

## *How founder-entrepreneurs from Chinese high-tech SMEs assess market risks and explore new opportunities for growth and survival during COVID-19*

### *Cómo los emprendedores de las PYMEs chinas de alta tecnología evalúan los riesgos del mercado y exploran nuevas oportunidades de crecimiento y supervivencia durante la COVID-19*

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#### **Abstract**

Founder-entrepreneurs in SMEs tend to have an active role in shaping the business and the direction and management of their innovation strategies. During COVID-19, their understanding of risks and approach towards decision making has become very crucial as the market sensitivity changed drastically with various levels of challenges such as travel restrictions, national lockdown, reduced market demand and operational uncertainty. So far, there are very limited studies on the role of the founder-entrepreneurs from Chinese high-tech software SMEs in managing the business risks from the pandemic. This paper will address some of these gaps by presenting case studies of 9 successful high-tech software SMEs in China and discuss how their founder-entrepreneurs have engaged with the market, identified COVID-19 related risks and how they have made critical decisions to survive and explore new market opportunities for growth. As part of a longitudinal study, in-depth interviews were conducted with the founder-entrepreneurs at various stages of the pandemic to explore their progress with the business operation and management. The paper will discuss the role of the founder-entrepreneurs from SMEs in risk analysis and decision-making. It makes an important contribution to the growing literature on Chinese SMEs, and COVID-19.

**Keywords:** founder-entrepreneurs; risk and opportunities; Chinese high-tech SMEs; COVID-19

**JEL Classification:** L26; M10; O53

#### **Resumen**

Los emprendedores de las PYMEs suelen tener un papel activo en la configuración del negocio y en la dirección y gestión de sus estrategias de innovación. Durante la COVID-19, su comprensión de los riesgos y su enfoque hacia la toma de decisiones se han vuelto cruciales, ya que la sensibilidad del mercado ha cambiado drásticamente con varios niveles de desafíos, como las restricciones a los viajes, los confinamientos, la reducción de la demanda del mercado y la incertidumbre. Hasta ahora, hay muy pocos estudios sobre el papel de los emprendedores de las PYMEs chinas de software de alta tecnología en la gestión de los riesgos empresariales derivados de la pandemia. Este documento abordará algunas de estas lagunas mediante la presentación de estudios de caso de 9 PYMEs exitosas de software de alta tecnología en China y, analizará cómo sus propietarios se han comprometido con el mercado, han identificado los riesgos relacionados con la COVID-19 y cómo han tomado decisiones críticas para sobrevivir y explorar nuevas oportunidades de mercado que les permitan crecer. Como parte de un estudio longitudinal, se realizaron entrevistas en profundidad con los emprendedores en varias etapas de la pandemia para explorar su progreso con el funcionamiento y la gestión del negocio. El artículo analiza el papel de los fundadores-empresarios de las PYME en el análisis de riesgos y la toma de decisiones. El artículo constituye una importante contribución a la creciente bibliografía sobre las PYMEs chinas y la COVID-19.

**Palabras clave:** emprendedor; riesgo y oportunidades; PYMEs chinas de alta tecnología; COVID-19

**Clasificación JEL:** L26; M10; O53

#### How to cite this article

Huang, Y., Baruah, B., & Ward, A. (2022). How founder-entrepreneurs from Chinese high-tech SMEs assess market risks and explore new opportunities for growth and survival during COVID-19. *Small Business International Review*, 6(2), e504.

<https://doi.org/10.26784/sbir.v6i2.504>

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Published by AECA (Spanish Accounting and Business Administration Association) and UPCT (Universidad Politécnica de Cartagena)

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## 1. Introduction

Small and medium-sized enterprises (SMEs) are the backbone of the national economy in China. More than 97% of Chinese companies are SMEs, contributing to about 60% of GDP and 80% of work opportunities (Srisathan et al., 2020). In this context, Chinese high-tech software market has grown rapidly in recent years gradually becoming one of the most important contributors to the development of the national economy. However, COVID-19 being one of the major global health crises across the world has brought in a lot of challenges especially for SMEs with many struggling to survive such unprecedented times (T. Sun et al., 2022). Now with the number of confirmed cases exceeding 499 million worldwide and with over 6.18 million people losing their lives as a result of the pandemic by April 2022 (World Health Organization, 2022), there is a critical need for businesses to understand how to address and navigate through these complex risks in the market and survive.

As the first country to be hit by COVID-19, the Chinese government has been taking a relatively strict and cautious approach to managing the outbreak and reduce the negative impacts. This includes digital technology pandemic prevention, zero-case policy, all-staff nucleic acid testing, all-staff vaccinations, a long-term quarantine system, and the official accountability system (Ding & Zhang, 2022). On the one hand, these strategies have greatly controlled the rate of spread of COVID-19 keeping the number of confirmed cases in China at a relatively low level for a long time (Burki, 2020). However, on the other hand, they have also increased tremendous pressure on the Chinese economy and creating social exhaustion (Ding & Zhang, 2022). The overall unstable and negative market environment has also led to the software market facing a major setback in the last two years in China making it difficult for their founder-entrepreneurs to survive and sustain their business. Due to limitations of resource accumulation and staff capacity, SMEs' risk tolerance is generally lower than large organizations (Asgary et al., 2020). High-tech SMEs are struggling with reduced market demand and opportunities due to all the changes and inconsistencies from the pandemic and the policies implemented by the government. This being an on-going and relatively new phenomena, only a limited number of studies have looked into the impacts of COVID-19 on Chinese SMEs and one of the major gaps in the literature is the role of founder-entrepreneurs in assessing market risks and opportunities during the pandemic. So far, no studies have explored this area especially for High-tech SMEs in China. This paper therefore addresses how founder-entrepreneurs from High-tech SMEs in China engage with the unpredictable market during COVID-19 so as to explore new opportunities for growth, assess risks and make critical decisions to survive and sustain their business.

This paper will present the case studies of 9 High-tech software SMEs in China that have successfully withstood the impacts of COVID-19 so far. Using semi-structured interviews, it will discuss the market challenges faced by software SMEs during the pandemic and the strategies used by their founder-entrepreneurs to tackle these risks. As one of the first studies on risk management in relation to COVID-19 and High-tech SMEs in China, this paper provides some useful insight into the impacts of this global pandemic. The experiences of these SMEs in dealing successfully with the COVID-19 challenges can help other enterprises and founder-entrepreneurs to be pro-active, understand the situation and perform better with their risk management strategies.

## 2. Research Background

### 2.1 Impact of high-tech SMEs in China

Due to the important contributions of SMEs on the economy, the Chinese government in recent years has emphasized on the development of high-tech industries and as part of that introduced a series of regulations and policies to support the growth of high-tech SMEs (Chen et al., 2018). This has led to a rise in the number of high-tech SMEs in China. Some researchers have discussed how such software SMEs can facilitate technological development and innovation achievement and hence, their growth can directly affect the performance and vitality of the Chinese innovation market (Rothwell & Dodgson, 1991; Zhu et al., 2012). According to a report by the State Council Information Office, Chinese SMEs by the end of the year 2017 owned over 70% of patents nationwide and contributed to about 75% of technological innovations (Ministry of Science of China, 2019). The Ministry of Industry and Information Technology of China (2022) reported that the annual revenue of the software industry by the end of the year 2021 in China had reached 118.75 billion yuan, and this indicates the vast potential of this market.

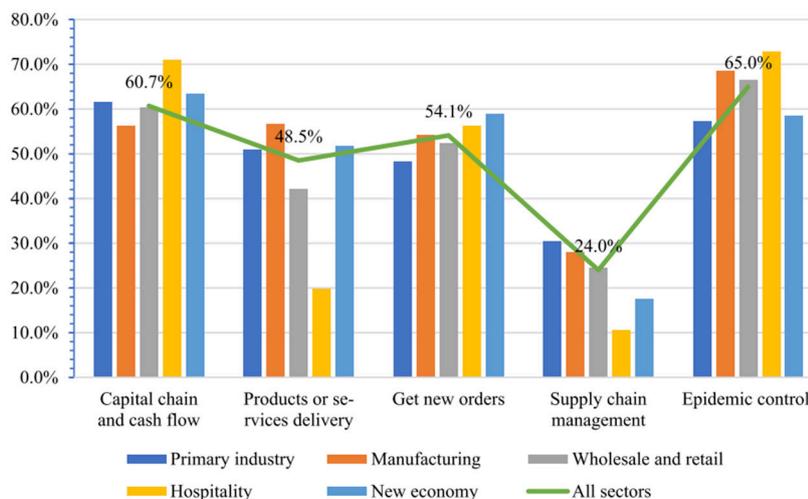
However, despite having good potential, the high-tech SMEs face some serious challenges on a regular basis. Their average life expectancy is only 3.7 years with more than half of the SMEs failing to survive beyond their first five years of operation. Keizer et al. (2002) pointed out that compared with large organisations, SMEs have significant limitations in resource accumulation, including skills, financial resources, and other intangible and tangible resources. This may directly influence their ability to innovate, further affecting their market performance and competitiveness (Keizer et al., 2002; Woschke et al., 2017). Researchers like Keizer et al. (2002) noted that in order to reduce operation costs, some entrepreneurs from software SMEs might be

reluctant in investing a significant proportion of their turnover on innovation activities. This might also be due to the long payback period of these activities. Although such cautious actions might help in preventing or reducing financial pressures for a temporary period, but in the long term, they could damage the company's resilience and competitiveness thereby increasing the ultimate risk of failure. So, for entrepreneurs from high-tech software SMEs, there is a need to balance their ability to innovate with their limited resources and keep up with the market changes and build their resilience to survive and sustain. According to Xiao and Ramsden (2016), "A key determinant to start and grow a high-tech business may be a set of strategic choices best reflecting the strengths of founding entrepreneurs and dealing with critical resources that are not available internally" (p. 893). Along with internal factors like resources, the development of Chinese high-tech software SMEs is also affected by external factors, the pandemic being the most significant in recent years.

## 2.2 COVID-19 risks and opportunities for businesses

The impacts of COVID-19 is unprecedented both in its complexity as well as severity (Gourinchas et al., 2020). Many researchers have identified and discussed some of the risks brought in by COVID-19 in various sectors. Fernandes (2020) for instance, observed how the pandemic has severely disrupted global supply chains, causing resource shortages in several areas. Countries have been taking various measures, such as quarantines, travel restrictions and lockdowns to control the spread of the pandemic. Sectors like tourism and hospitality had to face a lot of negative consequences due to measures like limited public gatherings, work from home schemes, temporarily closures of educational institutes and hotels, strict social distance policies and mandatory face masks in public spaces. In addition, the lockdown measures and policies have also resulted in many losing their stable sources of income. At the height of the outbreak, a large number of enterprises either had to close down or use extreme survival measures, such as laying off staff members and reducing expenditures wherever possible to decrease financial pressure (Raj Chetty et al., 2020). Alves et al. (2020) noted how the outbreak has widely impacted SMEs in terms of demand constraints and HR issues. A study by Sun et al. (2022) identified some of the negative impacts of COVID-19 on Chinese SMEs' performance. They highlighted some of the major setbacks such as logistics blocks, shortages of labour, and a decline in consumer demand. Lu et al. (2021) surveyed 4,807 SMEs in China and found how the pandemic presented a huge existential challenge for SMEs impacting the resumption of work, income, and confidence with day-to-day operation. Ma et al. (2021) similarly conducted a survey with 234 SMEs from various industries in Beijing to study the specific challenges from COVID-19. They studied the pandemic's impact from four perspectives: financing activities, markets, employees, and costs. Their analysis showed that the market had the most prominent effect from the pandemic and emphasized on the support from government to reduce the negative impact of the pandemic on SMEs. Gourinchas et al. (2020) used a large representative firm-level database from 17 countries, including Japan, Korea and the United Kingdom, to estimate the impacts of the COVID-19 crisis on business failure among SMEs and they concluded that without government support, the failure rate for SMEs would increase by nearly 9%. Lu et al. (2021) collected data from 3,194 SMEs engaged in the primary sector such as manufacturing, wholesale and retail trade and hospitality in Sichuan, China. Their findings as shown in Figure 1 highlight the different challenges for SMEs from the pandemic in different sectors.

**Figure 1.** Main pressures on the SMEs by sector

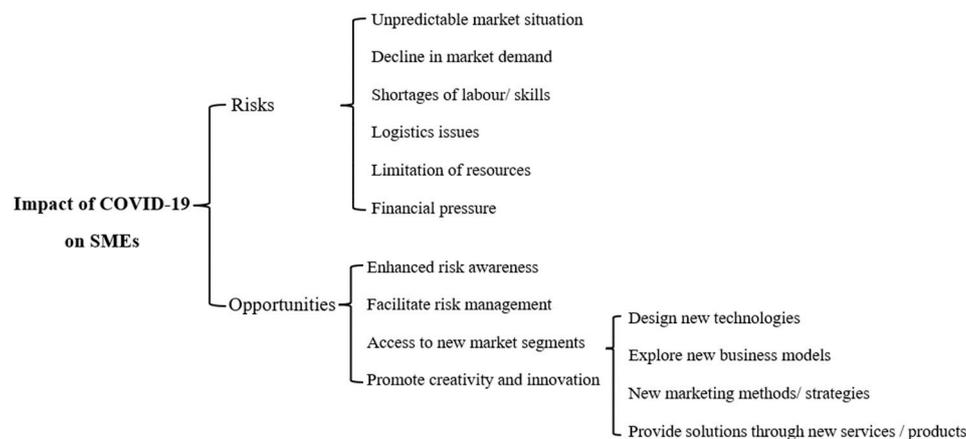


Source: Lu et al. (2021)

For example, SMEs in the primary sector faced poor logistics especially during the early stages of the outbreak when road controls and staff shortages hampered the transport of feed ingredients, finished products and farm animals, affecting feed supplies, and increasing costs. Poor logistics also prevented the timely delivery of orders, which further increased the difficulty of selling and this led to a backlog of stocks, which in

turn increased the financial pressure on SMEs. For small businesses in the wholesale and retail trade, the pandemic prompted them to start experimenting with online sales approaches. Lu et al. (2021) felt that from a long-term perspective, this shift might be beneficial to the development of retail SMEs as more businesses are exploring innovative and advanced sales model to build their competitive advantages. So, despite the challenges and risks, the pandemic has pushed organizations to build their resilience and competitiveness through innovation and by exploring new opportunities by thinking outside the box. Zutshi et al. (2021) observed how the beginning stage of the pandemic brought a period of confusion and fear of the unknown and a general lack of acceptance with a lot of unanswered questions. With time, there was a gradual stage of acceptance and adaptability leading to “*fantastic examples of creativity and innovation*” (p. 7). For instance, when the hospitality sector faced serious survival threats at the peak of the pandemic due to nationwide lockdown, Lau (2020) noted how hotel chains were forced to explore new approaches and technologies to generate revenues and maintain cash flow and mitigate the impact of the pandemic. Several hotels started using information and communication technologies to optimize their innovation performance, build/sustain brand awareness, and reduce safety risks. Some used live promotion via streaming platforms, live-stream conference to replace face-to-face conference, Artificial Intelligence based temperature checks for seamless check-in services, robot-based room services and deliveries. There was also a general push/demand for better internet connectivity and technology as remote-based working schemes became more and more common among several organizations. There was an increase in the use of social media and IT for promoting businesses and their products and services such as takeaway food options from regular restaurants. In this context, researchers like Alves et al. (2020) and Adam and Alarifi (2021) observed a heavy reliance on technology during the crisis and noted the importance of technology utilization for improving the performance of SMEs and building their likelihood of future survival. Zutshi et al. (2021) observed how SMEs were also focusing on local partnerships with other businesses and local councils to build their resilience during the pandemic. There was more openness and transparency in communication with both internal and external stakeholders in order to strengthen and preserve their relationships. Alves et al. (2020) suggested that there should be more investment from government to improve IT and telecommunication infrastructure and support for local SMEs to adapt to these changes in the business environment. Following the review, Figure 2 summarizes the key risks and opportunities faced by SMEs from COVID-19:

**Figure 2.** Risks and Opportunities for SMEs from COVID-19



Source: Authors

Among nascent SMEs with limited or no experiences with crisis management, Alves et al. (2020) observed a general lack of mechanism for formal documentation and strategies for comprehensive crisis management and aftermath measures. Fabeil et al. (2020) similarly noted “*There is no formal crisis management planning or contingency planning employed by micro-entrepreneurs*” (p. 842). Entrepreneurs seem to employ multiple synchronous strategies to ensure continuous operation of their businesses such as producing merging products to meet customer needs, using digital marketing etc. Alves et al. (2020) recommended SMEs to consider long-term and adoptive crisis management strategies which focuses not only on financial factors but also non-financial factors. Zutshi et al. (2021, p. 11) opined “*The SMEs need to adopt a resilient approach comprising unorthodox thinking and mindful execution*”. In this context, Alves et al. (2020, p. 16) noted “*Owners, top management, as well as different levels of personnel, should be involved in developing crisis management mechanisms according to their needs*”. Adam and Alarifi (2021) agreed how managers play a key role in tackling risks and implementing new coping measures during the pandemic crises:

The new management practices (in the field of external knowledge, structures and leadership, regeneration, or employee activities) that have been implemented in SMEs after the COVID-19 outbreak may result in improved performance and increased chances of survival for these enterprises (Adam & Alarifi, 2021, p.14)

In SMEs, founder-entrepreneurs tend to have an active role in market analysis and decision-making and their understanding of the market will greatly influence critical decisions such as investment in projects and clients. It also shapes the innovation culture with their overall business model and impacts their company's development direction and strategy. Their market understanding and approach towards decision making has become very crucial during COVID-19. In order to navigate their business and make effective decisions and manage risks in such unprecedented environment, founder-entrepreneurs need to be pro-active and sensitive towards their customers, stakeholders, market, business model and resource management. Gumusluoglu and Ilsev (2009) noted that high-tech SMEs are competing in a fierce environment where the rate of product update and the changes with customer demands are very fast and also the level of competition is very strong. In this context, for such SMEs, having good risk management capabilities become very crucial for their survival. As COVID-19 is a relatively new and on-going phenomena, one of the major gaps in the literature is the role of founder-entrepreneurs in assessing market risks and opportunities especially for High-tech SMEs in China. This paper addresses the following research question:

- How do founder-entrepreneurs from High-tech SMEs in China engage with the market during COVID-19 to explore new opportunities, assess risks and make critical decisions to survive? This paper will present the case studies of 9 successful high-tech software SMEs in China and discuss how their founder-entrepreneurs have engaged with the market during COVID-19 and made critical decisions to explore new market opportunities and assess risks so as to build their resilience and survive.

### 3. Research Methodology

#### 3.1 Research Design and Case study selection

This study is part of an on-going PhD research project. A Case study approach has been utilized for the research. The case study emphasises detailed contextual analysis of one or a small number of events, organizations or individuals, generally over time (Bell et al., 2019; Easterby-Smith et al., 2015). Flyvbjerg (2006) highlighted that the success of the case study relies on developing a 'good narrative', focusing on the situational details and specific events, and writing about them in a way which captures the "*complexities and contradictions of real life*" (p. 237). This research method allows researchers to focus in-depth on specific case(s) and to retain a holistic and real-world perspective. If the research questions require an extensive and detailed description of some social phenomenon, then the case study is an appropriate option according to Yin (2018).

This study explores how COVID-19 has affected the development of software SMEs in China and how entrepreneurs can manage challenges and lead their businesses to survive the complexities of the pandemic. Yin (2018) noted that such 'How' questions commonly deal with the tracing of operational processes over time, rather than mere frequencies or incidence. In this context, qualitative methods are more suitable to explore this type of research question. In addition, case studies are preferred when the relevant behaviours cannot be controlled and manipulated and when the desire is to study some contemporary event or set of events (Yin, 2018). For this study, the researcher used a constructivist philosophy to understand and interpret the views and perspectives of the founder-entrepreneurs of the SMEs.

Compared with the use of a single-case, the evidences from multiple cases are often considered as more compelling, and the overall multiple-case study approach is therefore regarded as being more robust (Herriott & Firestone, 1983). Yin (2018) suggested that when researchers have the choice (and resources), multiple-case designs may be preferred over single-case designs. In this study, the researcher utilized a multiple-case study approach, selecting 9 Chinese high-tech SMEs as cases based on following criteria:

- The main business of the company should mainly involve software design, development or operation. In other words, the company should be identified as a high-tech software company based on 'High-tech Industry (service) Classification Standard' of China (National Bureau of Statistics of China, 2018).
- Based on the definition of SMEs in China (National Bureau of Statistics of China, 2018), the company should have less than 250 employees and their annual income should not exceed one billion RMB.
- The company should have been operating in the market for over 3 years with relatively good financial and market performance. Their experience from the market competition and challenges will ensure rich data on risk management strategies to this study.

Table 1 shows the overall information of the SMEs selected as case studies including the names of the founder-entrepreneurs and the year of establishment of the business.

#### 3.2 Sources of information and variable measurement

The main sources of information were collected through semi-structured interviews with the founder-entrepreneurs from the selected SMEs. Using a longitudinal case study approach, the researcher interviewed participants at different stages since 2020 to understand the key impacts of COVID-19 on the development of

these SMEs and how they have responded to the market challenges posed by the pandemic. A specific interview guide was created to understand the impacts of COVID-19 and how the founder-entrepreneurs perceived the risks caused by the pandemic. As Table 2 shows, the interviews mainly focused on three aspects: the setbacks and challenges faced by Chinese high-tech software SMEs during COVID-19, the strategies used to cope with the risks in such unprecedented times and the future development plans following the experiences from the pandemic. In addition, the researcher also referred to some other information related to the case companies, such as their official websites and relevant news articles, in order to triangulate the information and gain a deeper understanding of the case studies. As the interviews were conducted face-to-face in China as part of site visits of the organization, the researcher had the opportunity to observe the internal working environment and atmosphere of the company. It also gave the researcher a closer experience of witnessing the company's development and management during the peaks of COVID-19. Such multi-source data collection along with site visits ensures the validity of the case studies.

**Table 1.** Basic Information of Case studies

Case No.	Company Name	Founder-entrepreneur	Main Product & Services	Establishment Time	Number of employees
1	Hangzhou Potential Network Technology Co., Ltd.	Kehao Chen	Online platform and application for human resources management	2015	0-49
2	Beijing ColorfulClouds Pacific Technology Co., Ltd.	Xingyuan Yuan	Software and online platform for translation and weather forecast	2014	0-49
3	Hangzhou Zhupai Information Technology Co., Ltd.	Ting Xu	Software and online platform for capital management	2014	50-99
4	Hangzhou Flyby Network Technology Co., Ltd.	Qiannan/Nancy Chen	Online services and platform for business travel	2016	50-99
5	Zhejiang Ruxie NetworkTechnology Co., Ltd.	Zuohua Fu	Online services and platform for personal insurance	2016	0-49
6	Hangzhou Good Memory Information Technology Co., Ltd.	Haijun Xu	Mobile application and online platform for engineering cost management	2016	0-49
7	Zhejiang Muzhiji Network Technology Co., Ltd.	Pengyao Zhu	Mobile application Designing	2016	0-49
8	Hangzhou WeihongTechnology Co.,Ltd.	Tong Han	Work collaborative software designing	2005	50-249
9	Hangzhou Wanjian Network Technology Co., Ltd.	Yong Cui	Online platform and application for medical education	2015	0-49

Source: Authors

**Table 2.** Interview guide used in the research study

Themes for Interview questions:		
Theme 1	COVID-19 risks	Impacts of COVID-19 on business and life Impacts of COVID-19 on the software industry Operation model of business Changes to business model due to COVID-19
Theme 2	Risk Strategies	Risk attitude towards COVID-19 Risk strategies implemented during COVID-19
Theme 3	Development plan	How COVID-19 experiences shape future direction Impact of COVID-19 on SMEs' risk management structure for future

Source: Authors

The participants and the lead researcher are native Chinese speakers and hence, the data was collected in Chinese and were recorded as audio files. Following the Chinese transcription of all interviews, the next step was to translate these into English. To ensure the validity of the translation, the researcher used an external person who was proficient in both English and Chinese and was not associated with the research study, to review the translation. Following the translation, the researcher reviewed the interview transcripts using NVivo 12 which is a qualitative data analysis tool for thematic analysis. Each transcript was analysed on a case-by-case basis to identify key themes such as risks faced by the companies and their risk management strategies. After the thematic analysis, the 9 cases were compared in order to build an overall picture of the risk management of high-tech software SMEs during COVID-19. And in order to maintain the reliability of the study, a cross-checking strategy was used in all key processes of the research, such as interview transcription, translation and coding.

## 4. Findings and Discussion

### 4.1 Impacts of Covid-19 on the market demand

As discussed earlier, COVID-19 has brought in a range of challenges for SMEs' development and ultimate survival. Among these, the impacts on the market environment are the most visible. In the interviews, many

participants discussed the market impacts of COVID-19 and these can be summarized under two main aspects: reduced market demand and increased market uncertainty.

### Reduced Market Demand

The outbreak of COVID-19 has had a serious impact on the overall economy of China thus affecting people's desire to consume or spend money. For software SMEs, such a decline in market demand has been a major setback that hinders their development and even threatens their survival.

Emphasizing this point, Haijun, who is the founder-entrepreneur of Hangzhou Good Memory Information Technology Co., Ltd., explained that due to the pandemic, many people's incomes have been affected to a certain extent. In such uncertain conditions, people are more willing to spend money on vital necessities of life, such as food and clothes than on software products. *"This situation is certainly negative for our business"*, he said. His company mainly provides software products for construction companies to offer engineering costing services. During the worst months of COVID-19, the sales of all their products experienced a significant drop. Analysing the reasons, Haijun stated that although their products can greatly increase the work efficiency of their users, they are not regarded as essential products for people's day-to-day life. Therefore, when people's financial resources are limited and their spending desire and capabilities decreases, they would obviously prioritize spending on things that are utmost essential to their lives. *"I think it's a common problem for software enterprises"*, he said, *"How to maintain a steady flow of sales is a major challenge in the current situation"*.

Xingyuan, who is the founder-entrepreneur of Beijing Colourful Clouds Pacific Technology Co., Ltd., also supported this opinion. His company operates an online platform to provide real-time weather forecasting services to their users. Compared with other businesses, people's demand for weather forecasting services is closely related to their travel needs. However, during COVID-19, the Chinese government has adopted very stringent control measures such as self-quarantine at home and reduced travelling as much as possible. These restrictions on travel has had a direct impact on Xingyuan's business. He stated, *"People were unable to go outside and therefore did not care about the weather conditions. In fact, the utilisation of our products dropped significantly during this period"*. Reviewing the future prospects, Xingyuan confessed that due to the recurrences of the pandemic and the measures placed by the Chinese government, he was not fully confident that the market demand could possibly recover in a short period. This will take time and he explained, *"This situation has brought a lot of pressure on me. I hope the pandemic status will improve soon, only then will our company be able to develop better"*.

Nancy's business has also been greatly affected by the outbreak of COVID-19. She runs a software SME, named Hangzhou Flyby Network Technology Co., Ltd., which mainly provides business travel services to other companies and organizations. Due to the nature of her business, her company appeared to be the most impacted of all participants in this study. She described, *"Due to COVID-19, many people had to temporarily postpone or cancel their travel plans. As the service provider, we were also under a very high level of pressure"*. She further explained that for the travel industry, there are several prime seasons each year, such as the Chinese New Year holiday from December to February, or the Labour Day holiday in May. For her company, these few months can sometimes account for more than half of the year's revenue. However, COVID-19 has significantly reduced the company's financial performance due to government's restrictions on travel during the holidays. Also, the complex pre-trip preparation such as vaccination documents and quarantine policies have also reduced people's enthusiasm for travelling. For business travel, the influences are also significant, Nancy said, *"Business travel is also subject to higher financial costs and uncertainty than before. In this case, some of our clients may consider using online conversations to handle business issues instead of travelling"*. This situation has resulted in a direct loss of business. Nancy indicated that compared to 2019, at least a third of user demand in 2020 was lost due to the outbreak. The situation was much better in 2021, however, due to the recurrence of the pandemic and strict government policies, market demand has still not been able to return to the pre-COVID levels. *"The situation may not improve completely in the short term"*, she sighed, *"But I believed that the overall industry is still full of opportunities, and everything will be better in the future"*.

### Increased Market Uncertainty

For the Chinese market, although it temporarily seemed that the most severe phase of the pandemic might have passed due to strict measures however, the recurring nature of COVID-19 and China's dynamic zeroing policy has continued to add a degree of uncertainty for the future. For founder-entrepreneurs of software SMEs, such an unstable environment is a significant challenge that tests their ability to explore opportunities for growth and invest in market.

Kehao, the founder-entrepreneur of Hangzhou Potential Network Technology Co., Ltd., pointed out that, rather than the losses that have already incurred, he was more concerned about the uncertainties and risks that may arise in the future. He described the main element of his business as providing human resources services to

other companies. In this case, the survival of his clients is tied to the growth of his business. Only when his clients are able to grow successfully will they have a greater demand for labour, which in turn will bring a constant flow of business opportunities for Kehao's company. However, the outbreak of COVID-19 broke such a positive cycle. Kehao expressed that since the spread of the pandemic, business survival has faced many challenges such as reduced market demand, increased financial pressure and changes in business practices. In this situation, many companies are opting for layoffs to control operation costs so as to gain a chance of survival. For Kehao and his company, it was a bad phase, he stated, "*The company's demand for labour has decreased, which highly impacted my company's financial performance. But what worries me more is how the future will unfold*". He noted that COVID-19 had been ongoing for over 2 years now, and with each recurrence, the situation brings strong impacts, such as city closures or work stoppages. "*No one knows what will happen tomorrow and which city will go into lockdown*", he cited, "*Such an uncertain social environment is not conducive to market development and will be highly threatening to the survival of our customers. If our customers cannot exist in such a changing market, then neither can us. Therefore, in my opinion, the main challenges will occur in the post-pandemic period*".

Tong, who runs a company named Hangzhou Weihong Technology Co., Ltd., also highlighted the uncertainties of the market and stated, "*The pandemic had made market forecasting more difficult*". He explained that the COVID-19 highly changed the market environment, in such context, past market performance was difficult to use as a reference when setting company development goals for the following year. He said, "*I don't know how to assess the company's performance in 2020 and 2021 because the market environment in these two years is different from what we have experienced before. Similarly, I don't know how to plan for future growth because I can't accurately predict where the market will go and what will happen in the future*". However, for him, such confusion about growth prospects is risky. As the founder-entrepreneur, Tong is responsible for setting the innovation budget for his business, which requires him to have a clear vision of the further development of the company. But in the current situation, he admitted that it was difficult for him to make the perfect decision.

## 4.2 Founder-entrepreneurs' Responses to Market Changes

In order to mitigate losses caused by COVID-19, participants have adopted a variety of strategies to cope with the challenges. Faced with a rapidly changing market environment, they have promptly adjusted the company's development plans and direction, and even identified new opportunities from unfavourable conditions. And for some of them, temporarily stopping the expansion of their business, and shifting their attention to existing customer maintenance seems to be an effective way to keep the business operating smoothly. The following are some of the successful strategies that have been applied by the participants in this study:

### Adjustment of development plan

Founder-entrepreneurs are responsible for adjusting the company's development plan based on the actual status of the market. Under the impact of COVID-19, many participants decided to slow down the company development speed to reduce their financial pressure. In their opinion, such a temporarily adjustment of the growth plan is also a smart choice to potentially guarantee a smooth operation of their business.

Kehao stated that one of the major advantages of SMEs is their flexible management structure. Due to the smaller size, SMEs could give a quicker response to the changing market environment. Therefore, when he realised the enormous impact of COVID-19 on the market environment, he made timely adjustment to the company's development plans. He suspended several ongoing projects and lowered the company's R&D budget for the upcoming years. At the same time, he also reduced his expectations for the business revenue. He explained, "*In the current market environment, it is difficult for us to achieve a similar rate of growth as before. Rather than pushing our employees to complete impossible business tasks, we should lower our expectations and slow down the pace of development*".

Pengyao, who is the founder-entrepreneur of Zhejiang Muzhiji Network Technology Co., Ltd., also adjusted his company's direction during the COVID-19. He explained that before the outbreak of COVID-19, his company mainly provided software and application design services to mobile phone manufacturers. Through years of hard work, his company had entered into long-term cooperation with several of China's leading mobile phone manufacturers. However, at the same time, the business had also reached a bottleneck in its growth. He explained, "*Now we can maintain a steady flow of business, but if we want to achieve greater success, we need to find some new market gaps to explore*". In this context, for Pengyao, the outbreak of COVID-19 not only brought him challenges but also new opportunities to drive the business's growth. He noted that due to COVID-19, people had to stay at home for a longer time. Their daily life, including shopping, communication and entertainment were highly dependent on the Internet and mobile application, which has led to a rapid increase in market demand for a number of related software products and services. For the shopping and communication market, there are already well-known companies such as Alibaba and Tencent that hold the majority of the market share. However, for the entertainment market, there are still some gaps that can

support the development of SMEs. Pengyao stated, "As you might know, short-form video and live streaming are popular in the current market. And the outbreak of COVID-19 has accelerated its growth even more. In this context, I wanted to seize the opportunity to expand our business content into this area". However, he also highlighted that although business expansion is important, he would not neglect the original business base. He would control the amount of capital invested in new projects to ensure a stable and healthy cash flow for the business.

#### Existing Maintenance of clients

Due to the impact of COVID-19 on the market environment, for many software SMEs, attracting new clients has become much more difficult. To reduce this negative impact and maintain a stable business volume, many participants decided to shift their attention from opening new markets to existing clients' maintenance.

Zuohua is the founder-entrepreneur of Zhejiang Ruxie Network Technology Co., Ltd., a company that provides online insurance services to customers. During the COVID-19, he noted a significant drop on the consumption habits of the public. Especially in the first half of 2020, they witnessed a negative growth in the number of clients. Such poor market performance made him alarmed and he began to look for a solution to maintain the company's healthy cash flow. In order to improve the market performance of their products, Zuohua undertook a series of promotional strategies. Unfortunately, the results were not satisfactory. After these failed attempts, he realised that in the current market status, exploring new markets might not be the best option. He pointed out that although COVID-19 has raised the public's risk awareness, due to lower incomes and other reasons, people are not willing to spend more money on insurance services, which do not improve their lives in the short term. "Since it's so difficult to develop new customers, why don't we put our energy into maintaining our existing customers?" Zuohua stated. He asked his employees to have frequent communication with their existing clients, in order to have a better understanding of their consumer characteristics and individual needs and provide specific or tailored services based on these details to increase customer loyalty. This strategy worked very well, Zuohua described that existing customers already have a certain level of knowledge and trust in their business, which makes the communication with them highly efficient. On this basis, they designed and provided them with more targeted services, which further enhanced customer loyalty and ensured a stable cash flow.

Kehao conducted a similar strategy to reduce the impacts of COVID-19 and expressed, "We changed our business aim from market expansion to customer maintain in these few years". In his opinion, aggressive development strategies may not be appropriate in the current market environment. Compared to the period before COVID-19, their customer acquisition costs have increased significantly. As a result of reduced market demand, they had to devote more time, effort and money to attract the attention of new customers. However, despite the amount of money they spent on promotions, the company's performance did not improve dramatically. Kehao sighed, "As an SME, our limited market influences and capabilities are not enough to support us to swim against the tide in an overall chilly market". After realising this, he changed the business's strategy to maintain and strengthen relationships with existing clients. He explained, "While I had no method of attracting new clients for the company, I could go about retaining existing customers and encouraging them to make subsequent purchases". For Kehao, this strategy may not help his company achieve significant revenue growth, but it could help in maintaining a relatively stable cash flow through the most difficult times.

Haijun also stressed the importance of maintaining existing clients and described the difficulties of marketing he faced during COVID-19. He expressed that introducing the product is an essential step when attracting new clients. Before COVID-19 exploded, they always had the opportunity to present or demonstrate their software products to their potential customers face-to-face. In that way, they could directly show their customers the advantages of the products and answer their questions in the first instance. However, the outbreak of the pandemic limited travelling and hence, making business trip became a difficult task. Haijun expressed, "Our clients are located in different areas in China, due to COVID-19, and sometimes we are unable to meet them face to face". To fix this problem, he tried to communicate with their potential clients online, however, the results did not meet expectations. He confessed, "Many of our clients are not comfortable with video meetings or online callings. In fact, there is almost no way we could achieve cooperation simply by communicating online". In this situation, they weren't many choices other than to maintain their existing clients. Fortunately, they had a number of existing clients who are willing to trust them and continue to work with them. "These loyal clients are the root of our company", Haijun said proudly, "This experience has reinforced my belief that maintaining existing customers is vital to the business. With their support, the company can withstand many setbacks, such as this pandemic".

The overall analysis showed that due to the characteristics and nature of business structure, there is a certain level of flexibility with the operation of high-tech software SMEs. So, despite the lockdowns from the pandemic, these SMEs in this study managed to maintain their basic operation by using some online working platform and tools. In addition, most of the employees in these companies had the advantage of having the skills and knowledge of software and internet technology, which allowed them to adapt seamlessly to an online working model. Therefore, most participants in the interviews did not identify any particular challenges with

working remotely or having shortages of labour or skills. For them, the most significant challenge from COVID-19 was the unpredictable changes in the market environment. The outbreak of COVID-19 highly impacted the income of their key consumers. In such difficult situations, many resorted to changing their spending habits by giving up or limiting unnecessary expenses leading to a significant change in market demands for certain products and services. For Chinese high-tech software SMEs, this situation is undoubtedly a significant setback, which highly impacted their stable cash flow and increased their financial pressure. The long-lasting impacts of COVID-19 further increased market uncertainties. Many participants stated how the pandemic has made the market volatile and unpredictable, shaking some of their confidence with growth and making decisions.

To address some of the risks, founder-entrepreneurs in this study utilized a range of strategies such as adjusting their development plans, maintaining existing clients, cutting selected ongoing projects to reduce operation costs. Similar to some of the articles discussed in the literature review, many SMEs in this study realized new opportunities brought in by COVID-19. Many used these opportunities to explore new projects so as to increase profit and revenue. The outbreak also forced people to work remotely and adopt new innovative approaches. For software SMEs, such changes in consumer lifestyles have brought in new market potential, and this could be a positive aspect for the long-term development of Chinese high-tech software SMEs. Another strategy discussed in the literature review was the strengthening of the relationship with existing clients and this is something a lot of the participants in this study too emphasized upon. During the pandemic, many realized the importance of loyal clients and how their support could help during the most difficult phase of business operation. Similar to the literature, the SMEs in this study did not have any dedicated structure or team for risk management and it was mostly the founder-entrepreneur who made all the key decisions on risks. Although entrepreneurs have taken a range of measures to address the challenges and risks from the pandemic, it must be noted that the risk tolerance of SMEs is still limited by their size and resources. Hence, there is a need for further support from the government to help such small businesses so as to mitigate the negative effects of the pandemic. Now with the availability of vaccines, many countries such as the UK have slowly started to lift restrictions (GOV.UK, 2022). However, the attitude and strategies of the Chinese government to prevent COVID-19 is very different. Unlike other countries, the Chinese government is determined to keep the number of confirmed cases to a very low level, and this policy is called 'Dynamic Zeroing' (GOV.CN, 2022). But with the recent relaxation of preventative measures by other countries, the pressure on the Chinese government is also increasing (Vasiev et al., 2020). Ding and Zhang (2022) noted that the long-term strict prevention strategies can cause social exhaustion among public and impact the economy. They suggested that the Chinese government should find a way to balance the wellbeing of the public and businesses and the need of having measures in place as a country to control the pandemic. Otherwise, the unpredictable and prolonged quarantine will greatly affect people's lives and work rhythms and the overall development prospects for businesses.

## 5. Conclusions

COVID-19 is a major global health crisis affecting the progress and development of businesses in various sectors all over the world. The Chinese government has implemented a series of policies which have been effective in limiting the spread of the virus, but these have also added tremendous pressure on the Chinese economy. For SMEs, the overall unstable, unpredictable and negative market environment due to COVID-19 is a major setback, which greatly affects their normal development and even threatens their survival. And in such a crisis-ridden environment, the judgement and decisions of the founder-entrepreneur can significantly determine the success or failure of an SME. Due to their important role in SMEs, founder-entrepreneurs tend to have an active role in market analysis and decision-making and are generally responsible for developing risk strategies.

This paper presented the case studies of 9 successful Chinese high-tech software SMEs to explore the market challenges that they faced during COVID-19 and the strategies they adopted to reduce the negative impacts and sustain growth. The analysis showed that the companies didn't have any dedicated team or department to look after risks and it was mainly the responsibility of the founder-entrepreneur. All the SMEs in this study faced some degree of decline with market demand due to the pandemic. In addition, the increasing market uncertainty also shook founder-entrepreneurs' confidence in the subsequent growth and expansion of their business. In response to these challenges, founder-entrepreneurs have taken a series of measures. For instance, some of them adjusted the development plan to match the changing market environment. At the same time, they are aware of the difficulty with attracting new customers in the current market conditions and hence, decided to turn their attention to the maintenance of existing customers and the cultivation of customer loyalty.

Since 2020, COVID-19 has continued to cause serious economic damage worldwide. With the development of a vaccine and national efforts to prevent and control the pandemic, more and more countries are now gradually coming back to some form of 'normality'. However, in China, due to the dynamic zero COVID policy of the government, strict measures has continued to be in place. For founder-entrepreneurs of Chinese SMEs, how to face the challenges of the post-COVID-19 period is an important question which needs to be considered. This

paper listed some market challenges faced by the Chinese high-tech software SMEs during the pandemic and introduced the strategies they implemented to reduce losses. It makes an important contribution to the growing literature on Chinese SMEs, and COVID-19. The findings can help other businesses to understand how to manage COVID-19 related risks and facilitate their development. It can also help policy makers in finding ways to help support small businesses in such complex environment. This paper is based on an ongoing PhD project and the researcher in follow-up studies will explore the connections between a company's successful risk management to the personal characteristics of the founder-entrepreneur, such as personality traits and risk attitudes. It will also analyse the influences of the COVID-19 outbreak on the founder-entrepreneurs risk attitude, decision-making and management style.

## Acknowledgements

I would like to express my gratitude to my academic supervisors, [Dr Bidyut Baruah](#) and [Prof Tony Ward](#) for their support throughout my PhD, and for giving me valuable feedback and guidance.

I would like to thank all the founder-entrepreneurs who participated in this study. I appreciate their willingness to take time out of their busy schedules to participate in my research and for sharing their experiences and insights despite all the challenges of Covid-19.

I would also like to thank the Program Committee of the [BEE conference](#) who recommended my paper for publication in this journal and the reviewers for their useful feedback.

Finally, I would like to express my gratitude to my mother, who has always supported me and encouraged me even in her most difficult times. I hope my work makes you proud, Mom.

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