluations of iFLYTEK on 207 product development and market consulting for the epidemic, and selects the top 20 key words, and uses Python to generate the keyword cloud. Similarly, select the patents that have come into effect in the substantive examination of enterprise patents, and eliminate the unrepresentative words such as "one kind" and "method". Select the first 20 words with the frequency of words, and use Python to generate the keyword word cloud to analyze the direct or indirect impact of enterprise managers' ability and tenacity on enterprise innovation.



Figure 4. Corporate Policy Keywords



Figure 5. Corporate Patent Keywords

Knowledge has the highest frequency of the key words of patented technology, while data and voice rank the second and third. Other key words mainly focus on education, such as school, students, teachers, language and English. In addition, it also involves the fields of accounting and finance, medical diagnosis and treatment, automobile and so on. The key words of enterprise policy are education industry, intelligence, medical design and intelligent assistant. The double reduction policy, the new track and the Tob+Toc model all represent that the enterprise managers have strong adaptability to the environment and can quickly absorb the policies and adjust the direction.



The key words of enterprise patent technology and enterprise policy have the same direction. In 2021, the Ministry of Education and other six departments issued the Guiding Opinions on Promoting the Construction of New Education Infrastructure and Building a High-Quality Education Support System. Affected by the Fourteenth Five-Year Plan and the epidemic environment, the service and construction of education platforms for schools and students by enterprises will be increased in 2020-2022, while the management of iFLYTEK clearly indicated that it will increase the bidding to deepen the development of educational intelligence, Enterprises are moving closer to "C end" from "B end".

In addition, in the opening of intelligent assistants, due to the special period of the epidemic, enterprises chose to use intelligent medical assistant telephone robots at the first time to carry out corresponding screening, prevention and control, and propaganda and education measures for more than 30 provinces and cities that have launched a first-level response to major public health emergencies. According to the data statistics, through the intelligent outbound call function, the intelligent medical assistant telephone robot screened 47000 patients with fever symptoms and 55000 patients with positive epidemiological history, which not only helped medical staff share the workload of manual screening, but also improved the work efficiency of medical staff to a certain extent. Jiang Tao, senior vice president and secretary of iFLYTEK, made it clear at the online performance briefing that the arrival of the digital survival era has made the whole people put forward higher requirements for education and medical care. Xunfei will actively respond to the national call, focus on people's livelihood, adhere to the people-oriented text, and extend the service radius with AI technology to improve the coverage of high-quality resources.

It can be seen from this that during the period of 2020-2022, the top management of iFLYTEK has continuously improved their psychological resilience, which is reflected in the relatively high scores of the self-psychological resilience scale, and the number of enterprise patents has increased rapidly during this period. In terms of the strategic regulation and control of the enterprise by the managers, we should seize the market gap and demand, adhere to the principle of people's livelihood, focus on the development of education and medical industry, and the people-oriented demand continues to promote the scientific and technological innovation of the enterprise.

## 4. Enlightenment

The overall development of iFLYTEK in the epidemic era of 2020-2022 is relatively clear, and it has made breakthroughs in the medical, financial and other industries at the same time. These are inseparable from the correct policy of enterprise managers in the face of risks and difficulties. In view of the performance of iFLYTEK managers in the epidemic era, we can get some enlightenment from it:

### 4.1. Managers should improve the psychological defense system

According to relevant data, 53 million new cases of depression (up 28%) will be reported in 2020, including 76 million cases of anxiety disorder. The psychological resilience of managers is not only related to their own health, but also determines the direction of enterprises and the development of enterprise atmosphere and spirit.

The uncontrollability of the future is the fundamental source of anxiety. As a high-tech enterprise, the investment in research and development is relatively high, the speed of product upgrading is faster, and the market has higher requirements for product innovation and quality, which is bound to determine that the managers of high-tech industry will bear greater pressure on public opinion and capital. Therefore, enterprise managers should first cultivate their own psychological defense system under the "comfort circle", that is, have psychological



expectations for potential crises that have occurred or have not occurred, and constantly improve and find loopholes in enterprise development strategies, so as to make up for weaknesses in time. In addition, improving the ability and level of pressure resistance and maintaining good living habits and work and rest are also effective means to improve the psychological resilience of enterprise managers.

#### 4.2. Adhere to market trend and deeply explore product characteristics

The most fundamental way for enterprises to resist risks is to still make the products they produce have consumer power and competitiveness under difficult market conditions. Long-term R&D and production make different high-tech industries have certain representative industries and products. When faced with risks and difficulties, enterprise managers should correctly treat the losses caused by risks, and more importantly, seize the opportunities and combine their own industrial characteristics to promote the deepening of enterprise products into the market.

For example, iFLYTEK carried out intelligent research and development in the field of education as early as ten years ago. When the epidemic and the double reduction policy hit, the enterprise managers of iFLYTEK did not blindly follow the trend and blindly develop the data platform of the medical industry. On the contrary, while breaking through the medical treatment, they built a bridge of educational services for schools and families in a deeper way. Therefore, when facing the risks in the era of VUCA, enterprise managers should find out the basic trend of the market, combine the characteristics of their own industrial products, and truly seize the opportunities, rather than drift with the current.

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