Research on Investment and Financing Data Analysis in the Chinese Robotics Industry

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Abstract

This research delves into the investment and financing landscape of the Chinese robotics industry, exploring its development across technological, capital, and policy dimensions. The classification of robots, which includes upstream components, midstream body manufacturing and system integration, and downstream applications, provides a comprehensive framework. Analysis reveals a concentration of investment events in downstream applications, with a notable increase in financing scale and the number of events in recent years. Urban distribution highlights major cities that are attracting significant investments, reflecting the geographical dynamics of the industry. The examination of investment rounds, currency distribution, and financing amounts sheds light on the industry's macroeconomic perspective. Detailed segmentation into upstream, midstream, and downstream sectors reveals distinct trends and funding preferences. Notably, the service robot sector emerges as a capital magnet, especially in medical and specialized applications. The study concludes with a forward-looking perspective, emphasizing the pivotal role of technology, capital, and policies in shaping the future trajectory of the Chinese robotics industry.

Keywords

Chinese robotics industry, Investment and financing Analysis, Classification of robots, Capital dynamics, Financing scale, Future development

1. Introduction

A robot is an intelligent machine capable of semi-autonomous or fully autonomous operation, performing tasks such as operations or movement through programming and automatic control. It possesses fundamental features of perception, decision-making, and execution. Robots can assist or even replace humans in undertaking hazardous, strenuous, and complex tasks, thereby enhancing work efficiency and quality, serving human life, and expanding or extending human activities and capabilities. Regarding the classification of robots, there is no globally unified standard and they can be classified from different perspectives [1]. In terms of the industrial chain, they can be categorized into upstream component enterprises, midstream body manufacturing &system integration enterprises, and downstream application enterprises. In terms of application scenarios, robots can be classified into service robots and industrial robots [2].

1.1 The classification in terms of industrial chain

1) Upstream (Components): Upstream components in the robotics industry refer to the core components and functional modules required for robot production, such as sensors and end effectors. Among them, the controller, reducer, and servo motor are the three essential components for robots, also serving as technological barriers.
2) Midstream (Body Manufacturing and System Integration): Body manufacturing and system integration constitute

the core aspects of the robotics industry. Body manufacturers engage in the design and manufacturing of the robot's physical structure. They integrate upstream components to achieve the complete production of robots, involving four steps: design, research and development, processing, and assembly. System integrators, on the other hand, customize integrated development based on user demands, encompassing image recognition, voice recognition, semantic recognition, and operating systems. The core technologies of midstream manufacturers include human-machine interaction systems, environmental perception systems, control systems, mechanical systems, and drive systems. Their objective is to achieve the practical deployment of robots in specific scenarios.

3) Downstream (Applications): Downstream primarily provides robot services based on various real-world scenarios. It can be divided into service robots and industrial robots. Service robots include restaurant delivery robots, floor-cleaning robots, etc. Industrial robots encompass warehouse logistics robots, painting robots, handling robots, etc.

1.2 The classification in terms of application scenarios

1) Service robots: Service robots are primarily applied in the tertiary industry, including personal/household robots such as robotic vacuum cleaners, educational robots, entertainment robots, companion robots, household cooking robots, and home security robots [3]. Public service robots encompass restaurant delivery robots, cooking robots in dining establishments, voice-activated conversational robots, mall guide robots, and cleaning robots. Specialized robots include underwater robots, maintenance robots, bomb disposal robots, emergency management robots, military robots, and medical robots.

2) Industrial robots: Industrial robots are primarily used in the manufacturing sector of the secondary industry, and they are categorized into six types: welding robots, painting robots, palletizing robots, assembly robots, handling robots, and other industrial robots. After more than fifty years of development, industrial robots have found applications in an increasing number of fields. In manufacturing, especially in the automotive industry, industrial robots have been widely adopted. In operations such as raw material manufacturing, machining, welding, heat treatment, surface coating, material handling, assembly, inspection, and warehouse stacking, robots have gradually replaced manual labor [4]. With the further and broader development of industrial robots and the increase in the level of robot intelligence, their application scope continues to expand. They have transitioned from the automotive manufacturing industry to other manufacturing industries, further extending to the machining industry, electronics and electrical industry, rubber and plastics industry, food industry, wood & furniture manufacturing, and other fields. In industrial production, various industrial robots such as arc welding robots, spot welding robots, sorting robots, assembly robots, painting robots, and handling robots have been widely adopted. Robots are playing a crucial role in enhancing the quality of human life [5].

3. Analysis of Investment and Financing Situation in the Chinese Robotics Industry

3.1 Macro perspective

1) Number of urban investment and financing rounds
The top 10 cities in China with the highest number of investments in the robotics industry are as follows: Beijing (471 times), Shenzhen (451 times), Shanghai (300 times), Hangzhou (144 times), Suzhou (117 times), Guangzhou (76 times), Nanjing (62 times), Wuhan (49 times), Dongguan (38 times), and Changzhou (32 times). The first five cities have received over a hundred investments each, with a total of 1,483 financing events, constituting 71% of the total investment and financing events in the Chinese robotics industry. Changzhou, ranked 10th, may not be as well-known as other popular cities; however, in recent years, it has accelerated the development of a robust robotics industry with a strong industrial chain, innovation, and application capabilities. The city's industrial-scale ranks among the top in Jiangsu Province, making it one of the most influential robotics industry bases in China.

2) Financing event rounds
In the distribution of investment rounds in the Chinese robotics industry over the past decade, early-stage investments such as seed and angel rounds, as well as Series A rounds, have consistently held a significant share. However, post-2013, the proportion of these two types of events has shown a declining trend, dropping from over 80% in 2012 to nearly 50% in 2021. While the proportion of seed and angel rounds, as well as Series A rounds, is decreasing, the number of B rounds and C rounds of financing events is steadily increasing. In 2011, there was only 1 B-round event, and by 2021, this number had risen to 62. Before 2013, there were no C-round events, and in 2013, there was only 1; however, by 2021, there were 40 such events, constituting over 10% of the total events in that year. It is noteworthy

that IPO financing events are also on the rise, with 31 events in 2021 and 26 events in the first nine months of 2022. Chinese robotics companies are increasingly attracting market and capital attention.

3) The change of currency distribution in investment and financing events

As of 2022, the investment and financing amount in the Chinese robotics industry is 189.097 billion yuan, accounting for 68% of the total investment. Following this, the investment in US dollars reaches 85.678 billion yuan, representing 31% of the total investment. Other currencies, such as Hong Kong dollars and euros, have a relatively small share, accounting for 1%. Examining the historical distribution of investment and financing amounts in different currencies in the Chinese robotics industry, it is evident that before 2012, the majority of investments were in yuan, with only a small portion in US dollars. However, after 2013, the amount of US dollar investments gradually increased, along with its proportion.

4) The average amount of single financing and the distribution of financing ranges

From 2011 to 2016, the financing amount in the Chinese robotics industry was mainly concentrated at the million yuan level. After 2017, the proportion of million yuan level financing events gradually decreased, with the tens of millions yuan level becoming the mainstream. Additionally, financing events at the hundred million yuan level have been increasingly active in recent years, with a growing number of such events. It is worth noting that there were 18 events with financing amounts exceeding ten billion yuan in 2021. The average financing amount for single events in the Chinese robotics industry has also undergone changes over the past decade. In 2018, the average financing amount reached 172 million yuan. By 2021, with the optimistic outlook of the market for the industry, substantial funding has flowed in, leading to a new record with the average financing amount per single event rising to 255 million yuan.

3.2 Segmented fields perspective

As of 2022, the Chinese robotics industry has witnessed a total of 2,092 investment and financing events. Overall, the number of such events shows a fluctuating upward trend. When looking at specific sectors, investment and financing events are concentrated in the downstream application field, consistently holding a significant proportion throughout the years, far exceeding other sectors. Specifically, by 2022, the Chinese robotics industry has experienced a total of 2,092 investment and financing events. Among these, the upstream components sector accounted for 519 events, representing 24.81% of all investment events in the industry, with a financing scale of 84.8 billion yuan. The midstream body manufacturing and system integration sector experienced a total of 151 investment and financing events, constituting 7.21% of all investment events. The upstream and midstream sectors have relatively fewer funded events because of the number of enterprises in this field, industry technological development, and application levels. The majority of investment and financing events in the Chinese robotics industry are concentrated in the downstream application sector, with 1,422 events, accounting for 67.98% of all investment and financing events. This is attributed to the widespread market demand and technological development in this application field.

1) Upstream

In the field of investment and financing in the upstream components of the Chinese robotics industry, the sensor sector has witnessed the highest number of financing events, totaling 201, accounting for 38.7% of the total upstream events. Regarding investments in core components of robots, the controller track has seen 58 financing events, the servo control system track has witnessed 42 financing events, and the gearbox track has recorded 41 financing events, collectively representing 27% of the total upstream events. Additionally, there have been 177 investment and financing events in other upstream components and technology development tracks. This category includes robot chip developers, robot chassis suppliers, positioning system developers, and others.

2) Midstream

In the midstream sector of the Chinese robotics industry, there are currently 216 companies, of which 77 have obtained financing, with a funding rate of 35.6%. As of 2022, this sector has witnessed a total of 153 investment and financing events, with a total funding scale of 42.774 billion yuan. Among the funded companies, 30 have received funding two or more times, while 7 companies have received funding three or four times. Additionally, there are 5 companies that have received funding five times or more.

3) Downstream

In the downstream sector of the Chinese robotics industry, there are currently 1,492 companies, of which 615 have received financing, resulting in a financing rate of 41.2%. Up to the year 2022, a total of 1,422 investment and financing events have occurred in this sector, with a total financing scale of 148.585 billion yuan.

Examining the distribution of investment events, financing is concentrated in the service robot direction within the downstream application field. In this direction, a total of 922 investment and financing events have occurred, accounting for 64.8% of the total downstream financing events, with a financing scale of 96.63 billion yuan. In the industrial robot direction, there have been 456 investment and financing events, accounting for 32%, with a financing scale of 48.78 billion yuan. Other companies in the sector have had 44 investment and financing events, accounting for 3.1%, with a financing scale of 3.175 billion yuan [6].

Specifically, in the service robot sector of the Chinese robotics industry, there are currently 951 companies, of which 404 have received financing, resulting in a financing rate of 42.5%. Up to 2022, a total of 922 investment and financing events have occurred in this sector, with a total financing scale of 96.6 billion yuan. Capital is particularly favorable towards medical robots, accounting for 25% of total service robot events. In the field of medical robots, surgical robot companies have received the most financing, with 115 events. Additionally, medical care and rehabilitation robot companies have also received a significant number of financing.

In the industrial robot sector of the Chinese robotics industry, there are currently 456 companies, of which 187 have received financing, resulting in a financing rate of 41%. Up to 2022, a total of 456 investment and financing events have occurred in this sector, with a total financing scale of 48.78 billion yuan. Among industrial robots, material handling robots are undoubtedly among the most widely used, visible in industrial manufacturing, warehousing logistics, and food production. In the field of industrial robot financing events, there is also a concentration in the material handling robot direction. In this direction, a total of 233 investment and financing events have occurred, accounting for 52% of the total industrial robot financing events, with a financing scale of 27.935 billion yuan. Examining the main directions of material handling robot financing, events are primarily concentrated on warehousing robots, AGV, sorting robots, and intelligent handling robots.

4. Conclusion and Outlook

In conclusion, from the perspective of specific sub-fields, the Chinese robotics industry, in terms of both the annual increase in the number of new companies and the quantity of investment and financing events, is predominantly concentrated in the downstream application sector. The primary reason for this phenomenon lies in the fact that downstream enterprises represent a crucial link closely connected to market demands. Moreover, compared to the upstream and midstream sectors, the technological entry barriers are relatively lower, leading to a significantly larger number of newly established entrepreneurial companies in the downstream. The proliferation of new companies, coupled with their widespread application across various scenarios, has attracted capital attention.

From the perspective of robot sub-sectors, compared to industrial robots, the direction of service robots is more favored by capital in China, with over 60% of investment and financing events distributed in the service robot sector. This is mainly attributed to the wider application scenarios of service robots. Within the service robot sector, medical robots and special robots have attracted significant capital attention, receiving a higher number of financings. The industrial robot sector, influenced by factors such as technological development and the decline of demographic dividends, has seen an increase in demand for intelligent and automated products in the manufacturing industry, leading to the rapid development of industrial robots. In terms of the direction of investment, logistics and handling robot enterprises are the most favored by capital, receiving the highest amount of financing.

Prospects for the development of the Chinese robotics industry can be elucidated from three dimensions:

(1) Technology: The Chinese robotics industry is currently in a rising phase of development, and it is expected to unleash tremendous potential in the future with the support of technology, policies, and capital. Technologically, advancements are crucial for the development of the Chinese robotics industry. As technological levels continue to progress, China's proficiency in robotics is also on the rise. While there is still a certain gap in technological proficiency in some areas compared to other countries, this gap signifies significant room for development. As technological barriers are overcome, more scenarios will likely see the application of robotic products in the future.

(2) Capital: The keen observation of capital is always an indicator of market trends. Looking at the overall investment and financing market, the number and scale of investment and financing events in the Chinese robotics industry are showing a fluctuating upward trend, reflecting the industry's immense potential for future development and attracting more capital. Particularly in 2021, both the financing scale and the number of events set new historical records. As we enter 2022, the Chinese robotics industry continues to be a focal point of capital attention, with companies in the industry frequently securing financing.

(3) Policies: Policy support serves as a catalyst for industry development. As an advanced manufacturing sector,

the development of the Chinese robotics industry has garnered national attention. In recent years, various departments and regional governments have continually introduced supportive policies to guide the development of the robotics industry. Looking ahead, the country is likely to continue encouraging and supporting the development of the robotics industry.

Funding

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