The Impact of the COVID-19 Pandemic on Firms: A survey in Guangdong Province, China

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Research

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Abstract

Background: The COVID-19 pandemic has affected all sectors of the economy and society. To understand the impact of the pandemic on firms in China and suggest responding public policies, we investigated firms in Guangdong Province (a Province with the highest Gross Domestic Product in China).

Methods: The survey sample included 524 firms in 15 cities in Guangdong Province. We chose these firms from list published by the government, considering the industrial characteristics of Guangdong province and firm size. The questionnaire comprised of four categories and included 17 questions was developed based on previous studies carried out by OECD. The executives of firms were contacted by phone or WeChat, and were invited to answer self-administered questionnaires through an on-line survey platform. The data was analyzed by SPSS.

Results: The following findings are worth to be noticed: (1) 48.7% of firms maintained stability, and 35.1% of the firms experienced a halt in operation or faced closure; (2) Nearly 70%-90% of the firms are or are willing to transform to online marketing, remote office work, and digital operations. (3) 46% of firms believe that there will be a certain loss this year, and 83.5% expected a decreasing trend of the city's GDP growth.

Conclusions: firms in Guangdong Province have faced great challenges in the epidemic. The firms’ production and operation activities are limited, and risks are faced. It is necessary to effectively implement supporting policies to profoundly lower production costs for firms, and help firms survive the difficult period, and even gradually transit to normal business operation status.

Background

The current COVID-19 is a rapidly evolving global challenge and like any pandemic, it weakens health systems, costs lives, and also poses great risks to the global economy and security [1, 2, 3, 4]. According to the data from WHO (World Health Organization) and Johns Hopkins University, till the middle of June 2020, the global COVID-19 pandemic has confirmed more than 7.5 million cases, causing nearly 420 thousand deaths in around 215 countries (https://www.arcgis.com/apps/opsdashboard/index.html). COVID-19 pandemic is a public health emergency. It’s a sudden outbreak that causes or is likely to cause serious public health damages including major infectious diseases, mass unexplained diseases, major food and occupational poisonings or other serious public health issues [5]. Global economic growth is expected to decrease continually on account of the epidemic impact throughout the world [6, 7]. According to the Organization for Economic Co-operation and Development (OECD)’s forecast, the global GDP (Gross Domestic Product) growth rate will drop to 2.4% in 2020 [3]. The current continuous worldwide spread of COVID-19 has greatly increased the risk of uncertainty and global recession [8, 9][1]. Supply chain disruption, shrinking demand for consumption and investment, significant weakening of economic activities, and damaged market confidence have put more severe tests on the resilience of relevant economies, the level of governance, and the effectiveness of international cooperation.
The impact of the epidemic on China's economy is significant [10, 11, 12, 13, 14]. For the two months of 2020, China's added value above designated Size, investment, and consumption fell by 13.5%, 24.5%, and 20.5% year-on-year, and the unemployment rate reached 6.2%, for the first quarter of 2020, China's GDP growth rate fell by 6.8%, according to the data released by the National Bureau of Statistics of China on April 17 [15].

As the basic unit of the national economy, the operation of firms is related to the development of national macro-economy. Therefore, it is necessary to understand the status of firms, coping strategies, and the need for government policies under the impact of the COVID-19 pandemic. Recent literature has begun to analyze firms' crisis response strategies, such as firms' marketing innovation strategies and strategic responses to crisis during the pandemic. [16, 17, 18] In addition, some specific industries are also analyzed to give more targeted countermeasures for the pandemic. [19] However, the conclusions of these studies have not been empirically tested.

In this context, in order to explore the impact of the COVID-19 pandemic on firms in China and to suggest the responding public policies, we investigated firms in Guangdong Province (the Province with the highest Gross Domestic Product in China). The purpose of this research was to discuss 1) what the pandemic impact on firms, 2) how they respond to this pandemic, 3) and what are the firms' expectations. Some implementing and supporting policies are recommended.

[1] The International Monetary Fund (IMF) broadly defined the global economic growth rate to fall below 2.5% per year as a global recession.

**Methods**

2.1. Study Setting and Design

The research protocol was approved by the Institutional Review Committee School of Management, Harbin Institute of Technology, with the approval number 2020-01. A survey was designed to be carried out in Guangdong Province.

The minimum sample size was calculated based on the formula below:

See formula 1 in the supplementary files.

where $E = 0.05$ (margin of error); $z = 1.96$ (confidence level); and $\sigma = 0.5$.

Based on the above parameters, the estimated minimum sample size was 384. However, in order to improve the reliability of the data, the sample was enlarged to more than 500. The survey sample included 524 firms distributing in 15 cities including Guangzhou, Shenzhen, Dongguan, and Foshan, etc. (there are 21 cities in Guangdong Province and the GDP of the 15 cities are more than 90% of the total GDP of Guangdong Province). And we chose these firms from a firm list published by the government, considering the industrial characteristics of Guangdong province and firm size.
2.2 Questionnaire development

The questionnaire was developed based on previous studies carried out by OECD in China [11]. It was piloted among 10 CEOs (Chief Executive Officer) and firm owners. The questionnaire was further revised based on their feedback and further advice from two senior experts [20]. The final questionnaire was comprised of four categories and included 17 questions following four categories: (1) demographic characteristics (3 questions); (2) the impact of the pandemic on firms (6 questions); (3) firms action (5 questions); and (4) firm perception (3 questions) (Appendix 1)

2.3 Data Collection

The survey was carried out from 10 March 2020 to 25 March 2020. Three research investigators contacted the executives of firms through phone or WeChat, and invited them to answer the self-administered questionnaires on “WJX”, an online survey platform (https://www.wjx.cn/). Participation in the survey was fully voluntary and written consent was obtained from each participant. The objectives of the study, confidentiality of individual information, and other ethical considerations mentioned in the survey guidelines were explained to the participants prior to data collection. They were asked to answer as many of the questions as they could. However, if they were not sure about the answer, they could simply leave it blank. Altogether, 553 anonymous questionnaires were collected.

2.4. Data Processing and Analysis

The data was entered into Excel for data documentation. SPSS (Statistical Product and Service Solutions) was applied to further analyze the data. 29 participants were excluded from the sample because they repeated the answers, answered less than 70%, and some key questions. Descriptive statistics of demographic characteristics of the sample and each item of questions were employed to summarize the data.

2.5. Demographic Characteristics of the Sample

The effective response rate of the sample was 94.8% (524/553). The industries in the effective response investigation mainly concentrate on IT Internet (18%), manufacturing (34.6%), finance (12.4%), real estate (6.7%), and service and commercial industry (23.7%). Other industries account for 4.8%. The distribution conforms to the Guangdong's industrial characteristics. The scale distribution of the surveyed firms is relatively balanced, among which 141 firms accounting for 26.9% have 50 employees or fewer, 162 firms accounting for 30.1% have employees between 50 and 500, 129 firms accounting for 24.4% have 501-5000 employees, and 92 firms, accounting for 17.6%, have 5000 employees or more. Table 1 shows the detailed demographic characteristics of the firms by number and percentage, including industry, size, and the firms’ location.

Results

3.1 The impact of the pandemic on firms
Our results indicated that half of the firms maintained overall stability. Most of them have maintained their operations, but there have still been relative high mount of the firms experienced a halt in operation or faced closure due to various reasons such as marital shortage and market sock (Q1 and Q2).

Firms are under at least one of the major operation pressures of employees' salary and insurances, rent pressure, loss of order, payment of accounts payable, and loan repayment (Q3). For firms with fewer than 50 employees, they face higher rent pressures.

Most firms barely maintained production, facing a shortage of material or even out of supply (Q4). By additional interviews, we find that 22.9% of firms encountered cancellation the of orders from domestic customers. 63.9% of the firms that reported business halt were due to cancellation of orders or delayed receipt of goods by overseas customers.

The statistics description of the above is as Figure 1.

Note: The details of the options can be seen in Appendix 1

3.2 The responding action of firms

Firms have recognized the problems in their own development and have devoted more efforts to R&D (Research and Development) and innovation. However, the epidemic would delay the launch of new products, and the progress of projects in cooperation with other institutions, especially for the IT industry (Q7). Many firms have faced high labor costs, which force them to consider reducing the number of employees, cutting employee wages, and postponing recruitment in order to live through the pandemic (Q5, Q6 and Q8). Manufacturing has been facing a higher proportion of employment difficulties and the real estate industry has been shedding more jobs. They have also searched for financial tools such as loan and funding from shareholders (Q8).

High percentage of firms are or are willing to transform into online marketing (Q9). Similar findings can be observed among the firms which are or are willing to transform to remote office work and digital operations (Q10 and Q11).

The statistical description of the above is as Figure 2 and Figure 3.

Note: The details of the options can be seen in Appendix 1

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3.3 The expectations of firms

A high percentage of firms believe that they will experience financial losses this year, while fewer firms think they would be able to make profits (Q13). However, firms with more than 1,000 employees are in relatively good survival condition, and some firms believe that they can make certain profits and have sufficient cash flows.

Among respondents, the firms expecting a decreasing trend of the city's GDP growth are much more than those believing that GDP will remain unchanged or those anticipating that GDP will increase (Q14).

Special attention needs to be paid to Q12. Most firms need government reduce, exempt, or postpone the social insurance, value-added tax, income tax and other taxes. More than half of the firms expect that consumption is stimulated. They also need subsidies for rent, utilities, and post stabilization etc. some firms expect to make a staged flexible salary. Smaller firms need more cash subsidies, while larger firms tend to get policies of extending loan repayment terms and debt forgiveness.

Note: The details of the options can be seen in Appendix 1

Discussion

Most researches about public health emergencies have focused on changes in overall consumption trends. By reviewing public health emergencies in the past 20 years, some major research perspectives were found, such as consumption trends, consumption behavior, changes in consumer decision-making and consumer psychology and so on[21,22,23,24]. These researches confirm that the pandemic reduces economic activity and employment and inhibits consumption, which consists with our findings on the impact of the COVID-19 pandemic. However, the above researches only analyzed the changes in overall consumption trend, while our research object is the firms themselves, which can reflect the impact of the COVID-19 pandemic on economic activities more comprehensively.

4.1 The impact of the pandemic on firms

Affected by the pandemic, returning to work is not equal to reaching production capacity, almost half of the firms were facing material shortages, some of them even said that they are out of supply (as Q1 and
Q2 show). For the pressure shown in Q3, firms were facing employment and settlement costs. In addition, 22.9% of firms encountered cancellation of orders from domestic customers. Many firms showed that the market expansion was also affected, due to the impossibility of site visiting and face to face interviews to customers.

Moreover, more than half of the firms reported that a sharp increase in operating costs as the cancellation of orders, delayed delivery and production stagnation. Some of them encountered the situation of insolvency and compensation for breach of contract. Firms are under the pressure of employees’ salary, five insurances and one fund, rent pressure, and payment of accounts payable and loan repayment.

As Q4 indicates, the business owners in the interviews reported that supply chain links - the producing and processing of raw material parts, and logistics etc. were affected by the epidemic situation in various regions, with different degrees of delay in delivery and work stoppages to wait for the material. The spread of foreign epidemic has affected many export businesses. Firms reported cancellation of orders or delayed receipt of goods by overseas customers.

4.2 The responding action of firms

According to Q5, Q6 and Q8, the epidemic has also negatively impacted the technological innovation and human resources in some firms. For example, the epidemic would delay the launch of new products, recruitment, and the progress of projects in cooperation with other institutions.

According to Q7, the combination of this pandemic and the impact of the Sino US trade dispute prompted some firms to recognize the problems in their own development and to devote more efforts to R & D and innovation.

Q9 and Q10 indicate that, more than half of the firms believe that this pandemic has promoted the establishment of remote office, recruitment, and business negotiation models, and the informatization and digitalization of firms have improved their ability to respond to major crises. Few firms also mentioned that the epidemic can eliminate competitors to a certain extent, promote the launch of new businesses, and accelerate marketing changes (such as community channel expansion). For example, the core business of clothing brand PeaceBird was offline retailing in large shopping malls. During the crisis, they transferred employees from offline stores to online marketing teams, successfully completed the channel transformation and survived the crisis by using livestreaming and social media platforms.

The epidemic strengthens the determination of some firms to turn crises into opportunities and invest in new industries. It has strengthened consumers’ health awareness and changed their consumption habits [26, 27, 28]. In the interview, some entrepreneurs expressed that this trend has brought new business opportunities and driving forces for marketing reform. It is necessary to accelerate the development of online education, medical care, 5G, and other industries.
Some firms have changed the original store-based marketing mode and integrated channels for interactive marketing. For example, the store is not open, but the salesmen are doing live broadcasts, group buying and social marketing, to name a few.

4.3 The expectations of firms

"Rebound consumption will come" is the hope of some people for market recovery after this pandemic, but the result of this investigation indicates the pessimistic consequence. Consumption is mainly determined by the ability to pay and demand [29]. The ability to pay depends on the consumer's current income and expectations of future income [30]. Since the epidemic has continued, almost half firms believe that there will be a certain loss this year.

As Q13 presents, nearly half of firms predict their losses in this year, directly affect their employees' income and even work opportunities. More than 20% of firms have reduced the number of staff to cope with the epidemic, resulting in higher labor costs.

As Q14 presents, respondents are also not optimistic about the GDP growth of the city where the firm is located. Among them, 83.5% expected a decreasing trend of the city's GDP growth, and 38.6% predicted a significant decline. In contrary, only a few respondents believed that GDP would remain unchanged or anticipated that GDP will increase. Therefore, there is insufficient support for consumption rebound from the perspective of income expectations.

From the perspective of demand, the Spring Festival, a period during this pandemic, is an important scene to stimulate consumption [31], but this scene is very time-sensitive and cannot be reproduced throughout the year [32]. In the long run, the epidemic will reduce people's willingness to consume in addition to necessities and immediate needs. In the near term, people's consumer psychology has not fully returned to normal [33], and it takes a process to establish a resumption of work mode that is compatible with epidemic prevention and control. Therefore, the endogenous power of compensatory and rebound consumption is insufficient.

4.4 Policy implications

Considering the firms' appeal and their situation, both financial policies as follows to help firms survive and implement to stimulate consumption are necessary.

(1) Financial policies supporting production and operation. Firms look forward to public policies and measures such as "exemption, reduction, postponement, return and compensation", in order to profoundly lower production costs for firms, and help firms survive the difficult period of production and operation, even gradually transit to normal business operation status.

(2) Investment driving consumption. On the premise of doing well in epidemic prevention and control, expanding investment should play a driving role in promoting consumption. Investment in fields as
public health facilities and health care should be increased to cultivate and expand relevant consumer demands.

(3) Measures facilitating consumption. Moreover, the supportive role of policies in promoting consumption should be enlarged. Issue policy measures to further promote consumption. Plan to launch a series of holiday tourism products and implement a paid vacation system. Continue to enlarge the holiday economy and the night economy.

(4) Effective role of industry organizations. In addition, industry organizations should play a leading role in promoting consumption. Release suppressed and frozen consumption by: carrying out various activities such as shopping festivals and food festivals to stimulate consumption; and actively create a good environment for promoting online to offline integrated consumption through preferential concessions, model innovation, policy stimulation, cooperation between banks and firms, strengthening services, and product innovation, etc.

4.5 Limitation of this study

Our study has several limitations that provide opportunities for future research. First, this study can only be viewed as a preliminary study and more follow-up tracing investigations at different stages need to be conducted in order to observe the continuing impact of the pandemic and the effectiveness of public policies and firms’ responses. Second, this study focuses on China which first recovers from the pandemic, more surveys should be implemented in other countries to explore different impact of COVID-19 among various cultural, social and governing systems. The cross-sector analysis is also needed in order to get more specific suggestions for different industries in different regions.

Conclusion

The research gets some findings. As many firms maintained overall stability, some firms experienced a halt in operation or faced closure. Almost all the firms are willing to transform into online marketing, remote office work and digital operations. Half of the firms believe that there will be a certain loss this year, and a very high percentage of firms expected a decreasing trend of the city's GDP growth.

There is a need to fully understand the impact of the epidemic on consumption and the difficulty of promoting the recovery of consumption, also to be aware that also all industries are greatly affected by this pandemic. It is necessary to effectively implement supporting policies to profoundly lower production costs for firms, and help firms survive the difficult period, even gradually transit to normal business operation status.

Declarations

Ethics approval and consent to participate
The research protocol was approved by the Institutional Review Committee School of Management, Harbin Institute of Technology, with the approval number 2020-01.

Consent for publication

Not applicable.

Availability of data and material

Please contact author for data requests.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

PZ conceived of the study and drafted the manuscript. DH performed the statistical analysis and helped to draft the manuscript. ML conceived of the study and participated in its design and coordination. All authors read and approved the final manuscript.

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Not applicable.

**Abbreviations**

OECD (Organization for Economic Co-operation and Development)

GDP (Gross Domestic Product)

WHO (World Health Organization)

IMF (World Health Organization)

CEO (Chief Executive Officer)

SPSS (Statistical Product and Service Solutions)

R&D (Research and Development)
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Table

Table 1: Statistic characteristic description of sample
| Industry of Firms | Sub-industry of Firms | Number of Firms | Percentage |
|------------------|-----------------------|----------------|------------|
| IT               | / Software and hardware services / E-commerce / Internet operations | 94             | 17.94%     |
| Manufacture      | Main Manufacture      | 88             | 16.79%     |
|                  | Electronic technology / Semiconductor / Integrated circuit | 14             | 2.67%      |
|                  | Clothing / Textile / Leather | 7              | 1.34%      |
|                  | Aerospace / Aviation / Energy / Chemical | 10             | 1.91%      |
|                  | Machinery / equipment / Heavy industry | 10             | 1.91%      |
|                  | Electric appliance industry | 5              | 0.95%      |
|                  | Furniture / Crafts / Toys | 6              | 1.15%      |
|                  | FMCG (food / beverage / cosmetics) | 12             | 2.29%      |
|                  | Automobile and spare parts | 9              | 1.72%      |
|                  | Medical / Nursing / Health / Sanitation | 8              | 1.53%      |
|                  | Instrumentation / Industrial Automation | 5              | 0.95%      |
|                  | Pharmaceutical / Bioengineering / Medical Equipment / Apparatus | 15             | 2.86%      |
|                  | 181                   |                | 34.6%      |
| Service and Commercial | Publishing / Printing / Packaging | 5              | 0.95%      |
|                  | Advertising / PR / Media / Art | 4              | 0.76%      |
|                  | Law                   | 1              | 0.19%      |
|                  | Accounting / Auditing | 1              | 0.19%      |
|                  | Traffic / Transportation / Logistics | 11             | 2.10%      |
|                  | Education / Training / Scientific research / College | 15             | 2.86%      |
|                  | Trading / Import & Export | 13             | 2.48%      |
|                  | Wholesale / Retail Communication / Telecommunications | 13             | 2.48%      |
|                  | 21                    |                | 4.01%      |
| Industry                      | Employees number of Firms | Percentage |
|-------------------------------|---------------------------|------------|
| Real estate and Architecture  | 35                        | 6.68%      |
| Finance                       | 65                        | 12.40%     |
| Other industry                | 25                        | 4.77%      |
| Total                         | 524                       | 100%       |

| Employees number of Firms | Percentage |
|---------------------------|------------|
| 50 and below              | 141        | 26.91%    |
| 51-100                    | 54         | 10.31%    |
| 101-300                   | 71         | 13.55%    |
| 301-500                   | 37         | 7.06%     |
| 501-1000                  | 42         | 8.02%     |
| 1001-4999                 | 87         | 16.60%    |
| 5000 and above            | 92         | 17.56%    |
| Total                     | 524        | 100%       |

**Appendix**

**Appendix 1: questionnaire**

Investigation on firms affected by the COVID-19 Pandemic

What extend does the production and operation of your firms affected by this pandemic? (One choice)

| Options                                                                 |
|-------------------------------------------------------------------------|
| Serious impact, leading to serious difficulties in business operation and bankruptcy |
| Great impact, leading to difficulties in operation barely maintained       |
| Small impact, leading some difficulties in business operation, but the overall operation remains stable |
| No significant impact                                                     |
| Positive impact, providing a new opportunity for firm development         |
are the reasons for the suspension of production and operation of your firm? (Multiple choice, up to 2 items)

| Options |
|---------|
| A. Shortage of production marital. |
| B. Difficult market development |
| C. Impact of responding measures for the pandemic |

are the main operating pressures your firm is currently facing? (Multiple choice, up to 3)

| Options |
|---------|
| A. Employee salary, five insurances and one fund |
| B. Rent, Houses, Equipment |
| C. Repayment of loans |
| D. Payment of accounts payable |
| E. Cancellation of orders |

4. How is the supply of raw materials, spare parts and other production and operation materials in your firm? (Single choice)

| Options |
|---------|
| A. Total disruption of supply |
| B. Supply shortage |
| C. Supply barely maintains production |
| D. Satisfied supply |
| E. Insufficient supply |

5. Does your company plan to reduce or increase the number of employees? (Single choice)
6. How does the pandemic affect your company's recruitment? (Multiple choice, up to 3 items)

Options

A. Increase in labor costs
B. Unable to find a suitable recruitment channel
C. Postpone or cancel the existing recruitment plan
D. Online recruitment.

is the obvious impact of the pandemic on your firm's technological innovation? (Multiple choice, up to 3 items)

Options

A. R&D process may affect the launching process of new product.
B. Unable to recruit suitable R&D personnel.
C. Unable to cooperate with other departments to carry out part of R & D work
D. Determine to invest more in technological innovation after being better aware of the firm’s self-development problems in the pandemic

8. How are you currently or planning to cope with the cash flow shortage? (Multiple choice)
9. Are you willing to transform to online marketing?

Options

- Very unwilling
- Unwilling
- Modest willing
- Willing
- Very willing

10. What self-help measures have your firm taken so far? [Multiple choice]

Options

- Apply for financing
- Increase online operations
- Cut pay and jobs.
- Remote office (digital office)

is the positive impact of the pandemic in your view? [Multiple choice, up to 3 items]

Options

1. Promote the establishment of remote office work mode
2. Promote to enhance information and digital construction of firms
3. Help to better realize their own shortcomings and solve existing problems
other policies do you expect the government will put in to place to help your firm overcome difficulties? Multiple choice, up to 4 items

Options

- Reduce, exempt or postpone the value-added tax, income tax, insurance premium and other taxes in stages
- Stimulate consumption
- Allow firms to implement a staged flexible salary method
- Provide subsidies for rent, utilities, and post stabilization etc.

What extend do you expect this pandemic will affect your firm's development in the first quarter of 2020? Single choice

Options

A. Certain profits
B. Balance of income and expenditure
C. Certain losses
D. Serious losses
E. Bankruptcy

14. What is your judgment on the city's economic (GDP) growth in the first quarter of this year?

Options

- Reduce significantly
- Reduce slightly
- Unchanged
- Increase slightly
- Increase significantly

15. What is the city where your firm is located?
16. What industry does your firm belong to?
| Options                                                                 |
|------------------------------------------------------------------------|
| IT / Software and hardware services / E-commerce / Internet operations |
| Catering / Entertainment / Tourism / Hotel / Life service              |
| Publishing / Printing / Packaging                                      |
| Electronic technology / Semiconductor / Integrated circuit             |
| Law                                                                    |
| Real estate development / Architectural engineering / Decoration / Design |
| Clothing / Textile / Leather                                           |
| Advertising / PR / Media / Art                                         |
| Aerospace / Aviation / Energy / Chemical                              |
| Accounting / Auditing                                                 |
| Machinery / equipment / Heavy industry                                |
| Home appliance industry                                               |
| Furniture / Crafts / Toys                                             |
| Traffic / Transportation / Logistics                                  |
| Education / Training / Scientific research / College                  |
| FMCG (food / beverage / cosmetics)                                    |
| Trading / Import & Export                                             |
| Agriculture / Fishery / Forestry                                      |
| Wholesale / Retail                                                    |
| Other industry                                                        |
| Automobile and spare parts                                            |
| Communication / Telecommunications operations / Network equipment     |
| Property Management / Commercial Center                                |
| Medical / Nursing / Health / Sanitation                                |
| Instrumentation / Industrial Automation                               |
| Bank / Insurance / Securities / Investment Bank / Risk Fund           |
| Pharmaceutical / Bioengineering / Medical Equipment / Apparatus       |
| Manufacture                                                           |
17. What is the number of employees in your company?

| Options          |
|------------------|
| 50 and below     |
| 51-100           |
| 101-300          |
| 301-500          |
| 501-1000         |
| 1001-4999        |
| 5000 and above   |

**Figures**

**Figure 1**

The statistics description of the Q1–Q4
Figure 2

The statistics description of the Q5-Q8
Figure 3

The statistics description of the Q9-Q11
Figure 4

The statistics description of the Q12–Q14

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- formula.docx