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Data-driven gripper market analysis with a geographical focus on Italy

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Sommario

L'elaborato di tesi verte su un'analisi di mercato relativa al settore dei gripper, cercando di comprendere le dinamiche e sviluppi nel breve periodo per valutare la possibilità di entrata nel settore da parte di una nuova azienda. L'analisi inizia dalla raccolta di informazioni sulle aziende già presenti sul mercato per capire cosa ogni azienda offrisse in termine di prodotti e servizi e quali fossero le loro caratteristiche. Dopo la fase di raccolta dati, per le aziende italiane, si è proseguito con una fase di clusterizzazione delle aziende identificate per poi continuare, per i cluster ritenuti rilevanti, con un'analisi approfondita del micro-settore individuato tramite il framework delle cinque forze di Porter. Infine, nonostante la posizione non classica, è stata eseguita l'analisi Pestle. Al termine dell'elaborato vengono riportate le conclusioni riguardanti il quesito posto inizialmente.

Abstract

The thesis work focuses on a market analysis relating to the gripper sector, trying to understand the dynamics and developments in the short term to evaluate the possibility of a new company entering the sector. The analysis begins with the collection of information on companies already on the market to understand what each company offered in terms of products and services and what their characteristics were. After the data collection phase, for the Italian companies, a phase of clustering of the identified companies continued and then continued, for the clusters considered relevant, with an in-depth analysis of the micro-sector identified through the framework of the five forces of Porter. At the end of the paper, the conclusions regarding the question initially posed are reported.

1. Introduction

The trend of digitalization and industry 4.0 has pushed many companies to transform. Industrial robots have become a fundamental component within any company. Closely related to industrial robots, there are grippers, that is the terminals of robots that manipulate the object in question.

Grippers, also called end effectors, are the terminal part of industrial robots and their task is to manipulate the object in question.

In recent years the use of grippers has also extended to sectors where their use might seem not possible such as agriculture and food & beverage.

As regards the market, an important premise to make is that the robot industry and the gripper industry are two different businesses. Robot manufacturing companies do not design and manufacture grippers and vice versa.

The gripper market and their development is growing thanks to the simultaneous growth of the robot market, they are highly dependent on each other.

Nowadays the leading companies globally are *Schunk, SMC, Festo, Destaco, Gimatic, PHD, Camozzi Automation* and *IPR,* but there are a fairly high number of small and medium-sized enterprises working also in design sector.

2. Methodology

Below there are the steps followed in the execution of the paper. Throughout the analysis, one of the goals was to use numerical and objective data to guide the analysis.

1. Starting from three of the most famous companies in the gripper market*: Festo AG & Co. KG, Schunk Gmbh & Co. KG* and *IPR - intelligente peripherien für roboter Gmbh*, I have identified their Ateco code via the Aida portal. The Ateco code is an alphanumeric combination that identifies an *"Attività Economica*", and allowed the identification of Italian companies operating in the sector.
2. Identification of companies operating in the sector from other countries through the use of other portals and specialized sites.
3. A first general analysis was made through the data of the companies present on their sites.

4. Due to the lack of data for non-Italian companies, from this step we will only deal with Italian companies. In this step, a series of rankings were performed to understand which were the leading companies and to understand how the market was divided between them.
5. Thanks to the data found and processed up to this point, through the use of the statistical software R-studio, the cluster analysis was performed which allowed us to identify clusters.
6. To some identified clusters, those considered interesting for the purpose of our analysis, the framework of Porter's five forces was applied.
7. The last step, despite being a macro-environmental analysis, was that of the Pestle analysis. This tool was the last to be used as all the data collected and processed were useful for its compilation.

3. Execution

3.1 Data collection

Based on the Ateco code of the companies *Festo AG & Co. KG, Schunk Gmbh & Co. KG* and *IPR - intelligent peripherien für roboter Gmbh*, over 8000 companies have been identified on the Aida range. To refine the search, three filters have been inserted:

- RAE code: 614: "wholesale of machinery, equipment and vehicles"
- legal status of the company: operating
- last year of finance statement: 2019

This has led to a substantial reduction in the number of companies. After an initial analysis of the list obtained, it was noted that within this there were a series of companies whose business was inferable from the name, for which another series of filters applied to the name was applied.

The Ateco code is an excellent search parameter but only for Italian companies or companies that have an office in Italy. So it was necessary to search for companies from other countries in another way.

From the article "2017 - A statistical review of industrial robotic grippers", it was seen as the nation with the largest number of companies operating in the sector was Germany. Therefore a search was performed only for that state.

Finally, non-Italian and non-German companies were identified through the directindustry.it website.

In the end of this part, the total number of companies is 88 divided into: 22 Italian companies, 30 German companies and the other 36 non-Italian and non-German companies.

3.2 Data analysis

Collecting the data from the sites of the previously identified companies, a first analysis was made of how the companies were structured, of the products and services offered, trying to identify their similarities and peculiarities.

Among the most interesting results, the one relating to the offer of grippers. None of the 88 companies offers more than 50% of the total gripper models identified. To this, however, it must be added that design companies are potentially able to offer any type of gripper.

3.3 Italian ranking

Due to the lack of data from European companies, from this point on, the analysis will only deal with Italian companies.

The economic-financial data obtained through the Aida portal were used in this phase to perform company rankings to understand how the market was subdivided.

To overcome the problem that companies do not only sell grippers and therefore it is not possible to have data concerning only that segment, a system of weights has been devised for each company and subsequently also a system of normalizers to try to make the data the as close as possible to the reality of the gripper sector. Finally, rankings were also created based on the number of gripper models and services offered by a company.

The various rankings obtained show a well-defined structure. The companies in the top five do not vary and the leading company in all rankings is *Gimatic*.

Again with the use of these data, the trend of the last four years was looked at, from 2016 to 2019. It was noted that for two consecutive years the market had an increase of about 10% per year while in the last available drop of about 7%.

3.4 Clustering

The cluster analysis phase is preceded by the analysis of the principal components, which helps us in the interpretation of the clusters obtained.
Three clusters have been identified from the cluster analysis:

- Cluster 1 is made up of small and medium-sized enterprises, some of which offer a good number of gripper models compared to the average. This group can be further analyzed to improve understanding of it.

- Cluster 2 is composed only of one company as it distinguishes itself from the others as it offers a wide range of grippers but at the same time is identifiable as a large company. Furthermore, in the year 2019, it has a negative profit, unique among those analyzed.

- Cluster 3 represents large companies that offer few gripper models compared to their offer and therefore are not very efficient in the gripper market.

Cluster 1, being the most populated and the one of greatest interest, was further subjected to a cluster analysis.
Within this, three other clusters were identified:

- The first sub-cluster was composed by the four design companies: *Sir, Rosbo, Mbl solutions, Evotech.*
- The second sub-cluster by the following four companies: *A.S.M., Vesta automation, Dal maschio, Air work.* These have very similar data, especially the first three.
- The third sub-cluster is made up of the remaining companies. Compared to the second sub-cluster, the average value of the "Gripper weight", "Ros" and "Roa"

column is higher. These are companies mainly aimed at the gripper market, which can also be seen from the average value of the "gripper models" column.

To try to confirm what has been done so far, others have been added to the data used. The analysis gave the usual division as output, confirming the goodness of cluster analysis

3.5 Porter's six force analysis

Porter's forces analysis aims to understand the competitive environment and the dynamics that govern it. In this analysis, in addition to the five classic forces, a sixth has been added: the complementors.

The other five forces are:

- Threat of new entrants
- Bargaining power of customer
- Bargaining power of suppliers
- Threat of substitutes product or services
- Intensity of rivalry evaluation

The analysis was done according to the following procedure:

- One of the previous cluster of companies was chosen from those identified
- Each force was broken down into sub-classes and for each of them, as far as possible, a driver was identified that would allow for an evaluation
- At this point, concerning the identified driver, information was sought, where possible in a numerical format, otherwise textual, always seeking objectivity
- Then the information was entered either for each company or the entire cluster, depending on the driver used
- Each sub-class was then assigned a weight concerning its importance in the sector of design companies. The sum of the weights for each sub-class must be 1

Also for each sub-class, an evaluation range from 0 to 3 has been identified, with different meanings depending on the sub-class. So, for example, the value 0 can take on both the meaning of "high" and "low" depending on the subclass.

Based on the numerical or textual values of each sub-class, an evaluation was given.

At this point, the value was calculated for each with the following formula:

$$F_i = (E_i/E_{max})\ x\ w_i$$

where E_i is the evaluation, E_{max} is the maximum evaluation and w_i is the weight.

For each force then the sum of the F_i is made, by doing so, the intensity of the force Fs_i is obtained.

The attractiveness of the sector is given by:

$$A_{sec} = m - \sum_{i=1}^{m} Fs_i$$

where m is the number of the force, in this case 6 and A_{sec} the attractiveness of the sector.

The analysis for the six forces follows the structure with three tables:

- the first table identifies a driver for each sub-class
- the second, to each sub-class-driver pair, where possible the corresponding value for each company, otherwise a textual value that explains the sub-class-driver pair. It is possible that both are present
- the third, for each sub-class-driver pair a weight, an evaluation, a range, and finally the evaluation is given using the formula previously described

Porter's force analysis was applied to both the cluster of design companies and catalog sales companies.

The outputs of this analysis were the graphs in Figure 1, Figure 2 and Figure 3.

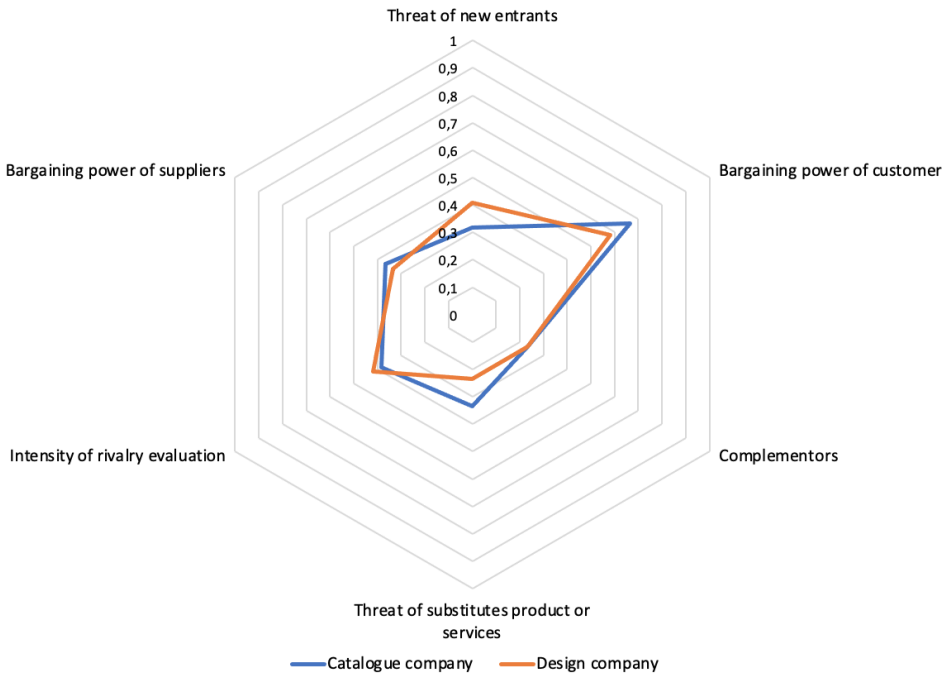

Figure 1: Polar graph, comparison between catalogue and design company

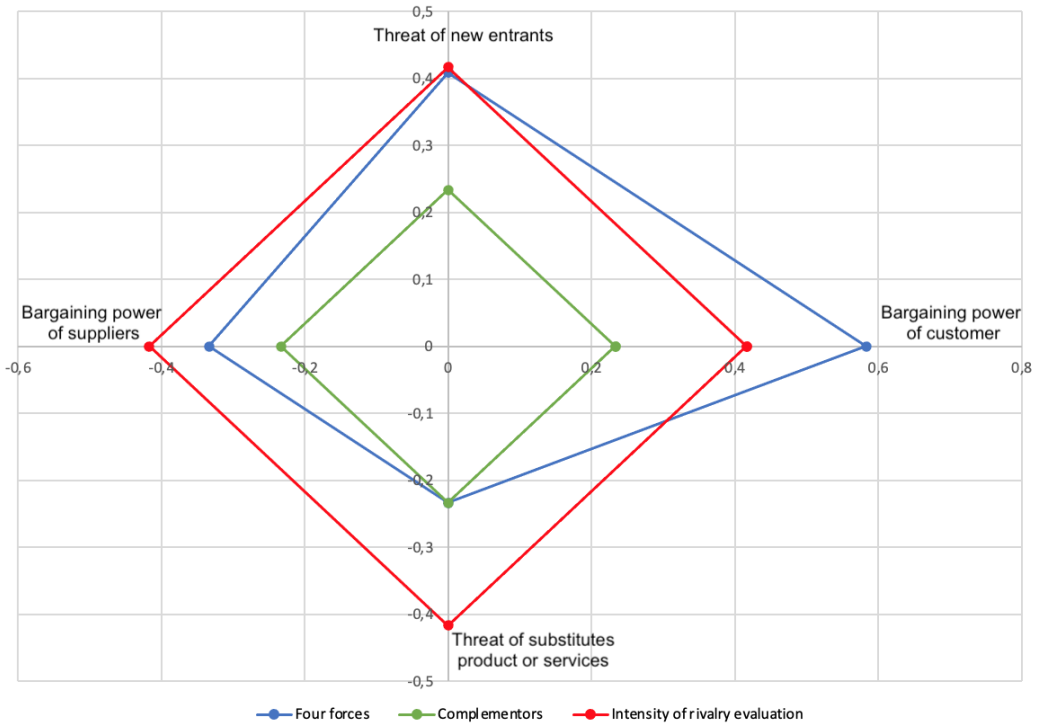

Figure 2: Relationship between six forces, design company

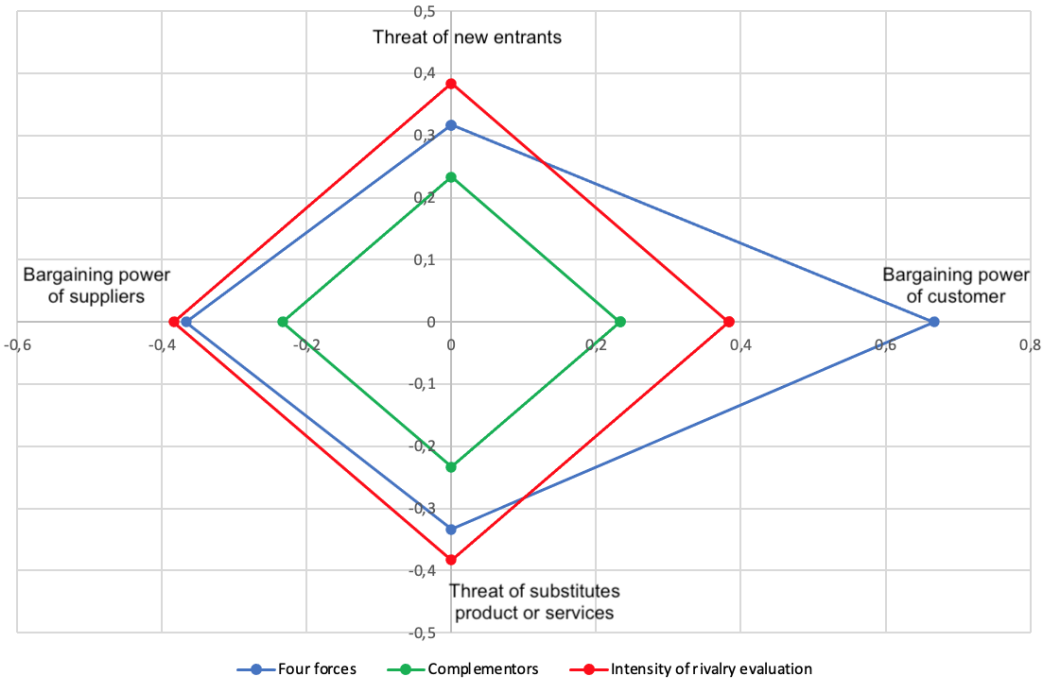

Figure 3: Relationship between six forces, catalogue company

These three graphs have allowed a better understanding of the dynamics of the sector and the two individual sub-sectors, also giving inspiration to any short-medium term developments.

3.6 Pestle analysis

These factors, in addition to allowing a correct understanding of the competitive environment, can identify opportunities or threats and therefore guide the company in future choices.

To try to have the most complete identification of these factors, it was decided to apply the 5w1h tool to each factor. The 5w2h tool, in its classical form also foresees the question "how much", but in our analysis this question is superfluous.

The pestle analysis has provided an image of the macro-environment favorable to the sector and its development with numerous incentives both on the manufacturing company side and on the purchasing company side, a growing trend in use and research and technologies in constant development.

4. Conclusion

Before dealing with the conclusions, some premises must be made to frame the analyzed situation.

The analysis concerned in particular the Italian market and Italian companies but it is obvious that foreign companies also participate in the Italian market. In particular, large companies such as *Festo AG & Co. KG* and *Schunk Gmbh & Co. KG* cannot be neglected as far as the catalog sales sector is concerned but also other companies that sell very particular types of grippers.

The second premise to be made is closely linked to this, namely that the scarcity of data on the Orbis database has strongly penalized the entire analysis as it does not allow a complete view of the competitive environment.

Having concluded the premises, we can conclude.

The Pestle analysis sets up a macro-environment favorable to the sector, with numerous support plans for both producers and buyers. The forecasts also show the growing sectors in the coming years and the advent of covid-19 has accelerated the automation process of companies. The only factor, in contrast, is the ethical factor which, however, does not depend directly on the sector but on the management of the personnel that each company implements.

The analysis of Porter's six forces shows us that both the two identified sectors are attractive but deserve two different conclusions.

The sector of companies that sell in the catalog is attractive but has greater difficulties as, as already mentioned, it does not take into account the large European players but also the Italian company *Gimatic* which, despite having been clustered as a single company due to its peculiarities, is an important company in the sector, in fact in all rankings performed during the analysis it was always in the first position. Another difficulty is also given by its static nature, in fact, the danger of new entrants for this sector is low. That said, none of the companies identified in this sector offers more than 50% of the categories identified. Therefore, in this sector, however attractive, it is necessary to enter by offering a large number of grippers.

The design sector is, as mentioned, attractive and presents some fewer difficulties as only one of the four companies is in the top positions of the various rankings performed and especially in the foreign companies identified, no companies that play an important role in the design sector. A problem identified in this sector is the high variability found in sales revenues, in fact, looking at the variations in the four years analyzed, it is the companies that have the highest percentages of increase or decrease while the variations in the other sector are much more contained.

Finally, a general consideration, in 2019 the sector, after two years of growth, recorded a slight decline, it would therefore be useful for the analysis to check the trend that companies have had in 2020 also in light of the arrival in Italy, Covid-19 and its implications already reported in the sector.

To sum up, both sectors are attractive and allow new companies to enter the sector. As regards the catalog sales sector, however, major problems have been identified, above all related to the lack of data, and the presence of some large companies.

While for the design sector, it is reasonable to assume that the entry of a new company can be successful.