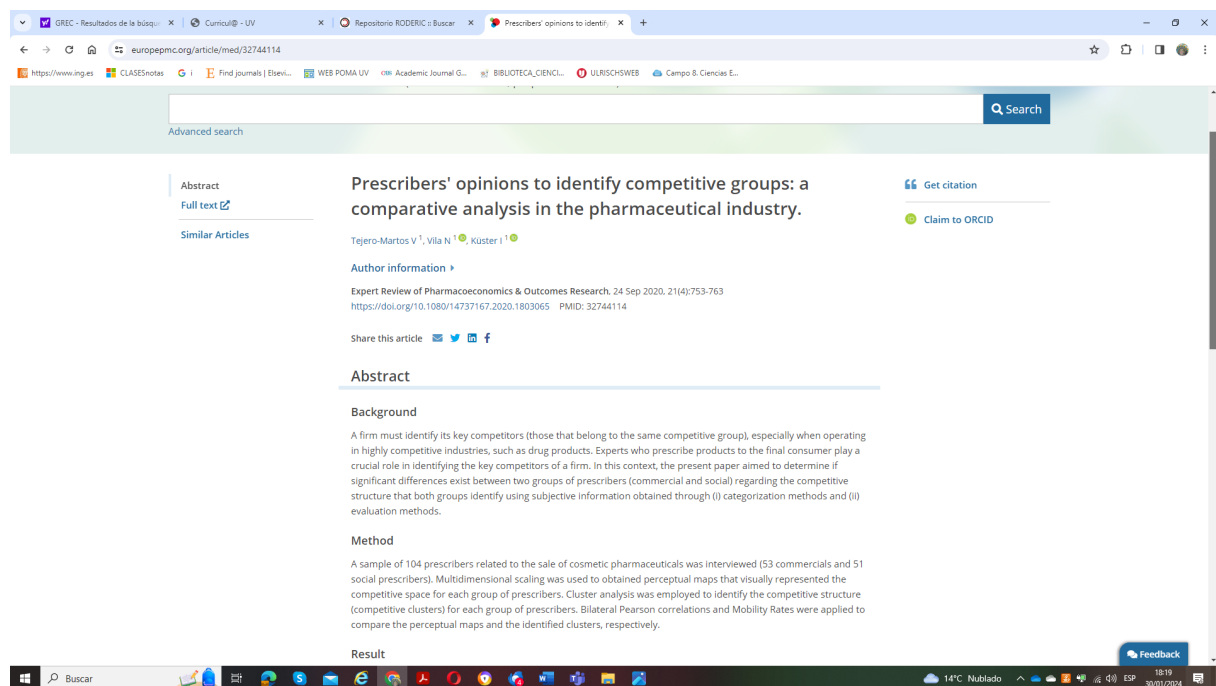




Prescribers' Opinions to Identify Competitive Groups: A Comparative Analysis in the Pharmaceutical Industry

Abstract

Background

A firm must identify its key competitors (those that belong to the same competitive group), especially when operating in highly competitive industries, such as drug products. Experts who prescribe products to the final consumer play a crucial role in identifying the key competitors of a firm. In this context, the present paper aimed to determine if significant differences exist between two groups of prescribers (commercial and social) regarding the competitive structure that both groups identify using subjective information obtained through (i) categorization methods and (ii) evaluation methods.

Method

A sample of 104 prescribers related to the sale of cosmetic pharmaceuticals was interviewed (53 commercials and 51 social prescribers). Multidimensional scaling was used to obtain perceptual maps that visually represented the competitive space for each group of prescribers. Cluster analysis was employed to identify the competitive structure (competitive clusters) for each group of prescribers. Bilateral Pearson correlations and Mobility Rates were applied to compare the perceptual maps and the identified clusters respectively.

Result

Competitive spaces and structures from both groups of prescribers were partially convergent, regardless the information was collected with categorization methods or evaluation ones. The competitive perceptual map identified by the commercial prescribers converges, to a certain extent, with the competitive perceptual map identified by the social prescribers when categorization data is used (correlation between maps= 0.322; $p < 0.01$). The same occurs when both targets (commercial prescribers and social prescribers) are compared using evaluation data (correlation between maps=0.69; $p < 0.01$). In addition, the mobility rate (MR) shows 31.25% of convergence between the clusters identified on these maps using categorization methods; and 6.25% of convergence when evaluation data is used.

Conclusions

There are certain perceptual differences depending on prescribers' occupation, although these differences are not significant. On the contrary, some differences due to the information collecting method (categorization versus evaluation) have been identify.

Key words

Retailing, Competitive group; pharmaceutical; evaluation; categorization; prescribers.

Statement of contribution:

Only few studies have studied the competitive structure of an industry by comparing perceptions of different groups of key experts; and even less comparing different information collecting methods. This work compares if the competitive structure identified by commercial prescribers (those who sell the product), differ (or not) to what social prescribers (opinion leaders) think; both, when categorization and evaluation methods are used. Such differential results are particularly useful in designing communication strategies aimed at both prescribers.

1. Introduction

The correct identification of competition is especially interesting in highly competitive industries such as drugs, in which figures have grown by more than 1,000 million euros in the last five years—[1]. Previous literature, highlighted that the pharmaceutical industry is constantly considered one of the most profitable industries in the world and is steadily growing [2; 3; 4]. It is evident that we are facing a scenario characterized by complexity in the identification of key competitors [5], mainly in the non medical prescription pharmaceutical products. Managing complexity requires decentralized adaptation rather than centralized control [6] (Helbing, Brockmann, Chadefaux, Donnay, Blanke, Woolley-Meza ... & Perc (2015)).

In this scene, and based on Riboldazzi (2017), the following lines refer to the sale of cosmetic pharmaceuticals without a doctor's prescription, and therefore for which a pharmacist's prescription is crucial. To adapt to the growing increase in this industry competition, companies tend to invest in planning and strategy to optimize their scarce resources. It is thus a priority to define and simplify the analysis of the competition with minimum cost. Traditionally, companies consider their competitors according to various variables (such as new product launch, advertisement budget, targets attended, etc.). However, the literature proposes an approach that allows the identification of competitors based on subjective information. In this regard, since 1970s, the concept of competitive group was coined from different schools of thought (e.g. Weick, 1979; Ranson et al, 1980). This approach implies that, beyond certain objective information, the groups of competitors can be formed according to the perception of the subject. As a consequence of the important role played by the prescriber in this industry, it may be of interest to manufacturing companies to know how the prescribers make up groups of brands that, in their opinion, compete in the same competitive space. According to Fischer et al. (2009), the prescribers of the industry, as experts, feel that they are equipped to evaluate competitors independently and analyze the competitive relationships that exist in

them. This study, based on the literature, considers prescribers as suitable for identifying competitive groups in the pharmaceutical industry. In the same vein, Zhang, Lai and Leung (2018) highlight the role of distributors to define the competitive structure of an industry.

It should be noted that, within the pharmaceutical industry, manufacturers reach the final consumer through a prescription [4] by two groups of experts: commercial prescribers (including pharmacists and para-pharmaceuticals) and social prescribers, referring to medical personnel (dermatologists, aesthetic doctors, surgeons, etc.).

In this scenario, a question arises: Do both collectives perceive the same competitive structure in the pharmaceutical industry? Are there any differences if the information is collected using categorization methods and evaluating methods?

To answer both questions, the present study addressed the perceptions of both types of prescribers, taking as a starting point the theory of competitive groups. Specifically, this paper aimed to determine whether there are significant differences in terms of the individuals that define competitors (social prescribers versus commercial prescribers) and in terms of the method used to collect their opinions (evaluation methods versus categorization methods).

The novelty of this issue is that, to date, there has been scarce literature analysing the competitive structure of an industry by comparing perceptions of different groups of key experts; and even less comparing different information collecting methods. This work provides the ability to compare if the competitive structure identified by commercial prescribers (those who sell the product), differ (or not) to what social prescribers (opinion leaders) think; both, when categorization and evaluation methods are used. Such differentiation results are particularly useful in designing communication strategies aimed at both prescribers.

2. Theoretical framework

2.1. Competitive groups: concept and methods

Literature defines a competitive group as ‘a whole group of companies in direct rivalry with each other’ (Authors, 2000: 192). That is, any company that operates in the same industry and whose growth in market share is directly proportional to the decrease of another company will be a direct competitor, forming part of the same competitive group. The competitive group is differentiated from the strategic group in at least two aspects. First, competitive groups add a dimension of rivalry to the members of each group. Secondly, competitive groups pay more attention to the importance of subjective information, which is briefly addressed in the theory of strategic groups (Authors, 2000).

The study of competitive groups has been reported by several schools of thought since 1970’s (e.g. Weick, 1979; Ranson et al. 1980). In general terms, the starting point to identify key competitors are managerial perceptions (subjective variables of the managers, such as quality perceptions or innovativeness). This approach is based on four assumptions (Porac et al., 1989). First, it is assumed that the activities and structures of organizations are determined in part by the momentary actions of their members. Second, it is assumed that such actions are based on a sequence of information processing in which individuals (who are part of the companies) attend the signals of the environment, interpret the meaning of such signals, and then externalize these interpretations through concrete activities. Third, ‘meaning’ is assumed to be problematic, and individuals must actively construct an interpretation by linking the received signals with well-learned and/or developed cognitive structures. Finally, it is assumed that individuals possess a capacity for reflection that can at least verbalize the content of their interpretations. Taken together, these four assumptions portray human activity as an ongoing entry–exit cycle in which subjective interpretations of external information become objectified through behavior (e.g. Weick, 1979). This continuous objective–subjective–objective

transformation makes it possible to generate interpretations shared by several people (Porac et al., 1989).

Two main lines of research have been followed to identify competitive groups with subjective information: one inspired by the theory of categorization, promoted by Johnson-Laird and Wason (1977), and another by the theory of evaluation, adopted by Kelly (1955) (Authors, 1999).

First, in the theory of categorization, competitive groups are identified by asking each individual who is part of a group of experts to distribute an initial set of competitors (laboratories) in as many competitive categories as he or she estimates is timely. Inspired by the theory of categorization, a second method called “direct citation” can be mentioned. This is based on asking each individual who is part of the group of experts to name his or her reference laboratories, or, if analyzing competition between products, asking each consumer to spontaneously evoke those brands of pharmaceutical cosmetics that he or she had in mind before making the final purchase decision (Authors, 1999).

Second, based on the theory of evaluation, competitive groups are identified by asking each professional to evaluate an initial set of competitors on a battery of dimensions or variables on which compete. The aim is to obtain competitive groups of companies/brands which are similarly perceived in terms of the items that have been used to compare them (Authors, 1999).

In sum, the competitive groups can be helpful because they allow to simplify the analysis of the competition based on subjective opinions. This is useful due to the scarcity of resources in companies, which means that companies must focus their attention on the group of rivals most relevant to their activity.

2.2.Cognitive differences in the identification of competitive groups: the role of occupation

According to Prensky (2001), research by social psychologists shows that people think differently. Environment, education, culture, and other factors have personal effects and even determine many thought processes, thus giving each individual different thoughts or cognition by simply having different experiences.

Researchers have discovered that cognitive differences influence the normal reactions and behaviours of consumers (e.g., Weinberg & Gottwald, 1982; Rook, 1987; Gardner & Rook, 1988). Some studies have shown that consumers think about marketing stimuli differently according to their cognition (Srull, 1984; Gardner, 1985). Others have shown that cognition is related to the behaviours or behavioural intention of consumers (Weinberg & Gottwald, 1982; Rook, 1987; Gardner & Rook, 1988). Research in psychology, communications, and consumer behaviour has suggested that some behaviours may be motivated by an attempt to alter or prolong specific cognitive states in the consumer (Faber & Christenson, 1996). This paper holds that the subjective characteristics (cognitive differences) of individuals can affect the way in which they perceive the competition and, therefore, the way in which they will group the competitors in clusters.

Moreover, consumer decision-making processes are characterized by successively screening the number of brands evaluated (Darley et al., 2010). In this process, the prescriber can play a determining role, because they know in depth the industry in which they are participating and have the ability to condition the purchasing decision of the consumer/buyer due to the social or commercial influence exerted on it (Salén, 1999). Based on this foundation, this study supports that a prescriber is a key agent to form competitive groups. In short, this work defends that the conformation of competitive (subjective) groups can vary depending on type of prescribers providing the information on competitive structure.

More specifically, in the health industry, the prescriber has a highly influential role (Fischer et al., 2009). In the commercial field, Salén (1999) identified the existence of two main types of

prescribers: the commercial prescriber and the social prescriber. Commercial prescribers are those intermediaries who perform a commercial task when the customer has doubts among several product possibilities. Meanwhile, social prescribers share social status, professional prestige or popularity; becoming opinion leaders to the consumer. In the pharmaceutical industry, the social prescriber would be the medical health personnel (dermatologists, aesthetic doctors, surgeons, etc.), while the commercial prescriber would be the pharmaceutical health personnel.

According to Barrick, Murray, Mount and Michael (1991), the cognitive structures of different persons will differ due to their previous formation and personal characteristics. In this sense, knowledge shared between one type of prescriber and another may vary. In this way, a hypothesis is presented that claims that the competitive groups identified by one type of prescriber or another will not be the same:

H1: The structure of competitive groups in the pharmaceutical industry that commercial prescribers identify will differ from the one that social prescribers identify.

As previously explained, the competitive groups defined with subjective data can be formed following two differentiated schools of thought (theory of categorization and theory of evaluation). Based on Urban and Miller (1998), the information obtained through evaluation will differ from the information obtained using categorization methods. Therefore, it is possible that the groups of laboratories/brands that the prescribers conform differ depending on the method of conformation. In this way, H1 can be divided into two sub-hypotheses:

H1a: The structure of competitive groups in the pharmaceutical industry, obtained with categorization data of commercial prescribers, will differ from that identified by social prescribers.

H1b: The structure of competitive groups in the pharmaceutical industry, obtained with evaluation data of commercial prescribers, will differ from that identified by social prescribers.

3. Methodology

3.1. Companies of the Competitive Scope

Our sample was composed by those top indexed pharmaceutical laboratories in IMS Health, selling in the cosmetic industry (IMS, 2017). The competitors starting space is composed of more than 2,000 pharmaceutical companies with cosmetic sales in Spain (IMS Health, 2017), but, only the top 16 were considered for this study. More specifically, following Barney (1991) and Kumar, Massie and Dumonceaux (2006), the annual turnover of pharmaceutical companies extracted from IMS Health was taken into account to limit the competitive space. In this way, considering billing data, quartiles of companies were created. Twenty competitors forming the first quartile were retained for the study in the first step. Within this group, four competitors were eliminated, given that in an empirical study conducted with 104 prescribers, it was found that 46.1% of the respondents associated these four companies with the attribute of strangers or without an associable group. As shown in Table 1, the invoicing of the sample of the selected companies represents 49.3% of the total turnover of the industry, according to IMS Health (2017) data. (Table 1).

(Table 1)

3.2. Data Collection Methods: Subjective Information

The subjective information (necessary for the conformation of competitive groups) was obtained from the group of experts participating in the industry. This panel consisted of the commercial prescribers (pharmaceutical) and social prescribers (aesthetic doctors, dermatologists, and plastic surgeons) who exercise or have exercised their

professional level in the international pharmaceutical industry. It is stressed that both types of prescribers play a decisive role in the marketing of pharmaceutical products.

In this regard, according to INE data (2016), in Spain there are 71,119 commercial prescribers (pharmaceutical) and 247,974 social prescribers (collegiate doctors), of which some are social prescribers belonging to the aesthetic medical sector (aesthetic doctors, dermatologists, and plastic surgeons). Through a non-probabilistic sampling procedure for convenience, a sample size of 104 subjects was finally reached (53 commercial prescribers and 51 social prescribers). Since convenience sampling was followed, the sampling error cannot be calculated. This sample size is adequate for this type of studies. For example, Sonenshein, Nault and Obodaru, (2017) interviewed 52 operators from 41 food trucks to identify how firms form a strategic group identity that shapes both competitive and cooperative behaviors among its members.

Table 2 shows the profile of our sample. The sample belonged mainly to a female gender profile, aged between 33 and 44 years, with an experience in the sector between 11 and 15 years and with exercise in the national scope. This profile was similar to the population profile according to INE data (2016).

(Table 2)

After selecting the sample, we followed a methodology for collecting information based on a cognitive approach. This approach aims to identify competitive groups using their subjective perceptions. The use of subjective perceptions was developed within the framework of two currents of thought: theory of categorization (Johnson-Laird & Wason, 1977) and theory of evaluation (Kelly, 1955).

First, we carried out **the categorization**. For this, each individual who was part of the sample (commercial prescriber or specialist) was asked to distribute an initial set of laboratories in as

many competitive categories as deemed appropriate. Subsequently, he or she had to cite under what criteria or attributes the different groups were formed. As a result, conglomerates were obtained from competitive groups with similar attributes within the same group, based on the prescriber's cognition (Authors, 1999).

Subsequently, **the subjective evaluation** was carried out, where competitive groups were identified by asking each prescriber to evaluate an initial set of competitors on a battery of dimensions or variables on which they compete. The result was the attainment of competitive groups whose members are perceived as being similar to a series of central attributes (Authors, 1999). Annexe 1 shows the variables used to evaluate the competitors based on Porter (1998).

3.3.Data Analysis Techniques

In order to respond to the hypothesis, several data analysis techniques were used: (i) multidimensional scaling was used to visually represent the perceived position of each competitor (ii) hierarchical (Ward) and non-hierarchical (K-means) cluster analysis to identify groups of direct competitors in the map, and (iii) bivariate Pearson correlations to analyse the correlation between two perceptual maps; (iv) additionally, the mobility rate (MR) was calculated, to identify the how many firms migrate from one group to another when different information/methods are used.

4. Analysis and Discussion of Results

4.1.Comparing Competitive Structures: Categorization Data (Hypothesis 1a)

First, the perceptual maps obtained by the two groups of prescribers using categorization and evaluation methods were compared to test H1a and H1b respectively.

The categorization method, previously described, was applied using information from commercial and social prescribers in order to compare them.

First, by grouping the results of the entire sample of **commercial prescribers**, a square symmetric matrix was obtained, whose cells collect the frequency with which competitors were assigned to the same group. This is known as the rivalry coefficient between two competitors. This matrix was the input of the analysis of multidimensional scales (IND SCAL mode), which resulted in the perceptual map shown in Table 3. The number of groups to be retained in this map meets three criteria:

1. Dendrogram breaks for the solution of four groups (1 and outlier) (Table 3);
2. in said solution, the explained variance was high ($\delta^2 = 96.37\%$ explained $\geq 60\%$) and the variability intra group that would explain the incorporation of an additional group was low ($\Delta \delta^2 = 2\% \leq 5\%$) (Table 3) (hierarchical cluster analysis by Ward method); and
3. the groups differed significantly from each other (sig level = 0.000) for the number of groups retained, as shown in Table 3 (non-hierarchical cluster analysis by K-means method).

(Table 3)

The competitive groups defined by commercial prescribers with categorisation data are defined by the following attributes:

- **Group A:** Formed by Isdin, Cinfa, Vineyards, Johnson, Caudalie, Omega-Pharma and Martiderm. They are big firms, highly internationalised companies.
- **Group B:** Formed by Bayer, Ferrer, and Leti. E-companies with very narrow and highly specialised product lines. These are focused companies.
- **Group C:** Formed by Bioderma, Vichy, and IFC. Firms with products for very specific pathologies like reactive, atopic, or sensitive skin. They are specialist companies.

- **Groups D:** Formed by Avene and Sesderma. These firms have extensive product lines and high prescription medical or pharmaceutical advice. They are companies with a customer orientation.
- **Outlier:** La Roche Posay.

The adjustment indices of this solution, shown in Table 3, denote that the perceptual map does not faithfully represent, in a visual form, the categorization data provided by the professionals (Stress = $0.36397 \geq 0.200$), the error being highly committed in this estimate (RSQ = 0.24828 - away from 1). This is because the opinions of commercial prescribers measured with categorization data were so dispersed that there is no clear structure of competitive groups in commercial prescribers with categorization data.

Social prescribers are those who, by their social status, professional prestige, or popularity, become opinion leaders before the consumer. This group consists of all employees of an aesthetic medical clinic (dermatologists, surgeons, cosmetic physicians, assistants, nurses, purchasing managers, etc.).

Following a procedure similar to that above, Table 4 shows the perceptual map obtained. Once again, the number of groups to retain serves three criteria:

1. Dendrogram breaks for the solution of four groups (Table 4);
2. in said solution, the explained variance was high (δ^2 explained = $96.34 \% \geq 60\%$) and the intra-group variability that would explain the incorporation of an additional group was low ($\Delta \delta^2 = 4 \% \leq 5\%$) (Table 4); and
3. the groups differ significantly from each other ($p = 0.000$) for the number of groups retained (Table 4).

(Table 4)

The competitive groups defined by the **social prescribers** with categorization data are defined by the following attributes:

- **Group A:** Formed by Isdin, Ferrer, Viñas, Bioderma, Johnson, and Martiderm. These are business leaders in sun blocks and protective facial cleansing. They are the leading companies in solar and facial treatment.
- **Group B:** Formed by Vichy, Avene, and IFC. These firms have high consumer recognition. They could be classified as brand-name companies.
- **Group C:** Formed by Caudalie, Cinfa, Omega Pharma, Leti, and Bayer. Their product lines are specialized for sensitive, reactive, and atopic skin. They are specialized companies in delicate skins.
- **Groups D:** Formed by La Roche Posay and Sesderma. These firms have high medical prescription. They are companies with business-to-business notoriety.

The adjustment indices of this solution, shown in Table 4, denote that the perceptual map does not faithfully represent, in a visual form, the categorization data provided by the professionals ($\text{Stress} = 0.37126 \geq 0.200$). An error was made in this estimate ($\text{RSQ} = 0.23517$, away from 1). As seen with commercial prescribers, this is due to the fact that the opinions of social prescribers measured with categorization data are so dispersed that there is no clear structure of competitive groups in social prescribers with categorization data.

Once the competitive groups were identified by both groups of prescribers using categorization data, Pearson's bivariate correlation between both maps was calculated to test H1a. The results showed that there is a highly significant correlation between the competitive groups structured identified by commercial prescribers and the competitive groups structure identified by social prescribers ($\text{correlation} = 0.322$; $p < 0.01$). This information allows the rejection of hypothesis 1a. The competitive structure identified by the commercial prescribers converges, to a certain extent, with the competitive structure identified by the social prescribers, when measured with categorization data.

4.2.Comparing Competitive Structures: Evaluation Data (Hypothesis 1b)

The same procedure applying categorization data was used for data evaluation.

Regarding **commercial prescribers**, Table 5 shows the perceptual map obtained with multidimensional scaling (mode INDSCAL). The number of groups identify in this map is based on these 3 points:

1. the dendrogram breaks for the solution of four groups (Table 5);
2. in said solution, the variance explained was high (δ^2 explained = 99.16 % $\geq 60\%$), and the increase of the explained variance that would suppose the incorporation of the fifth group was less than 5% ($\Delta\delta^2 = 1\% \leq 5\%$) (Table 5); and
3. the groups differ significantly from each other ($p = 0.000$) for the number of groups retained (Table 5), and the reduction of the number of groups worsens their significance (Table 5).

(Table 5)

The competitive groups defined by the commercial prescribers with evaluation data are defined by the following attributes:

- **Group A:** Formed by La Roche Posay and Avene. These firms' brand image is good, and their brands are often market leaders, provide high-quality products, and develop innovative marketing strategies that encourage sales. They are leading companies.
- **Group B:** Formed by Isdin and Sesderma. These firms have great international presence, and their products are sold in many markets and are innovative. They are innovative companies.
- **Group C:** Formed by IFC and Vichy. These firms' products meet the demands of the market, and the brand image is perceived in the industry as good. These are companies with a consolidated image.

- **Group D:** Formed by Bayer, Viñas, Bioderma, Martiderm, Caudalie, Johnson, Ferrer, Leti, Cinfa, and OmegaPharma. These firms target many markets and audiences with a huge investment in R&D. These companies are case-oriented to the market.

The adjustment indices for this solution (Table 5) show that the perceptual map faithfully represents, in a visual way, the evaluation data provided by industry professionals (Stress = $0.0664 \leq 0, 100; \geq 0.050$), with the error made in this estimation being minimal (RSQ = 0.999990 , close to). That is, the dissimilarity between the companies corresponds to their distance on the map.

In the case of social prescribers, Table 6 represents the perceptual map obtained from the analysis of multidimensional scaling (INDSCAL). Through cluster analysis, four groups are retained according to three criteria:

1. Dendogram breaks in the solution of two groups (and two outliers) (Table 6);
2. in said solution, the variance explained was high (δ^2 explained = $98.52\% \geq 60\%$) and the intra-group variability that would explain the incorporation of an additional group was low ($\Delta\delta^2 = 1\% \leq 5\%$) (Table 6); and
3. the groups differ significantly among themselves ($p X = 0.000 / p Y = 0.011$) for the number of retained groups (Table 6), and addition to the number of groups worsens their significance (Table 6).

The competitive groups defined by the social prescribers with evaluation data are defined by the following attributes:

- **Group A:** Formed by Isdin and Avene. These firms' brands are often market leaders and provide products of high quality and recognition, with high investment in R&D. These are market-leading companies.

- **Group B:** Formed by Viñas, La Roche Posay, Leti, Bioderma, Martiderm, Cinfa, Omega pharma, Johnson, Bayer, Ferrer, and Caudalie. These firms have great international presence; their products are marketed in many markets; and they frequently present new products on the market. These companies are very internationalised.
- **Outliers:** IFC and Sesderma.

The adjustment indices of this solution (Table 6) show that the perceptual map faithfully represents, in a visual way, the evaluation data provided by industry professionals ($\text{Stress} = 0.0125 \leq 0.100$), with the error made in this estimate being minimum ($\text{RSQ} = 0.99967$, next to 1). That is, the dissimilarity between the companies corresponds to their distance on the map. Finally, to test hypothesis 1b (evaluation data), a correlation between the structure of competing groups defined by commercial prescribers and the structured of competing groups define by social prescribers was obtained. Our results show that the Euclidean distances between pairs of points (competitors) in the first map (commercial prescribers) are highly correlated with the Euclidean distances between pair of points in the second map (social prescribers): $\text{correlation} = 0.69$ ($p < 0.01$). So, this information allows to refuse hypothesis 1b.

In sum, the competitive structure identified by the commercial prescribers converges with the competitive structure identified by the social prescribers. Therefore, in view of the results obtained, both H1a and H1b must be rejected; therefore, hypothesis 1 cannot be accepted.

Mobility rates between competitive structures

To conclude, we analyze how many competitors have been assigned to the same group using different information. To this end, Table 7 shows the mobility rates between the groups identified with the different methods of collecting information (data categorization and data evaluation). As Table 7 shows:

- the maximum number of coincidences (5) is recorded in the comparison of commercial and social prescribers, when categorization method is used. The mobility rate is 31.25% ($MR = 31.25\% = 5/16$), which is equivalent to affirming that 68.75% (100%, -31.25%) of the companies are assigned to different groups. So, this method seems more suitable to identify competitive groups, as far as the information source is not so much relevant.
- the minimum of coincidences (1) is registered in the comparison of commercial and social prescribers, when evaluation method is used. In this case the mobility rate is 6.25% ($MR = 6.25\% = 1/16$), which is equivalent to affirming that 93.75% (100%, -6.25%) of the companies are assigned to different groups. So, this data collection method is highly dependent on the information source; so, its usefulness is modest.

(Table 7)

Table 8 is shown below summarizes the analysis of results obtained in the present study. In sum, the highest number of matches between groups is recorded when categorization collection method is applied while the lowest is recorded with evaluation data.

(Table 8)

5. Conclusions, Implications, Limitations, and Future Lines of Research

In growing and competitive industries, the need for a tool to identify the competition in order to focus and simplify it has been revealed. In this context, the approach examined in this paper, based on competitive groups, is a valid and reliable tool for identification in the pharmaceutical industry.

First, the results of the study carried out with 53 commercial prescribers and 51 social prescribers allow us to conclude that there are no differences in the conformation of competitive groups depending on the type of prescriber, regardless of the categorization or evaluation method used. In other words, when prescribers are required to bring together the 16 companies

in the pharmaceutical industry by evaluating and categorizing methods, the resulting groups converge to some extent. However, there are some differences between groups, since their structures (as indicated by their mobility rates) are not 100% identical. That is, we have observed different compositions of groups for each of the solutions.

Second, our results lead us to conclude that the competitive groups identified by different targets using evaluation methods are less convergent. This implies that when forming the competitive groups on the maps, commercial prescribers and social prescribers show some differences. So, this data collection method seems highly dependent on the target interviewed. On the contrary, the competitive groups structures identified with categorization methods differ less.

Taking into account these conclusions, it is possible to establish four implications addressed to the managers of the pharmaceutical industry.

First, due to the scarcity of resources in companies, managers need to identify and focus their attention on the group of key rivals, that is, the companies against which they compete directly. In addition, we emphasize the importance of paying attention not only to the direct competitors, but also to the indirect competitors belonging to a different competitive group. To identify these competitive groups, managers can interview different targets and applied different data collection methods.

Second, and related to the former, the participants of an industry whose opinions influence consumers' purchasing decision, such as prescribers, play a very important role for the management of the companies; therefore, their opinions should not be ignored. We suggest periodically assessing not only what consumers perceive, but also what prescribers in the industry think about the competitive structure.

Third, it has been seen that there are certain perceptual differences depending on prescribers' occupation, although these differences are not significant. On the contrary, some differences

due to the information collecting method (categorization versus evaluation) have been identify. So, we recommend managers to apply different methods to identify its key competitors; based in evaluation methods (by providing some items to the interviewed to compare competitors) and using also categorization methods (by asking the interviewed to spontaneously cite the main competitors; or to separate the industry competitors' into competitive groups).

Fourth, when evaluating the information collection methods that we have used, our results show that commercial prescribers in the pharmaceutical industry tend to value some items/competitive dimensions such as the brand of the product. So, to reach this target, companies should invest in marketing tools to boost sales to became a leader with a well-known brand. On the contrary, social prescribers tend to value other attributes/competitive dimensions, such as product innovativeness, specialization or a higher focus on sanitary pharmaceutical products. So, to reach this target, a significant investment in R&D should be done by manufacturers. These slight differences are particularly useful in the design of communication strategies aimed at different groups of prescribers; as far as these strategies will be valued depending on the type of prescriber they are addressed to.

Finally, some limitations can be found this research. For example, perceptions have been expressed for a particular moment in time, and we were not able to perform dynamic analysis and forecasts on how to evolve group structures in the future. Likewise, the fact that the study focuses on a single sector, together with the limited sample size, prevents generalizing the results to other industries with different characteristics.

Regarding future research lines, we will recommend the use of further classification variables, such as gender. In this way, it could be measured whether the competitive groups identified by men and women will converge or not.

Second, in order to compare the ways companies are valued, perceptual maps could be measured by sets derived from the evaluation data. Thus, one could measure the attributes of

the evaluation together with the competitors, allowing them to be visualized simultaneously on the same perceptual map.

Third, and in order to generalize the superiority of the evaluation method, this analysis could be extended to other sectors. In this way, it could be possible to analyse to what extent aspects such as the maturity of the industry, the notoriety of the brands offered, the cadence between purchases, and power relations in the channel affect the convergence/divergence between the different collection methods of information applied.

Finally, although in this work the existence of competitive groups between different brands has been analysed using perceptions of various prescribers, other applications could be developed in the future. For example, the methodology of this research could be applied in future studies to identify groups of final customers who are likely to respond in the same way to the commercial recommendations of the prescriber.

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TABLE 1 Companies' Profile (Pharmaceutical laboratories)

features		Percentage of the sample
Billing	<€ 75,000	12.50 %
	€ 50,100 - € 75,000	18.75 %
	€ 25,100 - € 50,000	37.50 %
	> € 25,000	31.25 %
Main business	Cosmetic products	75 %
	Medical devices	25%

TABLE 2. Prescriptors' Profile

Features		% shows TOTAL	% shows PRESC.SOCIAL	% shows PRESC.COMERC.
Sample size		100%	50.96%	49.04%
Gender	Male	21.6%	11.6 %	10 %
	Female	78.4%	36.4%	42%
Age	<30	11.8%	5.7%	6.1%
	30-34	14.7%	6.8%	7.9%
	35-44	33.3%	16.8%	16.5%
	45-54	24.5%	12.5%	12%
	55-64	14.7%	8.6%	6.1%
	> 65	one%	one%	0%
Profession	Pharmacist	26.5%	0%	26.5%
	Aesthetic doctor	22.6%	22.6%	0%
	Plastic Surgeon	one%	one%	0%
	Dermatologist	18.6%	18.6%	0%
	Nurse cosmetic medical center	7.8%	7.8%	0%
	Clinical Assistant	9.8%	9.8%	0%
	Pharmacy assistant	8.8%	0%	8.8%
	Other health professions	4.9%	one%	3.9%
Years of experience	Resident	one%	one%	0%
	<5	14.7%	8.4%	6.3%
	5-10	18.6%	8%	10.6%
	11-15	25.5%	12.5%	13%
	16-20	24.5%	10.8%	13.7%
	> 20	15.7%	7%	8.7%
Scope	National	75.5%	41%	34.5%
	International	2.9%	2.9%	0%
	Both of them	21.6%	7.6%	14%

TABLE 3. Competitive structure identified by COMERCIAL PRESCRIBERS (categorization)

(a)

Number of groups: Ward method

N° clusters	Varianza Intra grupo δ^2	% de varianza explicada Intra grupo $\% \delta^2$	Δ Varianza explicada Intra grupo si se añade otro grupo $\Delta \delta^2 = \delta^2 t - \delta^2 t+1$
6	1,98	98,02%	
5	3,63	96,37%	2%
4	5,46	94,54%	5%
3	10,57	89,43%	9%
2	19,08	80,92%	13%
1	32	68%	

(b)

Number of groups: K-Means Method

4 groups solution

X exe: F ratio= 30,119 (p<0,000)

Y exe: F ratio= 36,690 (p<0,000)

(c)

Perceptual Map

Goodness of fit:

S-Stress= 0,48440; Stress=0.36397;

RSQ=0.24828

(d)

Dendrogram

Dendrogram using Ward Method

Rescaled Distance Cluster Combine

C A S E	0	5	10	15	20	25
Label	Num					
JOHNSON	6	→				
VIÑAS	9	→				
CAUDALIE	13	→	→			
ISDIN	1	→		→		
CINFA	8	→			→	
AVENE	2	→	→			
SESDERMA	15	→			→	→
MARTIDERM	11	→	→		→	→
OMEGAPHARMA	14	→	→	→		
LAROCHE	4	→	→			→
VICHY	3	→	→			→
BIODERMA	12	→	→	→	→	→
BAYER	10	→	→	→	→	→
FERRER	15	→	→	→	→	→
IFC	5	→	→	→	→	→
LETI	7	→				

The table shows a map with the competitive structure of the Spanish cosmetic industry identified by COMMERCIAL prescribers using 4 competitive groups after CATEGORIZING the 14 competitors into sets. This 4 groups solution was obtained with Ward cluster analysis and K-Means cluster analysis.

TABLE 4. Competitive structure identified by SOCIAL PRESCRIBERS
(categorization)

(categorization)

(a)

Number of groups: Ward method.

Nº clusters	Varianza Intra grupo δ^2	% de varianza explicada Intra grupo % δ^2	Δ Varianza explicada Intra grupo si se añade otro grupo $\Delta\delta^2 = \delta^2 t - \delta^2 t+1$
5	2,84	97,16%	
4	3,66	96,34%	4%
3	7,96	92,04%	9%
2	17,45	82,55%	15%
1	32	68%	

(b)

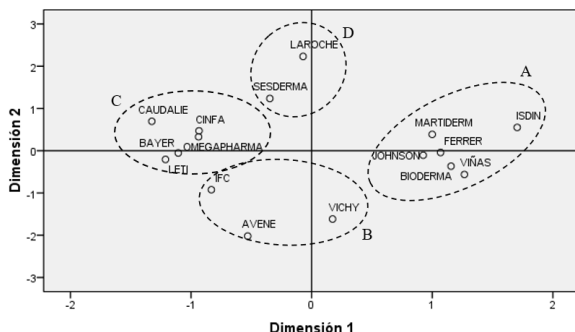
Number of groups: K-means method.

4 Groups Solution.

- X exe: F ratio= 55,878 (p<0,000)
- Y exe: F ratio= 20,567 (p<0,000)

(c)

Perceptual Map



Goodness of fit:

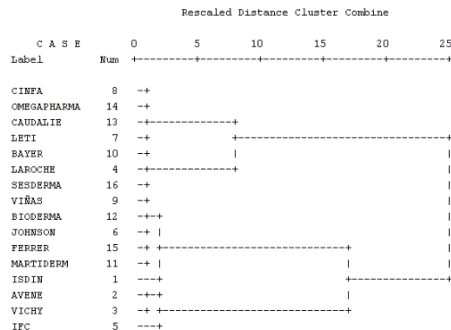
S-Stress= 0.47559; Stress=0.37126;

RSQ=0.23517

(d)

Dendrogram

Dendrogram using Ward Method



The table shows a map with the competitive structure of the Spanish cosmetic industry identified by SOCIAL prescribers using 4 competitive groups after CATEGORIZING the 14 competitors into sets. This 4 groups solution was obtained with Ward cluster analysis and K-Means cluster analysis.

TABLE 5. Competitive structure identified by COMERCIAL PRESCRIBERS
(Evaluation)

(Evaluation)

(a)

Number of groups: Ward method.

N° clusters	Varianza Intra grupo δ^2	% de varianza explicada Intra grupo $\% \delta^2$	Δ Varianza explicada Intra grupo si se añade otro grupo $\Delta \delta^2 = \delta^2 t - \delta^2 t+1$
5	0,52%	99,48%	
4	0,84%	99,16%	1%
3	1,90%	98,10%	3%
2	4,45%	95,54%	28%
1	32%	68%	

(b)

Number of groups: K-means method.

4 Groups Solution

- X exe: F ratio= 143,336 (p<0,000)
- Y exe: F ratio= 28,527 (p<0,000)

(c)

Perceptual Map

Goodness of fit:

S-Stress= 0.00154; Stress=0.0664;

RSO=00,999 90

(d)

Dendrogram

Dendrogram using Ward Method

Rescaled Distance Cluster Combine

C A S E	Num	0	5	10	15	20	25
Label							
CINFA	8	--					
OMEGAPHARMA	14	--					
LETT	7	--					
FERRER	15	--					
VIÑAS	9	-----					
BAYER	10	--					
BIODERMA	12	--					
JOHNSON	6	--	+				
MARTIDERM	11	--					
CAUDALIE	13	--					
VICHY	3	-----					
IFC	5	--					
AVENE	2	--					
LAROCHE	4	-----					
ISDIN	1	--					
SESDERMA	16	--					

The table shows a map with the competitive structure of the Spanish cosmetic industry identified by COMMERCIAL prescribers using 4 competitive groups after EVALUATING the 14 competitors. This 4 groups solution was obtained with Ward cluster analysis and K-Means cluster analysis.

TABLE 6. Competitive structure identified by SOCIAL PRESCRIBERS (Evaluation)

(to) Number of groups: Ward method. <table> <tr> <th>N° clusters</th> <th>Varianza Intra grupo δ^2</th> <th>% de varianza explicada Intra grupo %δ^2</th> <th>Δ Varianza explicada Intra grupo si se añade otro grupo $\Delta\delta^2 = \delta^2 t - \delta^2 t+1$</th> </tr> <tr> <td>5</td> <td>0,49%</td> <td>99,51%</td> <td></td> </tr> <tr> <td>4</td> <td>1,48%</td> <td>98,52%</td> <td>1%</td> </tr> <tr> <td>3</td> <td>2,52%</td> <td>97,47%</td> <td>2%</td> </tr> <tr> <td>2</td> <td>4,68%</td> <td>95,32%</td> <td>27%</td> </tr> <tr> <td>1</td> <td>32%</td> <td>68%</td> <td></td> </tr> </table>	N° clusters	Varianza Intra grupo δ^2	% de varianza explicada Intra grupo % δ^2	Δ Varianza explicada Intra grupo si se añade otro grupo $\Delta\delta^2 = \delta^2 t - \delta^2 t+1$	5	0,49%	99,51%		4	1,48%	98,52%	1%	3	2,52%	97,47%	2%	2	4,68%	95,32%	27%	1	32%	68%		(b) Number of groups: K-means method. 2 Groups Solution - X exe: F ratio= 89,726 (p<0,000) - Y exe: F ratio= 5,808 (p<0,000) 3 Groups Solution - X exe: F ratio= 74,000 (p<0,000) - Y exe: F ratio= 1,055 (p<0,000)																																																																																																																																	
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TABLE 7. Comparison of the composition of groups: mobility ratios between groups.

		Commercial prescribers: CATEGORIZATION				
		A	B	C	D	Mobility rate
Social prescribers: CATEGORIZACIÓN	A	4	1	1		MR= 5/16=0,3125
	B			2	1	
	C	3	2			
	D				1	
		Commercial prescribers: EVALUATION				
		A	B	C	D	Mobility rate
Social prescribers: EVALUACIÓN	A	1	1			MR= 1/16=0,0625
	B	1		1	10	
	C					
	D					

TABLE 8. Hypotheses test

CATEGORIZATION (H1a) Rejected. A convergence has been found.					
COMMERCIAL PRESCRIBER		SOCIAL PRESCRIBER		Pearson correlation	Mobility Ratio
No. groups	Adjustment index	No. groups	Adjustment index		
4	Stress=0.36397 RSQ=0.24828	4	Stress=0.37120 RSQ=0.23017		
				0,322	0.3125
EVALUATION (H1b) Rejected. A convergence has been found.					
COMMERCIAL PRESCRIBER		SOCIAL PRESCRIBER		Pearson correlation	Mobility Ratio
No. groups	Adjustment index	No. groups	Adjustment index		
4	Stress=0.0664 RSQ=0.999990	2	Stress=0.1225 RSQ=0,99967		
				0.693	0,0625

Annexe 1

Competitive Grill

ITEMS	CONCEPT
It is aimed at several target audiences (eg, different ages or social classes).	Target markets
It markets its products in various countries or markets.	Target markets
Make a great investment in R&D.	R&D
It provides the market with quality products.	R&D
Its price is adjusted to the target market or audience to which it is directed.	Sales
It favors the rotation of its products at the point of sale, encouraging sales	Sales
I know that the commercial representatives of the brand have labor policies and are happy with the laboratory.	Labor
Their products or lines of business are usually the market leaders.	Product line
The breadth of its product line is adequate (not too many, not too little).	Product line
Frequently presents new interesting products on the market.	Product line
Its product line covers the needs that the market demands	Product line/marketing
It has extensive after-sales services and gives a good service to the professional	Marketing
Develops innovative marketing techniques that help the sale.	Marketing
Delivery times at the point of sale are reasonable and comply with the provisions.	Marketing
The management of the history of my purchases, payments and customer account is useful and accurate.	Marketing
In general, the brand equity is perceived as good among professionals in the sector.	Marketing

Source: own elaboration based on Porter (1998).