Impact of a detailing restriction policy on prescription behavior

PhD in Management

- Appendices 1 to 5 -

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Please note: this document consists of the appendices 1 to 5 supporting António José Carreira Valente PhD thesis in Management.

The references are listed in the thesis.

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1. Appendix 1 – Complements to the literature review

This part of the appendix includes chapters and sub-chapters that were removed from the thesis main document, following the PhD jury committee suggestions, and the PhD candidate further attempt to make the final document leaner.

1.1 Life sciences industry and life sciences marketing

1.1.1 Distribution channels

Base concepts

According to Niziolek, Chiam & Yih (2012), the pharmaceutical supply chains consist of drug manufacturers, wholesalers, and pharmacies. The first sell and ship medicines to wholesalers in large quantities. The second sell and ship medicines bought from several manufacturers to pharmacies, in smaller amounts. And the third – which include retail pharmacy chains, hospitals, nursing homes, and mail-order pharmacies - generally maintain smaller medicines stocks, and can operate in pharmacy chains with their own warehouses.

Manufacturers can have primary and secondary distribution centers, whereas pharmacies can have distribution centers too, as represented below in figure 1.1.

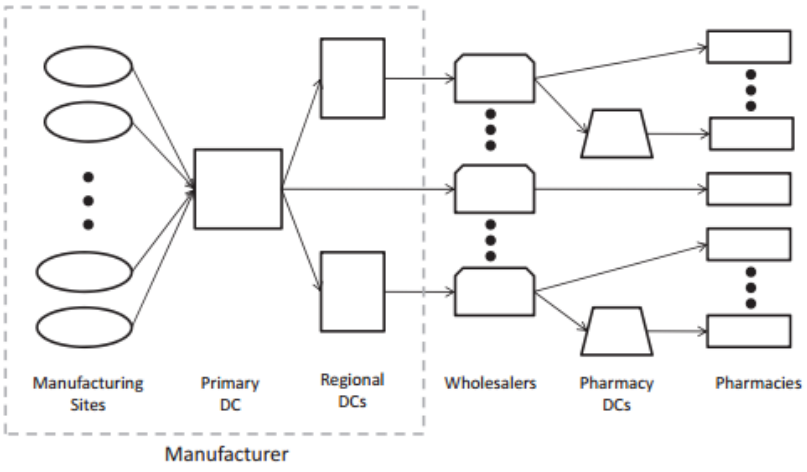


Figure 1.1 – Distribution network with intermediaries

Source: Niziolek, Chiam & Yih (2012)

Players in the distribution channels are typically remunerated using mark-ups or regressive margins schemes, and in the case of pharmacies, a fee for service may be allowed too, as explained by Leopold et al (2014). They highlighted that while with mark-ups «*a defined linear or percentage amount is added to the cost of a good to ensure a profit at the wholesale*

or retail level or both», «*with regressive margin schemes, the margin is expressed as a percentage of the selling price*». (p. 632). With regressive margins, the higher the medicines cost, the lower the margin percentage the distributional channel member can incorporate. Portugal implemented a regressive remuneration scheme for wholesalers and pharmacies in 2011 (Leopold et al, 2014), through Decree law 112/2011 (29th November), setting, for the first time, regressive commercialization margins for wholesales and pharmacies and by price ranges, the latter of which is a fixed value irrespective of the price of the medicine, with margins incorporating variable and fixed values, instead of a linear margin only (percentage).

Current issues on pharmaceuticals distribution channels

- **Disintermediation and reintermediation**

Niziolek, Chiam & Yih (2012) referred that several industries have adopted the use of disintermediation in the recent years, where intermediaries are bypassed in the supply chain, strategy also known as direct-ship. They explained that, despite a lower utilization in the pharmaceutical industry, disintermediation is also present, offering as advantages a closer relationship with pharmacists, and a lower risk of the existence of counterfeit drugs in the distribution channels, and as concerns the transportation costs, inventory costs and delivery frequencies. Manufacturers can choose among several levels of disintermediation, the highest of all called direct only, where manufacturers sell directly to pharmacies (Niziolek, Chiam & Yih, 2012). A scenario of disintermediation in shown below in figure 1.2, evidencing a channel configuration without wholesalers.

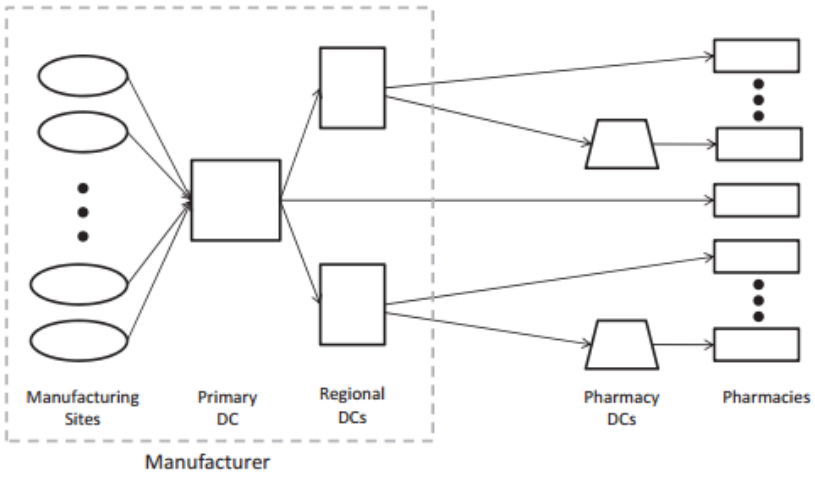


Figure 1.2 – Distribution network with no wholesalers (disintermediation)

Source: Niziolek, Chiam & Yih (2012)

Kanavos, Schurer & Vogler (2011), when addressing the pharmaceutical distribution chain in the European Union, that manufacturers may bypass wholesalers, and sell their products directly to pharmacies. This can be done with their own logistic resources or using wholesalers acting as logistics providers only, with no control of product discounting. They explained that this type of distribution is called direct-to-pharmacy distribution, or agency model, where a wholesaler distributes the manufacturers' products never having their formal possession, acting as couriers or logistics providers. This allows manufacturers a much higher control of their products' prices and discounts. Kanavos, Schurer & Vogler (2011) also referred that manufacturers can develop reduced wholesaler models (RWM) with wholesalers, by selecting a limited number of wholesalers to work with selling their products.

A deeper case of disintermediation occurs when drug manufacturers sell directly their products to patients. This is called direct-to-consumer sale of prescription medications by pharmaceutical companies and has emerged only recently as a delivery method to patients, as addressed by Seal et al (2016). These researchers explained that, in direct-to-consumer sale, prescriptions are sent to drug companies directly, bypassing wholesalers and pharmacies, and presented two examples: Viagra Home Delivery, a program developed by Pfizer for its product Viagra (prescriptions were given by pharmacists), and Nexium Direct, developed by AstraZeneca. Major issues about this type of sale include adequate counseling delivered to patients who receive the medicines directly from manufacturers (Seal et al, 2016), and the fact that manufacturers will have to accept responsibility of guaranteeing their products where and when patients need them, as well as increasing inventories (Rossetti, Handfield & Dooley, 2011).

Crow (2017), in his article in the Financial Times, addressed pharmaceutical industry fears of Amazon entering the prescription drug market which, if confirmed, would constitute a different type of intermediation called reintermediation. Crow (2017) noted that Amazon has been hiring senior specialists from insurance and distribution channel health companies, which may be interpreted as a move into the prescription drugs distribution business, where it could contribute to a significant cost reduction especially in generics (putting pressure on wholesalers and pharmacies), and deliver drugs to patients, by mail.

- **Vertical and horizontal integration**

Related with the previously addressed disintermediation topic, there is vertical integration. Vertical integration can be seen in the pharmaceutical industry, in more than one player of the

distribution channel. This integration has been growing, especially where wholesaler groups acquire pharmacies or pharmacy chains (not permitted however in some European countries), as noted by Kanavos, Schurer & Vogler (2011). They underlined that the reason for this interest may be explained by the increased competition wholesalers have been facing due to the development of IT and logistics, but also to the entry of drug manufacturers downstream the distribution channels.

Manufacturers are evidencing interest in creating direct vertical channels, by internalizing or acquiring wholesaler capabilities for part of their portfolio, with the goal of attaining a higher link with the retail (pharmacy business).

Horizontal integration can also be seen in the pharmaceutical industry distribution channels, in the case of pharmacies, by the creation of pharmacy chains, which can then benefit from joint procurement (Kanavos, Schurer & Vogler, 2011), for increased bargaining power in medicines buying process.

- **Diversification of services**

Kanavos, Schurer & Vogler (2011) also highlighted a tendency seen in the pharmaceutical distribution channel players, consisting of diversification or expansion of services, by wholesalers and pharmacies. While wholesalers are evolving to provide additional services to manufacturers, such as kitting, re-labelling, information services, patient services, clinical trial packaging, waste management and returns management, pharmacies are evolving to provide supplementary services to patients, including repeat dispensing, medicine waste disposal, blood pressure testing, weight control, cholesterol and blood glucose, emergency contraception, among other.

- **E-trading of prescription drugs**

Selling prescription drugs over the internet is more restricted than selling OTC products, as addressed by Kanavos, Schurer & Vogler (2011), who highlighted that as of 2011, only a few countries (including Denmark, Czech Republic, Germany, Netherlands, Slovakia, Sweden and the UK) were permitting internet pharmacies, as a way of facilitating the purchase of prescription medicines outside the network of physical pharmacies. This possibility gives patients an easier access to medicines and is more advanced in the USA than in European countries (Mossialos, Mrazek & Walley, 2004).

1.1.2 Alliances in healthcare

The drop in R&D productivity may have led to the increase in the number of collaborations between pharmaceutical companies, in an effort to counter the drop in the drug pipeline (Carter, 2005).

Figure 1.3 evidences the evolution of the number of mergers and acquisitions in the period of 2004 to 2015, showing a global positive tendency.

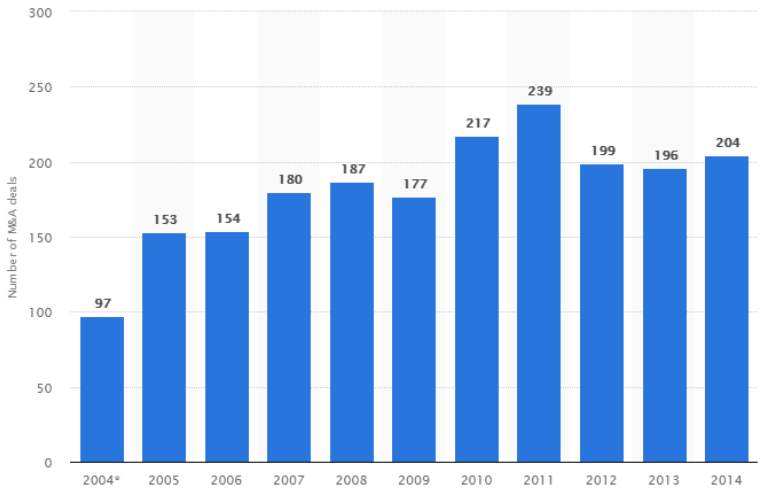


Figure 1.3 - Number of pharmaceutical merger and acquisition deals worldwide from 2004 to 2014

Source: Statista (2017b)

According to Zuckerman, Kaluzny, Montgomery, Ford & Trout (1991), alliances represent a mechanism for companies to search for collaborative solutions to common problems. Alliances in the pharmaceutical industry can be upstream or downstream, as explained by Hess & Rothaermel (2011): while upstream alliances are mostly focused on generating new basic knowledge, downstream alliances are more focused on creating knowledge more focused in production and marketing activities. Upstream alliances can be focused on basic research, drug discovery and development, with universities and other research institutes, whereas downstream alliances can be focused on clinical trials, FDA regulatory process, and marketing and sales (Rothaermel & Deeds, 2004).

Datamonitor Healthcare, a report commercialized by Informa, a business intelligence, academic publishing, knowledge and events business, provides insights on pharmaceutical and biotech industries alliances. It provides information about the number and

characterization of the deals developed between companies in the health sector and proposes a classification of several types of deals: acquisition, commercialization, joint venture, licensing, manufacturing, supply and distribution, option, and research and development, briefly explored in table 1.1 below.

Table 1.1 – Subcategories of Datamonitor Healthcare partnerships

Partnership subcategory	Brief description
Acquisition	Deals involving the acquisition of a product and/or technology, within a given territory or territories. Note that in the out-licensing exhibits, this category was labeled as Divestment
Commercialization	Deals involving the marketing, co-marketing, commercialization, promotion, and/or co-promotion of products and/or technologies, within a given territory or territories
Joint venture	A partnership in which two or more companies establish a new corporate entity to carry out research, development, marketing/commercialization, or other activities such as manufacturing/supply
Licensing	An agreement in which the source company(s) grants the partner company the rights to use, develop, manufacture, and/or market a given product(s) or technology, usually for initial up-front fees, milestone payments, royalty payments, and/or potential profit sharing. Includes in-licensing, out-licensing, cross-licensing, and sub-licensing partnerships
Manufacturing, supply, and distribution	A partnership deal involving the manufacture, supply, production, or distribution of a product or technology
Option	A contract giving a buyer the right, but not the obligation, to buy or sell an underlying asset at a specific price on or before a certain date. Note: Medtrack counts an option deal as a separate record if the overall agreement also includes a straight licensing component
Research and development	Deals in which two or more partners share in the funding of the research and development of a drug(s) or technology(s) in a given territory or territories

Source: adapted from Datamonitor Healthcare (2016)

According to Datamonitor Healthcare (2016), the structure of the alliances from 2011 to 2015 did not register substantial changes in proportion, as seen in figure 1.4 below, except for a slight decrease in the proportion of research and discovery agreements, and a slight increase in the proportion of acquisitions.

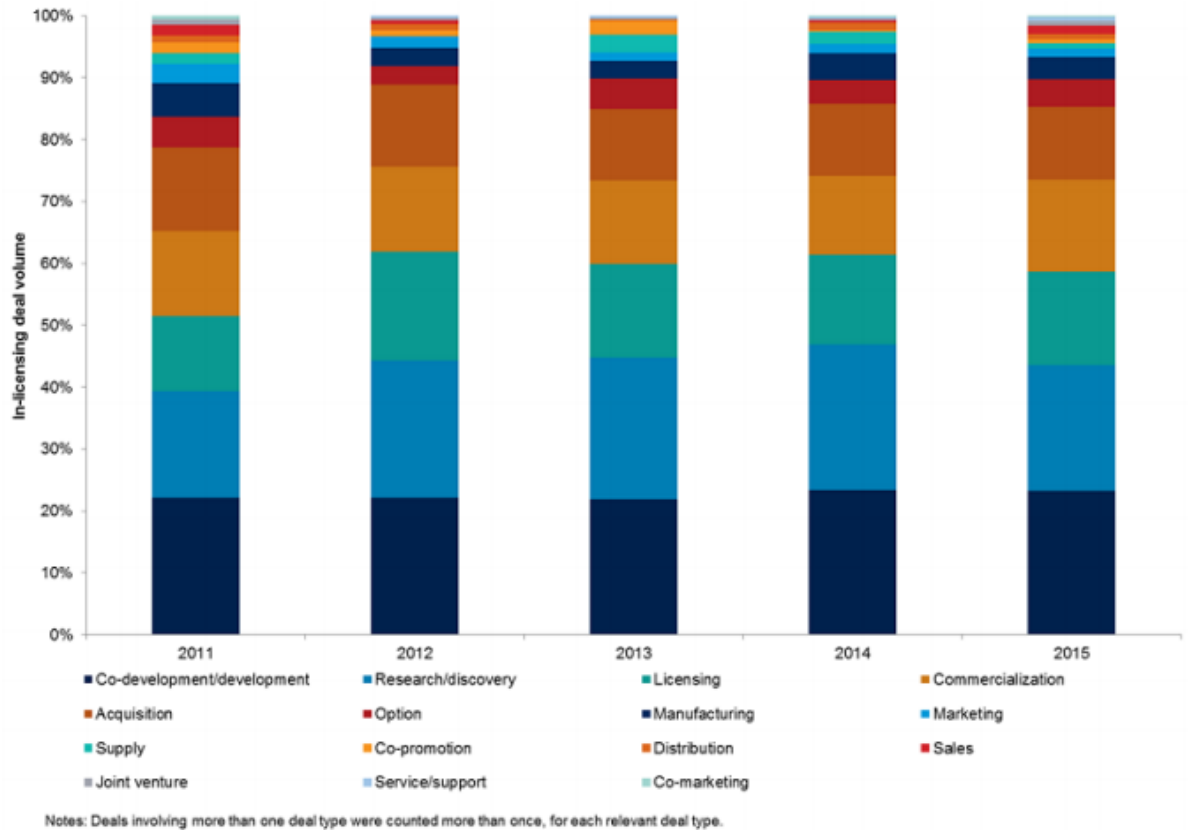


Figure 1.4 – Development and research/discovery consistently featured in Big Pharma's in-licensing deals, 2011–15

Source: Datamonitor Healthcare (2016)

1.2 Sales force management in the pharmaceutical industry

1.2.1 Content and logic of the chapter

This appendix explores the concepts of sales force effectiveness, a central concept in sales force management in the pharmaceutical industry. Upstream in the sales process, this section addresses the physician profiling, segmentation and targeting, moving then to the development of the optimal frequencies for the interactions with clients, in order to define the optimal number of representatives in the sales force team. It also addresses the importance of the sales force structure and design, and the relevance of sales territory alignment. It covers additional processes regarding sales force effectiveness such as recruiting and selection, training, compensation, and supervision and evaluation.

It also addresses the theories on customer relationship management (CRM) and sales force automation (SFA) in the pharmaceutical industry. The reasoning for this analysis resides in two main aspects: by the one hand, the importance of CRM as a philosophy in the management of the relationship between pharmaceutical manufacturers and their stakeholders, mainly physicians (the prescribers); by the other hand, SFA theories contribute to a broader understanding of the processes involving the interaction between PSRs and physicians. CRM and SFA concepts in the scope of the pharmaceutical industry will be addressed. It then addresses how manufacturers use information gathered in customer information databases, highlighting the main SFA tools covered in the literature. Closed-loop marketing is covered, highlighting its importance in the pharmaceutical marketing and sales management, since its usage can provide pharmaceutical manufacturers and their PSRs with a broader knowledge of their stakeholders. The sub-chapter then ends with the exploration of the main benefits and main barriers to the implementation of SFA in the scope of the pharmaceutical industry.

1.2.2 Concepts

As noted by Zoltners, Sinha & Lorimer (2008), sales force effectiveness involves a series of drivers including a set of basic decisions, processes, systems, and programs that impact the sales structure, salespeople, and activities. Sales force effectiveness addresses sales analytics and profiling, segmentation, targeting, call planning, sales force sizing and structure, territory alignment, salesforce recruiting, evaluation, compensation, and supervision and evaluation, concepts that will be individually covered in the SFE sub-chapter.

Customer relationship management and sales force automation concepts will be covered too. Pharmaceutical companies have the need of handling substantial amounts of data from their clients (physicians and other stakeholders), which needs to be gathered, analyzed, classified and disseminated, in order to properly feed and support the sales force effectiveness processes. In this scope, a customer relationship management (CRM) vision is important, in order to enhance customer relationships, through sales force automation (SFA) technological tools. CRM consists of processes and technologies that enhance customer relationships, and SFA handles only with technological tools. Consequently, CRM is a more comprehensive concept than SFA. A full sub-chapter will address CRM and SFA theories in more detail.

1.2.3 Sales force effectiveness

As addressed in the concepts section, sales force effectiveness (SFE) involves a group of drivers that have impact on the sales structure, salespeople and sales activities (Zoltners, Sinha & Lorimer, 2008). Examples of drivers pointed by Zoltners, Sinha & Lorimer (2008) include «*the sales force size and structure, the sales force recruiting process, the performance management system, and the sales force incentive compensation program*» (p. 118). Zoltners, Sinha & Lorimer (2005) addressed a series of steps used by a pharmaceutical company in the scope of a sales force project, here shown in figure 1.5, which can interpreted as the basic steps of sales force effectiveness.

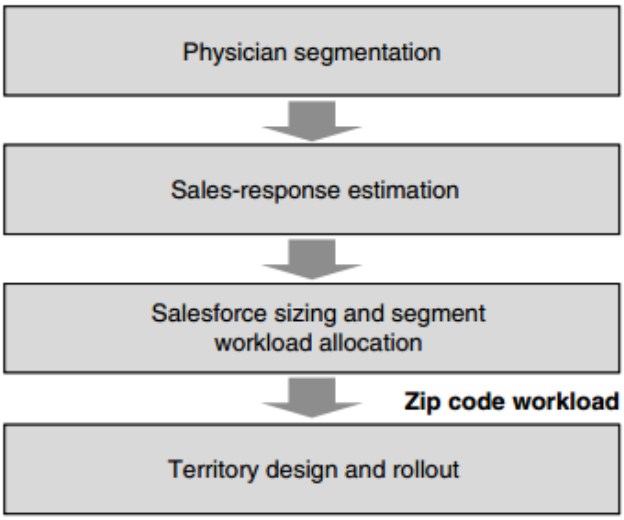


Figure 1.5 – Simplified steps in the scope of sales force effectiveness

Source: Zoltners, Sinha & Lorimer (2005)

A broader view of the concept of sales force effectiveness (SFE) in the pharmaceutical industry includes a wider series of processes comprising sales analytics and profiling, segmentation, targeting, call planning, sales force sizing and structure, territory alignment, salesforce recruiting, evaluation, compensation, and supervision and evaluation. Several consulting companies have been developing SFE projects to the pharmaceutical industry, including IQVIA and ZS Associates. The sales force effectiveness processes are sequentially related and should be analyzed using a holistic approach, since decisions in one process (ex: segmentation) may produce significant effects in one or more downstream processes (ex: call planning and sales force sizing). As a result, an individual analysis of each process may not be easy to develop, in a partition or dissociation perspective. Nevertheless, we will develop, in

the next topics, those processes, making, whenever applicable or useful, the relevant linkages between concepts.

1.2.3.1 Sales analytics and physician profiling

In order to efficiently profile, segment and target the prescribers, the pharmaceutical industry needs to have access to information. Profiling consists of gathering this information from multiple sources in order to gain insights about prescribers' behaviors, prescription potential, and other variables.

Monitoring and attempting to modify prescription behavior through prescription tracking is key to pharmaceutical marketing (Fug-Berman, 2008). Pharmaceutical companies typically use a set of marketing research tools to gather information about prescribers, usually subcontracting third-party providers. One of the main areas of focus is the prescriber profiling, defined as the «*use of detailed data from pharmacies and clinical practices to target and influence physician prescribing habits*» (Greene, 2007). According to this author, prescriber profiling can be classified into four types: prescription audits and claims databases, physician panels, physician databases, and specialized studies on an ad-hoc basis.

Prescription data

There are two main sources for prescription and prescriber profiling, consisting of data that can be used to target physicians (Greene, 2007): a first source is given by healthcare information organizations (HIO), also known by data-mining companies (Fugh-Berman, 2008). One of the HIO companies is the US firm IQVIA (former IMS Health and Quintiles), which provides prescription and profiling data to pharmaceutical companies. Two of its main services in the US are the National Prescription Audit (NPA), gathering information from thousands of pharmacies and compiling it to obtain national, regional and pharmacy-level sales of thousands of registered products, and National Disease and Therapeutic Index (NDTI), consisting of diagnostic and therapeutic information about patient contacts, based on a sample of participating physicians. According to Greene (2007), «*while the prescription audit (NPA) showed marketers which prescriptions were being filled in pharmacies, the therapeutic index (NDTI) allowed marketers to tie prescription sales data to specific diagnoses and temporal changes in therapeutic practice*». A second source includes Medicare and Medicaid claims databases and e-prescription databases with digital medical records, which according to Greene (2007) cost a fraction of HIO databases.

- **Individual-level prescription information**

But how can HIOs and non-HIOs have access to individual-level prescriptions? In the US, a physician organization called American Medical Association (AMA) provides Physician Masterfile (AMA, 2017a), «*an important link connecting pharmacy prescription data to individual prescribing physicians via a series of individual identifiers, including state licensing information, medical education information, national provider identifier codes, and US Drug Enforcement Agency numbers for all US physicians*» (Greene, 2007). Steinbrook (2006) had already evidenced that prescribing data can be linked to individual physicians in several manners, including Drug Enforcement Administration registration numbers, state medical license numbers, or internal identifiers used by pharmacies, also noting that IMS Health compiles information from several sources including pharmacies and links it to AMA Masterfile (AMA, 2017c), allowing it to sell physician-level prescribing data to pharmaceutical manufacturers.

Pharmacy data bought by HIOs in the US consist of patients' prescription records including date, medication name and dose, and also prescriber unique number that are then used as identifiers to link data from pharmacies with data from the Physicians Masterfile, bought from AMA (Fugh-Berman, 2008). Other sources HIOs use to gather information include insurance companies, buying them anonymized patient medical records to identify which drugs physicians prescribe to specific patient populations and diagnoses (Fugh-Berman, 2008).

In order to avoid criticism by registered physicians who may not want to publicly disclose their prescribing information, AMA implemented the Prescribing Data Restriction Program (PDRP), in 2006 (AMA, 2017b), empowering physicians to restrict pharmaceutical sales representatives and their direct reports (but not other pharmaceutical companies officials) from accessing their individual detailed prescribing data (Fugh-Berman, 2008). Physicians interested in opting-out the disclosure of prescription information can access the Physician Data Restriction Form (AMA, 2017d).

- **Aggregate-level prescription information**

Wherever disaggregated (individual-level) prescription information is not available or legal, regional (aggregated) prescription information may be used as surrogate information. Fugh-Berman (2008) noted that, in contrast of the USA, in Europe pharmaceutical industry access to information on each physician's prescriptions is not allowed.

European Directive 95/46/EC provides, in article 8 paragraph 1, that «*Member States shall prohibit the processing of personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, trade-union membership, and the processing of data concerning health or sex life*». The prohibition shall not apply if «*the data subject has given his explicit consent to the processing of those data , except where the laws of the Member State provide that the prohibition referred to in paragraph 1 may not be lifted by the data subject's giving his consent*» (paragraph 2 a).

Commission Decision 2002/165/EC (of 3 July 2001), in the scope of Case COMP D3/38.044 — NDC Health/IMS Health, clarified how drug prescriptions or sales data can be used in the light of European Directive 95/46/EC. Paragraph 5.1 point 12 explained that «*pharmaceutical companies use regional sales data to build their territories, to develop and implement incentive schemes for their sales representatives and to gain knowledge of market developments (market shares of their products, comparison with previous time periods, etc)*». They also explained, in point 13, that «*regional sales reports are based on data delivered by pharmaceutical wholesalers to report providers, such as IMS (…). These data represent the purchases of the individual pharmacies from the wholesalers. It is assumed that these purchases are a good proxy for pharmacy sales and therefore the doctors' prescriptions. Wholesalers commonly have data-supply agreements with providers of regional sales reports, whereby wholesalers provide data on sales to an aggregation of pharmacies within geographic segments to the report providers*».

In point 14, the Commission Decision underlined that «*this input segmentation structure is a grid superimposed on a country map, grouping communities of doctors, pharmacies and patients and contains among others the following data: postcodes (…), political boundaries, number of residents, distribution of physicians and pharmacies (…) and street maps*». Then, in point 17, the Commission Decision addresses the usage of brick structures in many European countries, explaining that «*in many countries regional sales data are provided in a predefined segmentation known as a 'brick structure', mainly so to create segments with equal sales potential, and to comply with data-protection law (which stems from Directive 95/46/EC (8)). For the pharmaceutical manufacturers, the brick structure in which regional sales data are being reported is very important because they have organised their sales forces and the way the sales personnel are rewarded according to this structure. The territory of a salesperson is composed of a number of bricks of the brick structure. A number of companies define the sales territory of a sales representative as an aggregation of several (…) bricks in*

that representative's working contract. The remuneration of sales representatives is based on movements in drugs' market shares and growth rates per brick».

Arezzo (2004) underlined this topic. She noted that, in order to comply with European Directive 95/46/EC, Healthcare Information Organizations (HIOs) such as IMS Health partitioned a country territory in small segments with a similar sales potential, called bricks, which must contain at least three pharmacies, not allowing the identification of sales per pharmacy. Arezzo (2004) explained that data aggregated by these geographic structures (bricks) are essential for the business of pharmaceutical manufacturers. She explained that «*firstly, they constitute a significant tool to analyze the market insofar as they allow firms to know the percentage of sales within small segments of the country; secondly, they allow firms to monitor the effective performance of sales representatives – which is of primary importance in this sector*» (p. 3).

Fugh-Berman (2008) noted, too, that prescription data for individual physicians is not allowed in Europe, underlining that, instead, pharmaceutical companies use prescribing data for groups of physicians (known as "bricks"). Gisev, Larance, Cama, Nielsen, Roxburgh, Bruno & Degenhardt (2017) explained that HIOs (IMS Health, in the case), provide regional pharmaceutical sales data organized in bricks, which consist of clusters of pharmacies, «*developed for medicine sales and distribution purposes*» (p. 2).

Sales can be valued at sell-in, or at sell-out. Sell-in represents product inflow to pharmacies, and sell-out represents the product outflow to patients (Pedroso & Nakano, 2009). By other words, sell-in represents wholesalers' sales to pharmacies, or the drug inventory bough by pharmacies, at wholesaler price), and sell-out represent the pharmacy sales to patients. As noted by Pedroso & Nakano (2009), farmacies' «*inventories account for the difference between sell-in and sell-out, and the ratio sell-in/sell-out for the effectiveness of inventory management*» (p. 5).

Therefore, in the absence of disaggregated prescription information, this macro-level brick sales data can be used to qualify each territory, aimed at knowing the average number of drugs dispensed per prescriber in each territory (dividing the quantity of drugs sold by the number of physicians from specific specialties in each territory).

Non-prescription data

Whenever physician-level prescription data is not available, pharmaceutical companies face a substantial challenge to properly segment each physician, and try to access data that could indirectly, or tangentially, qualify physicians in terms of prescription potential, since aggregate-level prescription data may not add sufficient detail for segmentation purposes.

It is relatively simple for a pharmaceutical company to gather information about its promotional investments made to each physician. Companies such as IQVIA or Veeva provide CRM systems designed at registering and compiling nominative information for each targeted physician, including the call pressure (number of sales calls made to the physician), participation in clinical meetings, invitations for events, and other marketing activities. Also, demographic and professional information about each physician can be accessed by pharmaceutical companies in their CRM systems, either from internal sources (own company updating a physician master file) or from external sources (buying a physician database from a company such as IQVIA). This information can include doctor gender, age, graduation year, and other data that could help companies defining physician segments. Companies can also benefit from information gathered by the sales reps teams on doctor potential, behavior and attitudes, using for instance questionnaires to qualify physicians.

Additional non-prescription information may include information sold by HIOs and CRM providers such as physician-level segments on global call pressure (sum of the sales calls made by a specific group of pharmaceutical companies competitors, to prescribers, when available), to qualify doctors in terms of accessibility and interest by the industry (in the practical assumption that to a higher call pressure may be associated a higher physician potential). Also, HIOs may provide a syndicated classification of market potential (defined as the average classification given by a group of competitors to each physician, based on the data gathered by a CRM company working with several pharmaceutical companies).

Other non-prescription data may include primary market research on attitudinal information, bought from HIOs such as IQVIA and hMR, and market research agencies such as IQVIA, hMR, GfK, Intercampus and Spirituc, to name a few of the ones listed in the Portuguese Association of Market Research Companies (APODEMO, 2017) website. Data on population demographics can also be of interest to pharmaceutical companies, identifying not only the population density, but also the prevalence of specific diseases in each region, which can be then taken in consideration in the segmentation algorithms.

1.2.3.2 Segmentation

Kotler & Armstrong (2012) defined market segmentation as «*the process of dividing a market into distinct groups of buyers who have different needs, characteristics, or behaviors, and who might require separate products or marketing*» (p. 49). By other words, segmentation consists of creating clusters or segments of clients that have similar behavior or potential, using profiling information. Segmentation includes the analysis of data, and the development of the segmentation strategy (Deal, 2014).

Segmentation is a critical component of sales force effectiveness, since only with quality data will the downstream steps such as targeting and call planning be efficiently performed.

Sources of data for physician segmentation

MacLennan and MacKenzie (2000) explained that the segmentation makes use of a series of information sources, the more multifactorial the better. They underlined that these sources can be primary (already existing) and secondary (to be gathered) sources, internal (inside the company) and external, and can also include patients, physicians and payers, using formal and informal data. Several authors have addressed data sources for physician segmentation exercises. These references have been made both directly (with explicit references) and indirectly (inferred from the evidence from articles addressing pharmaceutical marketing, where the importance of data sources is evidenced). For instance, Zoltners, Sinha & Lorimer (2004) have not made an explicit reference to statistics institutes as external information sources for segmentation, but underilined the importance of using patient demographics information (where disaggregate prescription information is not available). This information type is mostly found in statistics institutes (providing total population, population disease prevalence, and other variables aggregated by region). Based on an analysis of relevant literature, table 1.2 was developed (shown below), which compiles the main internal and external sources of data for segmentation purposes.

Table 1.2 – Main pharmaceutical companies sources of data for physician segmentation

	Data sources for physician segmentation	Theoretical grounding (non-exhaustive)
Internal	CRM systems & company records	(Bhalla, Evgeniou & Lerer, 2004; Donaldson & Wright, 2004; Lundstrom & Wright, 2005)
	Pharmaceutical sales representatives	(Scharitzer & Kollarits, 2000; Fugh-Berman & Ahari, 2007)
External	Healthcare database providers	(Puschmann & Alt; 2001; Donaldson & Wright, 2005)
	Healthcare Information Organizations (HIOs) & Market research agencies	(Manchanda et al, 2005; Steinbrook, 2006; Fugh-Berman & Ahari, 2007; Fugh-Berman, 2008; Gagnon & Lexchin, 2008)
	Statistics Institutes	(MacLennan and MacKenzie, 2000; Zoltners, Sinha & Lorimer, 2004)

Summarizing, internal sources of data may include companies' own records (such as previous profiling information and segmentation), data compiled in CRM systems (which allow to register promotion activity such as number of detailing calls, invitations and participation in medical meetings and congresses), and PSRs (who can gather information from physicians in a more or less structured way, involving the use of questionnaires to collect insights to be incorporated in the segmentation exercise). External sources of data include HIOs (physician-level and brick-level prescription information), healthcare database providers (IQVIA as one of the main providers, with its OneKey database), market research agencies (conducting both ad-hoc and syndicated research on physician behaviors and attitudes, and identification of key opinion leaders), and statistics institutes (such as the National Institute of Statistics in Portugal, allowing the incorporation of demographics and disease prevalence by region).

Segmentation variables

Several segmentation variables can be use by pharmaceutical companies to develop physician segmentation exercises. Based on a series of scientific papers, complemented by the analysis of a limited number of industry practice documents developed by healthcare information organizations such as ZS Associates and IMS Health, we summarized a list of physician segmentation variables into three dimensions: healthcare institutions related variables, physician related variables, and populations and patients related variables.

The identification of the variables was performed using both literature directly addressing some segmentation variables, and literature that did not explicitly addressed variables in the

scope of physician' segmentation, but addressed its importance to the knowledge of the physicians, pointing different prescription behavior patterns, which we inferred as important variables for physician segmentation purposes. For instance, Gönül & Carter (2012) did not address explicitly the variable "number of insurance affiliations" as a segmentation variable. However, they demonstrated that the higher the number of insurance affiliations, the higher the number of prescriptions written by phsycians, and therefore we considered it as a relevant variable for physician segmentation.

- **Healthcare institutions related variables**

Size and type of healthcare institution can be a segmentation variable, as noted by Zoltners, Sinha & Lorimer (2004). They referred an example of a company that segmented hospitals in teaching or community hospitals, and small, medium, large and very large. They also noted that the number of beds can be used in segmentation exercises, as a surrogate measure of potential. Accessibility / restrictions is another possible segmentation variable. Linkewich & Margolis (2007) noted that it is important for pharmaceutical companies to know healthcare institutions' policies and restrictions, since physicians affiliated in restrictive institutions (for instance with formulary restrictions) may not be able to prescribe the promoted (detailed) medicines. In case of such restrictions, accessibility and call ROI may be compromised; therefore this information is valuable not only for segmentation but also for the targeting and call planning steps.

- **Physician related variables**

The list of possible physician-related variables used for their segmentation was organized in five groups.

The first group – **demographics** – includes physician age, a segmentation variable addressed by Bhalla, Evgeniou & Lerer (2004). Two examples can be presented for the utility of this segmentation variable. First, younger physicians might be more easily influenced than physicians with more experience (Malhotra et al, 2004), and second, heavy prescribers typically are more seasoned physicians (Gönül & Carter, 2012).

The second group – **geographics** – includes geographic location, which was also approached by Bhalla, Evgeniou & Lerer (2004). This variable can be used for instance if pharmaceutical companies want to give an extra weighting to physicians practicing at specific territories or bricks.

The third group – **practice** – includes four variables. Physician specialty was referred by Zoltners & Sinha (2005) and by Bhalla, Evgeniou & Lerer (2004) as a variable that helps determine a physician profile. For instance, specialists can be categorizes as influencers, and primary care physicians as imitators (Carter & Chitturi, 2007), and specialists typically evidence much higher levels of prescription than generalists (Gönül & Carter, 2012).

The number of insurance affiliations (or the number of insurance plans the doctors has agreements with) can also be a segmentation variable to qualify physician prescription potential. Gönül & Carter (2012) found that the higher the number of insurance affiliations, the higher the number of prescriptions written by phsycians. Another useful segmentation variable consists of the key opinion leader (KOL) status, since opinion leaders play an important role among their communities in creating positive sentiments in relation to new launched products (Bhalla, Evgeniou & Lerer, 2004). Nair, Manchanda & Bhatia (2010) underlined that key opinion leaders can have a high impact on pharmaceutical manufacturers, since detailing to these doctors can have a significant social multiplier. Cegedim, a French multinational providing market research services to the pharmaceutical industry, used to provide (until 2015) a service called "Physician Connect", where it identified the main KOLs in each therapeutic area.

Number of patients is another segmentation variable that can be used to segment physicians. Gönül & Carter (2012) found that a higher number of patient traffic (number of patients seen per week) can be a good indicator of a higher number of prescriptions for older drugs. Pharmaceutical companies can obtain this information directly from physicians. When this information is not available, other substitute variables can be used. For instance, office size and size of patients waiting area can also be relevant segmentation variables to consider, especially in the case of absence of disaggregated (nominative) data, as explained by Zoltners, Sinha & Lorimer (2004), as alternative variables that can be correlated with physician potential.

The fourth group – **market potential** – is one of the most used by pharmaceutical companies to segment physicians. It includes total past prescription volume by physician (Yi, Anandalingamb & Sorrell, 2003; Bhalla, Evgeniou & Lerer, 2004) and product category prescription volume (Bhalla, Evgeniou & Lerer, 2004; Zoltners, Sinha & Lorimer, 2004; Zoltners & Sinha, 2005). Kappe, Venkataraman & Stremersch (2017) also noted the importance of the doctor's prescription volume. Detailing allocation across doctors is

typically based on each doctor category prescription volume, as underlined by Manchanda and Chintagunta (2004). The category prescription volume is given by the sum of the drug sales of all competitors in a given therapeutic class, and represents the maximum current potential of a given physician. Another variable that can be used to segment physicians is the customer lifetime value. Linkewich & Margolis (2007) explained that by anticipating the physicians' lifetime value, companies can detect whether for instance a low prescriber today can be on a growing trajectory to become a more valuable prescriber in a few years. The concept of customer lifetime value was also addressed by Mulhern (1999). He explained that customer lifetime value (also known as customer profitability) «*is the net dollar contribution made by individual customers to an organization*» (p. 26), based on the «*anticipated future stream of purchases*» (p. 28). He performed calculations using physician prescriptions and discovered that a small percentage of physicians represent a substantial percentage of profits, shown below in figure 1.6.

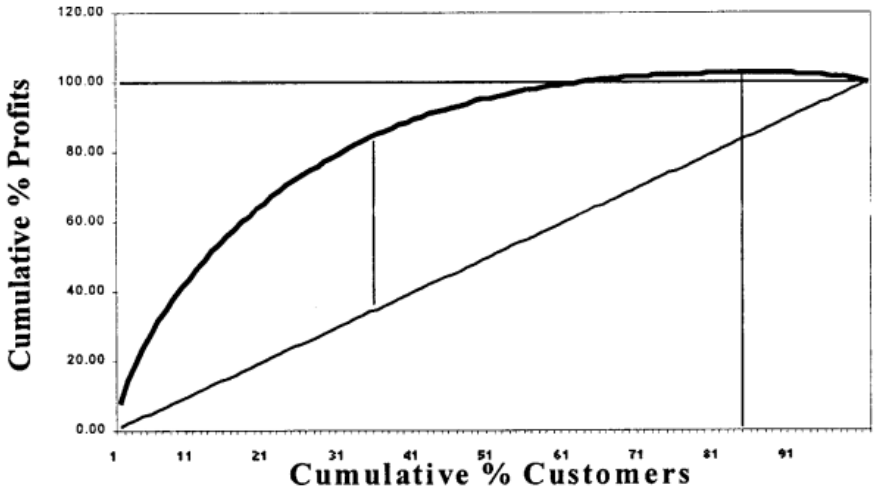


Figure 1.6 – Inverted Lorenz curve for physicians

Source: Mulhern (1999)

The fifth group – **usage and behavior** – includes a series of additional segmentation variables. Product prescription volume allows companies to calculate the product prescription share for each physician (considering disaggregate availability of product category and product prescription data). This variable was addressed by Bhalla, Evgeniou & Lerer (2004), Zoltners, Sinha & Lorimer (2004), and Zoltners & Sinha (2005). Zoltners, Sinha & Lorimer (2004) referred to this variable as physician loyalty to the company's products. Percentage of

new prescriptions is another segmentation variable that can be incorporated in segmentation algorithms.

Linkewich & Margolis (2007) explained that pharmaceutical companies can use the volume of prescriptions generated for patients who have received a prescription for a specific brand, for the first time. They also addressed another possible variable, consisting of product switching. They explained that pharmaceutical companies may analyze «*new prescription volumes to understand what percentage of a physician's prescriptions that initiate therapy actually represent switches to or from a given product*» (p. 4), also noting that this information is especially beneficial when managing competitive detailing (the concept of competitive detailing will be addressed later in this thesis). The analysis of product switching may also help identify physicians that are generating the new business to the company. Promotion responsiveness is another variable that can be used to segment physicians, as explained by Linkewich & Margolis (2007).

Physicians may not respond in a uniform way to promotion tools such as detailing, and it is useful to analyze the relation between individual physicians prescribing behavior and the call activity they received (response curve analysis). Yi, Anandalingamb & Sorrell (2003) and Manchanda, Rossi & Chintagunta (2004) also addressed the concept of promotion responsiveness. Even not explicitly referencing promotion responsiveness as a physician segmentation variable, its importance as so can be inferred from their reasoning. Kappe, Venkataraman & Stremersch (2017) addressed doctor's responsiveness to detailing importance.

Another segmentation variable is response to innovation, or adoption behavior. Zoltner, Sinha & Lorimer (2004) explained that pharmaceutical companies can segment doctors into early versus late adopters, having as a base each physician's willingness to try a new therapy. Call pressure is another variable which can be used to segment physicians. Manchanda, Rossi & Chintagunta (2004) noted that «*in general, higher-volume physicians receive greater detailing attention*» (p. 468). Competitive call pressure allows companies to know how many calls their competitors are deploying, also allowing to calculate the call pressure share (also known by share of voice). Disaggregate (nominative) level data can be of extreme value to companies.

Rao & Yamada (1988), Dong, Manchanda & Chintagunta (2009) and Liu et al (2016) addressed the concept of competitive detailing, and even not referring this variable as a

segmentation variable, its importance to help qualify physicians is inferred. Kappe, Venkataraman & Stremersch (2017) underlined the competitive detailing relevance in the scope of sales force decisions. Gönül & Carter (2012) also addressed that the variable PSR intensity (measured as the frequency of the encounters with PSRs, which can also be called call pressure) increases the likelihood that physicians will be heavy prescribers of more established drugs.

- **Population and patients**

The list of possible population and patient-related variables used for physician segmentation were organized in three groups. The first group – **geographics** – includes region, as addressed by MacLennan and MacKenzie (2000). The second group – **demographics** – includes patient demographics (Zoltners, Sinha & Lorimer, 2004). This subgroup can include patient age and gender (MacLennan and MacKenzie, 2000; Linkewich & Margolis, 2007), and patient population (which may be calculated multiplying the population number by the disease prevalence in each region). Linkewich & Margolis (2007) explained that patient age can be especially important in specific cases, presenting an example where a company promoting a transdermal patch would benefit from directing their efforts to physicians treating mostly patients over 65 years of age.

Patient diagnosis is another possible segmentation variable. Fugh-Berman (2008) noted that HIOs buy anonymized patient medical records, allowing them to know to which patient populations and diagnoses the prescriptions were directed to. This information can then be sold to pharmaceutical companies, which can use it for segmentation purposes (linked to physician data). Income can also be included as a segmentation variable (MacLennan and MacKenzie, 2000). It can be available from the national statistics institutes. For instance, the National Statistics Institute of Portugal provides regional information on purchasing power, which can be added to a segmentation algorithm.

Population purchase power can be of special interest in the case of non-reimbursed or high-cost treatments. Another segmentation variable which can be used is patient possession of prescription health insurance coverage. Gönül & Carter (2012), when characterizing high prescriber physicians, underlined that the higher the density or proportion of patients with health insurance, the higher the number of prescriptions written by the physician for established drugs. Datta & Dave (2016) also found that if the physician knows that the patient

has prescription private insurance, then he or she will be more like to prescribe a more expensive branded drug.

The third group – **psychographics** – consists of patient lifestyle and personality (MacLennan and MacKenzie, 2000), patient needs (Greengrove, 2002), which may discover unmet needs or current displeasure with existing treatments, and patient compliance and persistence. Linkewich & Margolis (2007) explained that patient compliance and persistence can substantially vary from doctor to doctor, and that pharmaceutical companies have the interest of identifying those physicians whose patients appear to evidence lower levels on this variable.

Given the segmentation variables described in the last paragraphs, there are other important aspects to underline. **First**, many pharmaceutical companies use a combination of market potential and physician behavior (especially product loyalty) to develop segmentation matrixes (Zoltners, Sinha & Lorimer, 2004).

Second, and related to the first, the use of prescription data is almost a standard practice across the pharmaceutical industry (Bhalla, Evgeniou & Lerer, 2004). Yi, Anandalingamb & Sorrell (2003) also noted that physician-level prescription volume may be the main segmentation variable used, since it provides the current prescription behavior of doctors, both in terms of number of prescription of specific drugs and total number of prescription of a drug class. However, prescription volume alone may not be sufficient to help identify high volume prescribers (Gönül & Carter, 2012), which leads to the next point.

Third, there are variables that can be a direct representation of the market potential of a physician, and other variables that are surrogate approximations, whenever direct measures of potential are unavailable (Zoltners, Sinha & Lorimer, 2004). The pharmaceutical industry uses both types of variables.

Fourth, related to the third, information can be aggregated (by territory or region, for instance), or disaggregated (by physician). Wherever disaggregate (nominative) information is available and allowed, direct measures can be more easily used (such as in the USA). In many other countries (such as Portugal and other European countries), physician-level prescription information is not allowed (only aggregated drug sales information, by territory or brick), and therefore a combination of direct (however aggregate) and surrogate measures may be needed to reach an approximation of physician prescription potential.

Fifth, pharmaceutical companies can use other segmentation variables, not found in the literature. As an example, the variable hospital revenues, which are generally tracked directly by pharmaceutical companies. By knowing the number of physicians per hospital, companies can calculate the average physician prescription potential. Another example can be the data collection regarding attitudinal variables, with primary market research using a representative sample of physicians, whose answers will be extrapolated to the specialty's universe.

Evidence from the previous pages regarding segmentation variables was summarized in table 1.3 below. It was built, as explained above, considering both the direct and indirect references to each variable as a segmentation contribute to quantify physician prescribing potential.

Table 1.3 - Summary of the main variables used to segment phsycians

		Segmentation variable	Theoretical grounding (non-exhaustive)	Data sources (adapted from MacLennan and MacKenzie (2000)	Type (adapted from Zoltners, Sinha & Lorimer, 2004)	Aggregation level
Healthcare institutions		Size and type	(Zoltners, Sinha & Lorimer, 2004)	External	Surrogate	Aggregate
		Accessibility / restrictions	(Linkewich & Margolis, 2007)	External	Surrogate	Aggregate
Physician	**Demographics**	Age	(Bhalla, Evgeniou & Lerer, 2004; Malhotra et al, 2004; Gönül & Carter, 2012)	Internal / External	Surrogate	Physician
	Geographics	Geographic location	(Bhalla, Evgeniou & Lerer, 2004)	Internal / External	Surrogate	Physician
	Practice	Specialty	(Bhalla, Evgeniou & Lerer, 2004; Zoltners & Sinha, 2005; Carter & Chitturi, 2009; Gönül & Carter, 2012)	Internal / External	Surrogate	Physician
		Number of insurance affiliations	(Gönül & Carter, 2012)	Internal / External	Surrogate	Physician
		Key opinion leader (KOL) status	(Bhalla, Evgeniou & Lerer, 2004; Nair, Manchanda & Bhatia, 2007)	Internal / External	Surrogate	Physician
		Number of patients	(Gönül & Carter, 2012)	Internal / External	Surrogate	Physician
		Office size	(Zoltners, Sinha & Lorimer, 2004)	Internal / External	Surrogate	Physician
		Size of patient waiting area	(Zoltners, Sinha & Lorimer, 2004)	Internal / External	Surrogate	Physician
	Market potential	Total prescription volume	(Yi, Anandalingamb & Sorrell, 2003; Bhalla, Evgeniou & Lerer, 2004; Kappe, Venkataraman & Stremersch, 2017)	External	Direct	Physician
		Product category prescription volume	(Bhalla, Evgeniou & Lerer, 2004; Zoltners, Sinha & Lorimer, 2004; Zoltners & Sinha, 2005)	External	Direct	Physician
		Physician lifetime value	(Mulhern, 1999; Linkewich & Margolis, 2007)	Internal / External	Direct	Physician
	Usage & Behavior	Product prescription volume / share (loyalty)	(Bhalla, Evgeniou & Lerer, 2004; Zoltners, Sinha & Lorimer, 2004; Zoltners & Sinha, 2005)	External	Direct	Physician
		Percentage of new prescriptions	(Linkewich & Margolis, 2007)	External	Direct	Physician
		Product switching	(Linkewich & Margolis, 2007)	Internal / External	Direct	Physician
		Promotion responsiveness / Detailing responsiveness	(Yi, Anandalingamb & Sorrell, 2003; Manchanda, Rossi & Chintagunta, 2004; Linkewich & Margolis, 2007; Kappe, Venkataraman & Stremersch, 2017)	Internal / External	Surrogate	Physician
		Adoption behavior / response to innovation	(Zoltners, Sinha & Lorimer, 2004)	Internal / External	Surrogate	Physician
		Call pressure / PSR intensity / Competitive call pressure / call pressure share (competitive detailing)	(Rao & Yamada, 1988; Dong, Manchanda, Rossi & Chintagunta, 2004; Manchanda & Chintagunta, 2009; Gönül & Carter, 2012; Liu, Gupta, Venkataraman & Liu, 2016; Kappe, Venkataraman & Stremersch, 2017)	External	Surrogate	Physician
Population and patients	**Geographics**	Region (territory / brick)	(MacLennan and MacKenzie, 2000)	External	Surrogate	Aggregate
	Demographics	Patient demographics (age, gender, patients population, ...)	(MacLennan and MacKenzie, 2000; Zoltners, Sinha & Lorimer, 2004; Linkewich & Margolis, 2007)	External	Surrogate	Aggregate
		Patient diagnosis	(Fugh-Berman, 2008)	External	Surrogate	Physician
		Income / purchase power index	(MacLennan and MacKenzie, 2000)	External	Surrogate	Aggregate
		Health insurance / prescription plan coverage	(Gönül & Carter, 2012; Datta & Dave, 2016)	Internal / External	Surrogate	Physician
	Psychographics	Patient lfestyle, personality	(MacLennan and MacKenzie, 2000)	Internal / External	Surrogate	Physician
		Patient needs	(Greengrove, 2002)	Internal / External	Surrogate	Physician
		Patient compliance and persistence	(Linkewich & Margolis, 2007)	Internal / External	Surrogate	Physician

Segmentation algorithms

Segmentation exercises may be developed either internally using the company own resources, or externally, subcontracting a third party, usually a HIO (in Portugal, the main companies providing physician segmentation services are IQVIA and hMR).

After collecting data from internal and external sources, companies compile information in a segmentation, or statistical package (SPSS, for instance) spreadsheet. Segments identification can therefore follow using two methods: one more advanced consisting of cluster analysis, and one simpler consisting of percentiles cut points. Regarding the former method, Deal (2004) highlighted that cluster analysis can be found and used in many sectors including health disciplines, specifically for physicians segmentation. Concerning the later method, Anandalingamb & Sorrell (2003) and Yi, Zhou & Park (2011) suggested that companies usually divide physicians in 10 equal segments (deciles), where the first decile represents the lowest prescribers, and the last decile represents the highest prescribers.

Segmentation algorithms may differ depending on the type of data available. The next two sub-topics will address two different scenarios.

- **Physician-level prescription data available**

In this scenario, companies can segment physicians using one or more segmentation variables. If the choice is to use one variable only, for instance a specific drug prescription volume, then the exercise is relatively straightforward by using either clusters analysis or deciles. Should the choice be to use two variables, for instance physician-level prescription volume data on drug class, and individual drug, the segmentation options could basically include three possibilities: one is cluster analysis, using a statistical software package; another is combining the two variables into one single score (giving weights to each of the variables according to its importance or marketing priority); and another is to create a segmentation matrix, with two axis, where one axis represents the doctor potential (measured by the number of drug-class prescriptions), and other axis represents the specific brand utilization (it can also be called penetration, or loyalty). More than two variables can also be used, either by combining them into one or two axis, or creating a third axis (with attitudinal data, for instance). Kumar (2005) highlighted these three approaches, where the second is similar to the one highlighted by Zoltners, Sinha & Lorimer (2004), combining market potential and loyalty (measured as the

percentage of the own brand prescriptions on the total prescriptions of a specified drug class), here shown in figure 1.7:

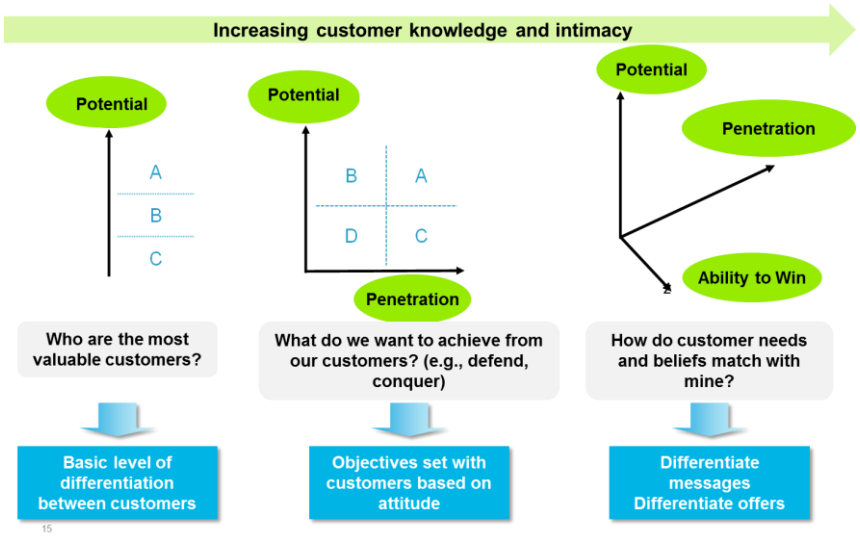


Figure 1.7 – Segmentation tactics

Source: Kumar (2015)

We will now briefly present some very simple, non-cluster analysis practical examples of different segmentation tactics that can be used in physician segmentation using individual-level prescription data.

The first example uses one variable only, shown in table 1.4. Deciles can be computed and each physician will be classified into a different decile.

Table 1.4 – Example of deciles segmentation algorithm using one variable

	Nr of drug A prescriptions	Decile
Physician 1	200	D9
Physician 2	23	D1
Physician 3	32	D2
Physician 4	64	D6
Physician 5	64	D6
Physician 6	213	D10
Physician 7	52	D3
Physician 8	90	D8
…	…	

Source: own elaboration

The second example consists of using two variables (shown in table 1.5, combining their scores into one single variable, and then applying deciles (for exemplification purpose, a 50% weight was applied to both variables).

Table 1.5 – Example of deciles segmentation algorithm combining two variables into one

			50%	50%		
	Nr of Prescriptions		Score		Weighted score	Decile
	Drug class	Drug A	Drug class	Drug A		
Physician 1	342	200	86%	94%	90%	D10
Physician 2	100	23	25%	11%	18%	D2
Physician 3	34	32	9%	15%	12%	D1
Physician 4	400	64	100%	30%	65%	D7
Physician 5	75	64	19%	30%	24%	D3
Physician 6	301	213	75%	100%	88%	D10
Physician 7	159	52	40%	24%	32%	D5
Physician 8	342	90	86%	42%	64%	D7
…	…	…	…	…	…	…

Source: own elaboration

A third example can be computed by combining the two nominative variables (drug class and drug A prescriptions) into a matrix, shown in table 1.6.

Table 1.6 – Example of matrix segmentation using two variables

					Axis		
	Nr of Prescriptions		Score		Potential = Y	Penetration = X	Segment
	Drug class	Drug A	Drug class	Drug A (penetration)			
Physician 1	342	200	86%	58%	High	High	A
Physician 2	100	23	25%	23%	Low	Low	D
Physician 3	34	32	9%	94%	Low	High	C
Physician 4	400	64	100%	16%	High	Low	B
Physician 5	75	64	19%	85%	Low	High	C
Physician 6	301	213	75%	71%	High	High	A
Physician 7	159	52	40%	33%	Low	Low	D
Physician 8	342	90	86%	26%	High	Low	B
…	…	…		…	…	…	…

Source: own elaboration

In this third example, the two axes (Potential (Y), consisting of the drug class prescriptions, and Penetration (X), consisting of the ratio between drug A prescriptions and drug class prescriptions) were classified in high and low, based on a simple criteria (percentile 50%). They were then classified into A, B, C and D segments (Kumar, 2015). Plotting both scores into a scatter plot chart allows a more visual and pragmatic view of the segments. Segment A represents the quadrant that the company should defend. In this very simplified and illustrative example, it represents 37% of the total market potential, 56% of the drug A prescriptions and has an average drug A penetration of 65%. Segment B represents the quadrant characterized by physicians who are heavy prescribers of competitors' drugs, but evidence low prescriptions of drug A, so there is market to conquer. It represents 42% of the total market potential, 21% of the drug A prescriptions and has an average drug A penetration of 21%. Segment C represents the quadrant where the tactic may be to maintain or secure the current competitive position. It represents 6% of the total market potential, 13% of the drug A prescriptions and has an average drug A penetration of 90%. Finally, segment D is characterized by both low potential and low drug A penetration, representing 15% of the total market potential, 10% of the drug A prescriptions and has an average drug A penetration of 28%. Figure 1.8 presents a possible example.

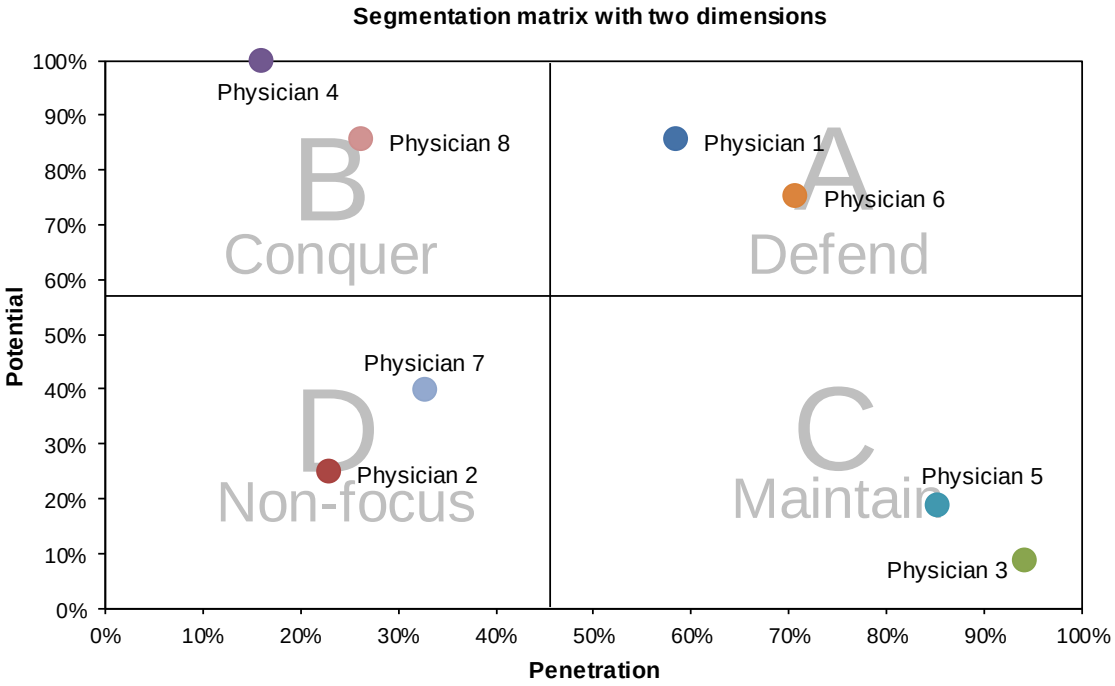


Figure 1.8 – Example of matrix segmentation with two dimensions

Source: Adapted from Kumar (2015)

This type of matrix may help industry practitioners to gain insights on which segments to prioritize, in the scope of targeting.

Zoltners, Sinha & Lorimer (2004) provided a similar example of segmentation using the same variables (market potential and client loyalty), yet using nine distinct segments. The result is shown in figure 1.9.

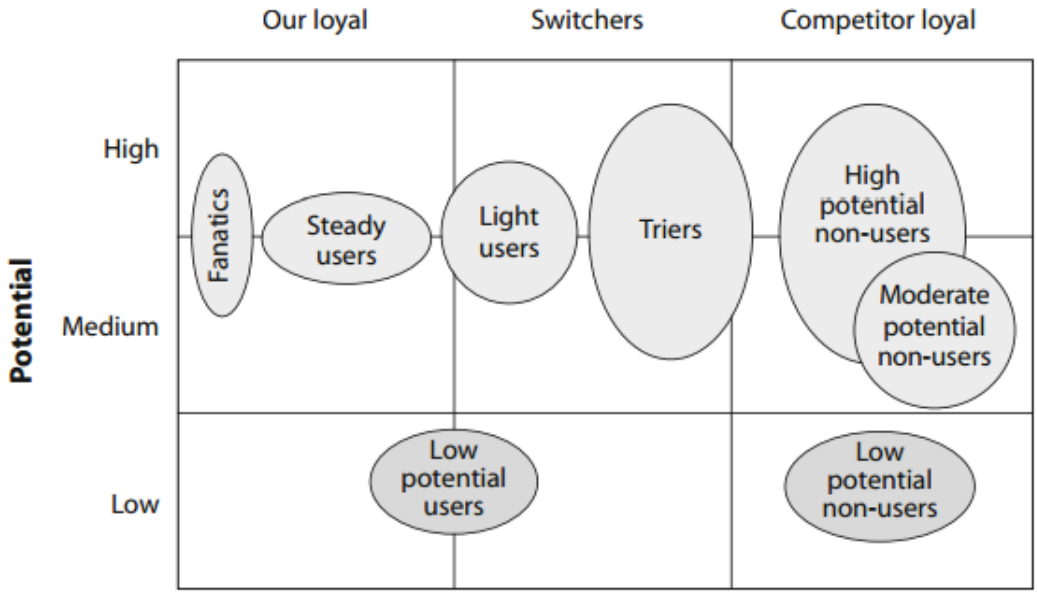


Figure 1.9 – Physician segmentation example using nine segments

Source: Zoltners, Sinha & Lorimer (2004)

Despite its higher complexity (using nine different segments), this type of segmentation may be very useful by allowing companies to study and understand differences between segments, helping the salespeople conceptualize segment differences (strong segment names), customizing the resources (selling time) and delivering the most effective detailing sales messages for each physician segment (Zoltners, Sinha & Lorimer, 2004).

Before moving to the scenario where physician-level prescription is not available, we underline a note for reflection about using prescription information only. As addressed previously in this thesis, Gönül & Carter (2012) studied the attributes that characterize heavy prescribers of older and newer drugs, and found that not only the number of prescriptions but also other relevant variables may explain a physician potential in terms of heavy prescribing. As covered before, these attributes more associated with stronger established drug prescribing may include being a specialist, being more experienced, having a higher call pressure from

PSRs, having a high number of prescriptions in all therapeutic areas, receiving more PSRs at their offices, and allowing PSRs more time for their visits. Gönül & Carter (2012) suggested that using prescription volume alone to develop physician segmentation may be misleading since it may lack other relevant variables that help identify heavy prescribers.

- **Physician-level prescription not available**

When physician-level prescription data is not available, segmentation algorithms can also be developed. Let us assume that a Portuguese pharmaceutical company has access to the information shown in table 1.7.

Table 1.7 – Example of available information for a segmentation exercise – raw data

		Brick-level data				Physician-level data					
	Brick	Drug A prescriptions	Population with disease	Purchase power index	Nr prescribers	Calculated avg Pop. per doctor	Calculated avg nr. Rx per doctor	Call pressure (industry)	Syndicated potential	KOL	Current segment (rep)
Physician 1	1	2300	7150	90	4	1788	575	45	A	Yes	B
Physician 2	2	2347	13847	88	10	1385	235	40	A	No	A
Physician 3	3	1001	5255	87	4	1314	250	39	A	No	A
Physician 4	4	3400	18870	70	24	786	142	26	B	No	B
Physician 5	5	2410	10243	64	23	445	105	30	B	Yes	B
Physician 6	6	980	5978	66	10	598	98	23	B	No	C
Physician 7	7	432	1598	57	9	178	48	34	C	No	C
Physician 8	8	256	1357	50	6	226	43	17	C	No	C
Physician 9	9	42	151	45	2	76	21	16	C	No	D

Source: own elaboration

Part of the dataset includes brick-level information (number of drug A prescriptions, population with disease treated by drug A, population purchase power, and number of prescribers), and physician-level information (the calculated number of patients in the brick per doctor, the calculated average number of drug A prescriptions per doctor, the sum of the number of visits received by the companies promoting drug A competitors, the average classification that the competitors give to each doctor, the fact that the doctor is a KOL or not, and the current classification developed internally based on the data collected by the PSRs). Indexes can be created and a weighted average can be computed. The weights of the variables (brick-level only) can be calculated using linear regression (brick prescriptions as the dependent variable); using conjoint analysis; using a simpler approach where project developers give weights based on their perceptions; or using mixed methods. A possible algorithm configuration may be the one shown in table 1.8:

Table 1.8 – Example of available information for a segmentation exercise – calculated data

		10%	10%	30%	10%	20%	10%	10%		
		Brick-level data	Physician-level data						100%	
	Brick	Purchase power index	Avg Pop. w/ disease per doctor	Avg Rx per doctor	Call pressure (industry)	Syndicated potential	KOL	Current segment (rep)	Weighted score	Segment
Physician 1	10	100%	100%	100%	100%	100%	100%	75%	98%	A
Physician 2	4	98%	77%	41%	89%	100%	0%	100%	69%	B
Physician 3	17	97%	74%	44%	87%	100%	100%	100%	79%	B
Physician 4	35	78%	44%	25%	58%	75%	0%	75%	48%	C
Physician 5	75	71%	25%	18%	67%	75%	0%	75%	44%	C
Physician 6	142	73%	33%	17%	51%	75%	0%	50%	41%	C
Physician 7	25	63%	10%	8%	76%	50%	0%	50%	32%	D
Physician 8	68	56%	13%	7%	38%	50%	0%	50%	28%	D
Physician 9	93	50%	4%	4%	36%	50%	0%	25%	23%	D

Source: own elaboration

Each variable was given a specific weight to allow the calculation of the final score (while in a company setting the weights should be defined using a structured approach, the weights here shown are intended to serve for illustration and calculation purposes only). Segments can then be defined based in percentiles. For instance, A segment represents scores higher than percentile 90, B segments higher than percentile 65, and C segments percentile 35. Using a second alternative, segments can be defined based on their contribution to the sum of weighted score, here representing the cumulative potential. For instance, A segment should capture 40% of the cumulative potential, segment B 30%, segment C 20% and segment D 10%. A third alternative would consist of defining curve slope at which segments could be defined. For instance, segment A cut point would be when the slope reached 2,5, segment B 1,5, and so on.

Even in the absence of physician-level prescription data, some pharmaceutical companies develop segmentation exercises using physician-level extrapolated prescription. This is typically done using market research questionnaires applied to a relevant and representative sample of physicians. Questionnaire can include questions about number of drugs prescribed, brand preference, prescription potential (total drug class prescription, number of patients seen per week, and other), prescription attitude (willingness to adopt new drugs), and other insights that can help understand physician prescription profiles. Collected information can then be extrapolated from the sample to the whole physician universe (sampling frame), based on physician characteristics (which are available in HIO physician databases). For instance, IMS

Health has ran such types of projects using both regression and artificial neural networks techniques, obtaining extrapolated results that can then be used to optimize an individual-level segmentation. If the extrapolation method is well calibrated and validated (comparing real answers to the ones predicted by the extrapolation), companies can then use one of the segmentation methods available whenever physician-level prescription data is available. Figure 1.10 illustrates a table which visually explicates the data extrapolation logic using artificial neural networks.

Doctor ID	Interviewed?	Gender	Age	Specialty	Type of practice	Nr of working places	Coord. / Manag. position	Drug class call pressure	Brick	Other …	Nr of drug A Rx per week	Nr of drug classe Rx per week	Nr of patients w/ pathology per week	Rx attitude (new drugs adoption)	Other …
1	Yes	M	42	Spec. 1	Public	1	No	54	B023	…	6	14	20	Innovator	…
2	Yes	M	46	Spec. 2	Private	2	No	42	B043	…	14	15	25	Conservative	…
3	Yes	F	64	Spec. 2	Public	1	Yes	76	B154	…	4	20	30	[illegible]rly adopter	…
4	Yes	M	32	Spec. 1	Private	1	No	32	B236	…	3	10	13	[illegible]nservative	…
5	Yes	F	35	Spec. 1	Mixed	3	No	23	B078	…	7	12	12	[illegible]nservative	…
6	Yes	F	47	Spec. 1	Mixed	3	Yes	57	B027	…	7	17	24	[illegible]novator	…
7	Yes	F	67	Spec. 2	Public	1	Yes	73	B001	…	21	24	26	Early adopter	…
…	Yes	M	56	Spec. 1	Priva[illegible]	4	No	49	B222	…	24	32	40	Late adopter	…
400	Yes	M	40	Spec. 2	Pu[illegible]c	1	No	42	B104	…	0	10	13	Innovator	…
401	No	F	54	Spec. 1	Pu[illegible]ic	1	Yes	82	B004	…	2	25	34	Innovator	…
402	No	M	34	Spec. 1	Public	1	No	35	B027	…	12	14	23	Early adopter	…
403	No	M	32	Spec. 2	Private	2	No	68	B148	…	6	13	25	[illegible]y adopter	…
404	No	F	31	Spec. 1	Public	1	No	14	B198	…	3	9	11	Innovator	…
405	No	F	47	Spec. 2	Mixed	3	No	57	B050	…	24	28	31	Innovator	…
406	No	M	68	Spec. 2	Mixed	5	Yes	79	B021	…	8	32	43	Conservative	…
…	No	F	46	Spec. 1	Public	1	Yes	36	B142	…	15	27	36	Conservative	…
4000	No	F	43	Spec. 2	Private	2	No	22	B200	…	10	19	21	Innovator	…

A

B

C

Quadrant **A)** Nominative data typically available at HIO physicians databases

Quadrant **B)** Real answers

Quadrant **C)** Extrapolated answers

Figure 1.10 – Example of available information for a segmentation exercise – extrapolated data

Source: own elaboration

In this example containing illustrative data only, an artificial neural networks software package can learn based on the real answers and the doctor profiles, and extrapolate answers to non-interviewed doctors, using their characterization data available at physician databases.

1.2.3.3 Targeting

Finalized the segmentation step, the next step consists of the physician targeting. Market targeting «*involves evaluating each market segment's attractiveness and selecting one or more segments to enter*» (Kotler & Armstrong, 2012; p. 49). By other words, it can be described as the process of selecting the eligible segments to impact with marketing activities.

Targeting procedures here described will consider, again, two scenarios: one with physician-level prescription data, and another with aggregate-level prescription data. Dong, Manchanda & Chintagunta (2009) defined targeting as «*setting marketing policy differentially for different customers or segments*» (p. 207).

Physician-level prescription available

In order to prepare the targeting exercise, the next step consists, according to Yi, Anandalingamb & Sorrell (2003), of «*developing a promotional response function for each decile that best characterizes the relationship and tradeoff between the detailing frequency provided to the physicians in the decile (…) and the prescriptions they wrote for the detailed drug during this time*» (p. 534). This can be done by combining both individual call pressure (number of details) and number of prescriptions per physician over a period of time. As a result, individual concave sales-response curves can be obtained for each decile (Yi, Anandalingamb & Sorrell, 2003), here theoretically shown in figure 1.11.

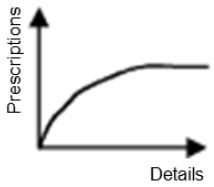


Figure 1.11 – Concave sales-response curves (detailing)

Source: Yi, Anandalingamb & Sorrell (2003)

Figure 1.12, obtained from Yi, Anandalingamb & Sorrell (2003)'s data, presents a practical result obtained when analyzing the responsiveness of decile 9.

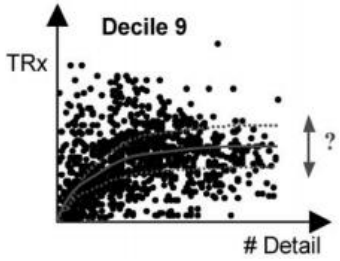


Figure 1.12 – Decile 9 calculated sales-response curve

Source: Yi, Anandalingamb & Sorrell (2003)

A further step was proposed by Yi, Anandalingamb & Sorrell (2003), consisting of linear programming, with the goal of determining the optimal detailing frequency for each one of the physicians' deciles. As noted by the researchers, higher-decile physicians typically receive more visits (details) from the PSRs, when compared to lower-decile physicians. The targeting exercise takes into consideration the diminishing marginal returns on sales, on each quartile, to then define the deciles to impact with detailing activities. This type of approach will be addressed later in the sizing topic models, specifically the sales response models with diminishing marginal returns of detailing on prescription volume.

At the end of this targeting exercise, a company can decide to target, for instance, deciles (segments) 1 to 4 with detailing activities.

Physician-level prescription not available

The lack of individual-level prescription information does not allow a direct calculation of segment-level sales response curves. Instead, aggregate response curves can be calculated using brick-level data (prescriptions vs calls), but this exercise may only allow generalized insights about the causal effect of aggregate detailing effort on aggregate prescription behavior. One alternative would be to target all doctors in the bricks most responsive to detailing efforts, but not all doctors are the same, and the targeting exercise would involve severe flaws.

Without nominative prescription information, the targeting may be decided either by analyzing each segment contribution in terms of cumulative potential (the score calculated during the segmentation step), or by using «*mathematical constructs such as modified pareto-curves (logarithmic) to simulate the sales distribution in the segment*» (Kumar, 2015). This second method may use assumptions on the concavity of the pareto curve, and apply it to the individual segmentation scores, giving a notion of prioritization of the physicians to target. However, it would still incorporate several sources of bias, including the lack of knowledge about the proportion of prescriptions generated by each segment, and the fact that the segmentation score may be an approximation only to the real prescription potential of the individual physicians.

Summarizing, the decision on which segments to target in the absence of physician-level prescription data will depend on the method used by the company to define the segments cut

points, and is also linked to the assumptions that are valid for the sales force sizing exercise (to be detailed in the Sizing topic).

1.2.3.4 Call planning

The call planning process cannot be dissociated from the upstream processes (given that it will depend on the segmentation and targeting) and downstream processes (since the sales force sizing will mostly depend on the call planning decisions).

Call planning consists of the «*planning of the activities related to drug promotion and sale*», a definition proposed by Agnetis, Messina & Pranzo (2009; p. 267). These researchers noted that the purpose of call planning is to optimize a measure of total sales over a period of time, composed of a finite number of time periods, given a defined set of physicians (previously segmented and targeted). In this scope, the call planning builds on top of the targeting exercise (which defined the optimal visit frequencies for each segment or decile). Call planning therefore allocates calls for each physician segment. As noted by Kappe, Venkataraman & Stremersch (2017), there are three main attributes that determine the number of visits a doctor receives: doctor's prescription volume, doctor's responsiveness to detailing, and competitive detailing.

Call planning may have different approaches depending on the existence of physician-level prescription data, or aggregate-level only.

Physician-level prescription data available

In this scenario, which may be considered the most desirable by using physician-level prescription information (but only available in the USA and in New Zealand), the call planning exercise will be based on the optimal number of calls that maximize each doctor segment. Table 1.9 represents a simplified, illustrative example of a possible call planning using deciles (1 to 4).

Table 1.9 – Example of call planning using deciles

				Absolute number of calls	
	% of Rx	Nr of phsycians	Optimal nr of calls per 3m cycle / physician	Per cycle	Per year (4 cycles)
Segment (decile) 1	40%	2500	3	7500	30000
Segment (decile) 2	25%	2500	2	5000	20000
Segment (decile) 3	15%	2500	1	2500	10000
Segment (decile) 4	10%	2500	0,5	1250	5000
	90%	**10000**		**16250**	**65000**

Source: own elaboration

Using these assumptions (and considering a hypothetical optimal number of calls calculated in the segmentation and targeting steps based on sales response curves by segment), the necessary number of calls would reach 65 thousand per year (four three-month cycles).

Physician-level prescription data not available

In the scenario where segment-level sales response curves are not available, the call planning exercise will have to observe a less scientific approach. For instance, if aggregate level response curves by brick signal a very positive and significant relation between details and prescriptions, then company deciders may consider a possible increase in call pressure to doctors working on specific bricks. Another option can be to use anecdotal evidence or rules of thumb regarding the optimal number of calls per doctor segment (example: A segment should be visited no less than 3 times per cycle, B segments 2 times, and so on). By computing the number of calls per segment, a table similar to table 1.9 can be obtained.

1.2.3.5 Sales force sizing

Sales force sizing is one of the most important processes or steps regarding sales force effectiveness, since the result of it may have a substantial impact on companies cost structure (fixed, using company own resources, or variable, using external sales forces). Mantrala et al (2010) underlined that pharmaceutical companies must decide on the optimal sales force size in dynamically changing environments, and the relevance of adjusting sizing decisions considering the different product life cycles. They also noted that, in a product launch phase, companies typically make a stronger initial investment allowing a stronger sales force size. Since forces are a significant investment for pharmaceutical companies and are usually the main tool companies use to promote its products, companies are willing to allocate important resources to guarantee that sales forces are the correct size (Zoltners, Sinha & Lorimer, 2004).

Sales force sizing consists of the decision on the number of PSRs to allocate to promotion activities, and can be developed using a series of methods, given specific assumptions. Some of the methods are based on an initial restriction, and others incorporate cost vs benefit analysis. According to Kumar (2015), and to Zoltners, Sinha & Lorimer (2004), several sales force sizing methods can be implemented, which will be covered in the next sub-topics.

Status Quo

This method consists, according to Kumar (2015), of the maintenance of the previous year number of PSRs. It may be relevant in situations where the share of voice and market share appear to be stabilized, and no sales force disruption is advisable. Zoltners, Sinha & Lorimer (2004) called this method "the same as last year" rule, highlighting that it could be risky since many exogenous (economy growth, competitors changes in sizing) and endogenous (cancellation of new product launch, and other) variables may have taken effect from last year assumptions.

Pay as you go

According to Zoltners, Sinha & Lorimer (2004), pharmaceutical companies use the "pay as you go" sizing strategy usually when companies have a small sales force to support a product promotion, and managers decide to wait to see the results of previous year sizing decisions on sales, before approving any suggestion to increase the number of PSRs. According to the researchers, it uses a very prudent and conservative decision-making process, yet it may involve substantial opportunity costs (by not deploying the sufficient number of PSRs, in markets with very positive sales response curves). Mantrala et al (2010) also referred the "pay as you go" strategy, where sales force size increases while sales also increase in the initial periods after product launch.

Chase the leader

Kumar (2015) noted that when a company wants to reach the same share of voice as the market leader, the "Chase the leader" strategy can be applied. Let us analyze a very simplified and illustrative example where drug A has a share of voice of 39% (drug A number of calls divided by the total number of calls in the competitive product perimeter), and company managers are seeking to match drug B (main competitor) share of voice. By increasing the number of calls to 80 thousand per year, drug A now has the same share of voice of drug B (table 1.10).

Table 1.10 – Chase the leader sizing scenario - before and after

	Before		After	
	Nr of calls	Share of voice	Nr of calls	Share of voice
Drug A	65000	39%	80000	44%
Drug B	80000	48%	80000	44%
Drug C	20000	12%	20000	11%
	165000	**100%**	**180000**	**100%**

Source: own elaboration

If we consider some assumptions regarding sales force productivity here shown in table 1.11, then the number of PSRs is simple to calculate, dividing the number of calls by the installed capacity per PSR.

Table 1.11 – Productivity assumptions per year, per PSR

Yearly productivity assumptions	
Nr of field days	210
Nr of calls per day	7
Installed capacity per rep	**1470**

Source: own elaboration

Table 1.12 evidences the number of PSRs before and after (rounded up):

Table 1.12 – Chase the leader sizing scenario - number of PSRs

	Before	After
Sizing of the sales force (number of PSRs)	45	55

Source: own elaboration

Observing these assumptions, the "chase the leader" scenario would imply 10 additional PSRs, in order to guarantee the same share of voice as the market leader (in a *ceteris paribus* scenario where drug B would not increase their call pressure on physicians).

Workload buildup

According to Kumar (2015), the workload buildup «*is a simple quantification model that calculates the total effort required based on our segmentation results, assumes a rep capacity, and thus, computes the total number of reps required*». This model uses the segments selected in the targeting exercise, the number of physicians in each segment, the coverage in each segment, the number of desired or optimal calls in each segment, and the field force installed capacity. Table 1.13 illustrates a simplified example of this model using matrix-type segmentation.

Table 1.13 – Workload buildup scenario

			Calls per year		
Segments	**Customers**	**% coverage**	**Calls per physician**	**Calls per segment**	**Total**
Defend	2000	100%	8	16000	120000
Maintain	4000	50%	4	8000	
Conquer	8000	100%	12	96000	
Non-Focus	6000	0%	0	0	

Source: adapted from Kumar (2015)

Dividing the total number of calls per year by the installed capacity per PSR (please see table 1.13), we obtain the sales force sizing for this scenario (120000 / 1470 = 82 PSRs (rounded up value)).

This model can be especially intuitive and useful in the case of working with non-nominative prescription information, as a first approach in terms of sizing. However, as highlighted by Kumar (2015), it uses a wrong and even risky assumption, that each physician is equal inside a segment, or, by other words, has the same potential, which is not certainly the case.

Profitable coverage

This model evaluates the effort versus the reward from incremental sales calls, as noted by Kumar (2015), and may solve the issues described regarding the workload buildup model. The profitable coverage model calculates the marginal return on targeting an additional customer in a segment, versus the marginal cost of sales force effort. As noted by Kumar (2015), this model will generate the recommended coverage as an output (rather than a discretionary estimation by the analyst). The model uses several inputs, starting with the value generated by each physician, the PSRs team cost, its installed capacity, the number of calls

per segment, and the desired profitability. Thus, it can be used in scenarios using physician-level prescription data.

Kumar (2015) proposed four steps to apply this model. The first step consists of the cost of effort calculation. Assuming a PSR would cost USD100000 per year (all direct and indirect costs), and an installed capacity of 1470 calls per year, we get a cost of ~USD68 per call. In the second step, and considering the target profitability we want to set, the calculation of the minimum profit by physician can be made (in the assumption that it is viable to target them). Table 1.14 summarizes the information so far.

Table 1.14 – Profitable coverage scenario – target profitability setting

Segments	Customers	Calls per physician, per year	Cost of Effort ($)	Target Profitability	Minimum Threshold of Return ($)
Defend	2000	8	544	0%	544
Maintain	4000	4	272	50%	408
Conquer	8000	12	816	-50%	408
Non-focus	6000	0	0	100%	0

Source: adapted from Kumar (2015)

In this scenario, Kumar (2015) set a low value to the target profitability regarding segments "Defend" (0%) and "Conquer" (-50%) with the goal of guaranteeing maximum coverage in those segments, even at the expense of negative return on some physicians (this may happen in segment "Conquer", where it is assumed, based on the target profitability, that we will accept targeting and visiting doctors who generate less than USD816 per year (to the limit of USD408, in order to capture as much additional market share as possible). Conversely, since the "Maintain" segment appears to be less important, we can set higher target profitability, where only doctors who generate a return equal or higher than USD408 would be targeted and detailed.

The third step suggested by Kumar (2015) consists of comparing the minimum threshold with the individual profits generated by each physician. At the end of this exercise, we obtain the coverage percentage in each segment (segment "Maintain" may not be 100% targeted). The fourth step consists of the calculation of the optimal sales force sizing.

Kumar (2015) underlined that this model allows the incorporation of differential sales return analysis in a segment, a model especially useful when incorporating physician-level prescription information.

An adaptation of this model can be used when using deciles-based segments, by performing a differential analysis of the profit generated versus the cost born regarding each physician. Let us assume a series of assumptions, shown in table 1.15.

Table 1.15 – Sales response – fixed marginal sales call cost

					Absolute number of calls	
	Nr of phsycians	Nr of physicians generating profit > call cost	% of physicians targeted	Optimal nr of calls per 3m cycle / physician	Per cycle	Per year (4 cycles)
Segment (decile) 1	2500	2500	100%	3	7500	30000
Segment (decile) 2	2500	2500	100%	2	5000	20000
Segment (decile) 3	2500	2500	100%	1	2500	10000
Segment (decile) 4	2500	1250	25%	0,5	312,5	1250
	10000	**8750**			**15312,5**	**61250**

Source: own elaboration

In this deciles scenario, and using a marginal sales call cost (set at USD68), we target the physicians that meet the criterion of profit > marginal sales call. In this illustrative example, let us assume that only 625 out of 2500 segment 4 physicians meet this criterion. Computing the values, we reach 61250 calls per year, which implies a sales force optimal sizing of 43 PSRs (61250 / 1470).

According to Kumar (2015), this model can also be used in the absence of physician level information, by using modified pareto-curves (logarithmic) to simulate the sales distribution in each segment.

Zoltners, Sinha & Lorimer (2004) addressed a similar sales force sizing model, called Target-return-per-call method, where companies calculate the sales force costs per call per segment, and the minimum return on investment of each segment. It allows, such as the approach proposed by Kumar (2015), the identification of which physician segments to cover and detail, how much time to spend with each segment, and how many PSRs are needed to cover those segments and physicians.

One of the flaws of this model (using matrix or deciles segmentation) is that it does not take in consideration the diminishing returns on prescriptions as a result of detailing activities. This limitation is addressed by another model covered in the next sub-topic (sales response curves). Another limitation is that it does not predict sales and profit consequences of alternative sizing decisions, as highlighted by Zoltners, Sinha & Lorimer (2004).

Sales Response

The sales response approach employs, as noted by Zoltners, Sinha & Lorimer (2004), the "sales force drives sales" concept directly. Sales response models are a more evolved version of the profitable coverage model. According to Kumar (2015), sales response models can incorporate the law of diminishing marginal returns on sales calls, using concave-shaped sales response curves. When used in the scope of deciles segmentation using physician-level data, by incorporating the marginal cost of one additional call, and considering the assumption that marginal product of labor (PSRs' calls, in the case) decreases with the increase of the installed sales force capacity, an optimal cut point, targeting and sizing can be achieved. Zoltners, Sinha & Lorimer (2004) noted that «*by determining the best sales force investment strategy for each market segment, it is possible to determine the profit-maximizing sales force size*» (p. 254), and that «*the optimal sales force size for the segment is when the contribution is maximized. This is the point where the contribution graph peaks. Sizing the entire sales force is accomplished by summing the segment-level data for all market segments*» (p. 254).

Sales response models can be built using both historical data and judgmental data, as suggested by Zoltners, Sinha & Lorimer (2004). They then noted that historical data can be cross-sectional (allowing the analysis of variation in call frequency across several sales territories) or time-series (permitting the analysis of call variation over time), while judgmental data can use sales managers insights and opinions on several sales force sizing scenarios in terms of sales forecast.

These sales response models for sales force sizing calculation were addressed on topic **Physician-level prescription available**, as a targeting method highlighted by Yi, Anandalingamb & Sorrell (2003).

Sales response models have been used to study the impact of detailing on prescription behavior. For instance, Montoya, Netzer & Jedidi (2010) used a forward-looking dynamic policy regarding detailing and sampling to optimize the current allocation policy of a

pharmaceutical company. By using a hidden markov model which accounted for the physician-level dynamics in prescription behavior, they were able to obtain an optimized number of details (calls) for each physician, reducing overall company spending by 20%, and increasing prescriptions by 61,9%. Sales response models were also used by Manchanda, Rossi & Chintagunta (2004). They recognized that «*high-volume physicians are detailed to a greater extent than low-volume physicians without regard to responsiveness to detailing*» (p. 467), and that high-volume physicians, but unresponsive to incremental detailing efforts, are detailed the most. The results obtained were an optimization of the number of details per physician, inducing a higher number of prescriptions.

Sales response models, despite their additional complexity in relation to simpler models, are more precise, by taking in consideration that the call pressure effectiveness is not always the same. After a certain threshold, saturation might become evident, where one additional detail will not produce a positive increment in the number of promoted drug prescriptions. These models also offer a series of other benefits, as addressed by Zoltners, Sinha & Lorimer (2004). They allow, at a macro level, alternative sales force sizing scenarios to be evaluated, and sales to be projected, using short and long-term exercises, by testing several competitive scenarios. At a micro level, they allow the simulation of physicians' prescription potential, for instance estimating the ROI of increasing the call frequency to a physician with lower loyalty, comparing with a physician with the same potential at the drug class, but with a higher call frequency, allowing the interpretation of sales response relationships (figure 1.13).

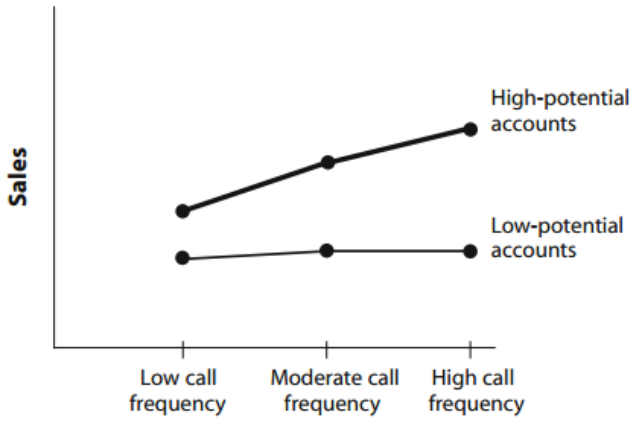


Figure 1.13 – A simple sales response relationship

Source: Zoltners, Sinha & Lorimer (2004)

Additional insights on sales force sizing

The literature on sales force sizing covers additional aspects of interest that may be relevant not only to the scientific community but also for industry practitioners. We will now briefly address some of those aspects.

In the scope of sales force sizing, downsizing is characterized by the reduction in the number of PSRs. It can be triggered by a merger (Zoltners & Sinha, 2005), or by other reasons, including the loss of exclusivity (LoE) of a drug (and generics entry as competitors), profitability reasons (need to decrease fixed costs), and the decision to substitute or complement traditional communication channels with new channels such as on-line (for instance e-detailing). In a downsizing situation, one major decision is to select the PSRs to leave (Zoltners & Sinha, 2005). Conversely, upsizing consists of the increment of new PSRs in the company sales force. Sales force sizing decisions can be generated by a series of reasons, including the launch of a new drug, the need to increase the share of voice for competitive reasons, and the need to increase profitability by taking advantage of the sales response curves analysis.

Scenario analysis is another relevant aspect decision makers in the pharmaceutical industry have to account for in sales force sizing decisions. Zoltners, Sinha & Lorimer (2004) underlined the importance of addressing risk management as an important part of the sizing decisions, since there are several exogenous variables that can substantially impact the sizing exercise, including economic uncertainty, competitors' tactics, or ability to launch a new product on time. They suggested that sales force sizing decisions may incorporate scenarios (ex: pessimistic, realistic and optimistic). Zoltners, Sinha & Lorimer (2004) also addressed the need of stakeholder validation in sales force sizing exercises, in order to incorporate the perspective of important stakeholders.

Kumar (2015) noted that the sales force sizing exercise, despite the higher or lower mathematical reasoning and optimization, is a complex process that demands caution, since it is embedded in human resources management, which demands prudency and reasonable stability. Therefore, the optimal sizing strategy, underlined Kumar (2015), must include other variables such as operational, legal and also emotional, in a medium-term horizon of at least three to five years. Also, decisions on sizing, and especially on eventual reductions on the number of PSRs, may be explained in light of the prisioner's dilemma, as proposed by Zolterns, Sinha & Lorimer (2004). They suggested that, due to high margins on promoted

products, even low incremental sales can bring additional profits, and companies do not want to risk being the first mover in sales force reduction, losing share of voice in the competitive market in the case its competitors kept their detailing pressure on physicians.

Kappe, Venkataraman & Stremersch (2017) proposed a method to investigate hypothetical and unprecedented salesforce policy changes of pharmaceutical manufacturers, using data from the statins drug class. They reached a very interesting conclusion: significant sales force size reductions are more likely followed by non-leaders when the initiative is taken by the market leader, and all firms benefit from increase profits. In the case, Lipitor competitors were more likely to reduce their sales force sizes in reaction to a significant reduction in Lipitor number of PSRs, than in the scenario where the initiative of sales force size reduction would have been taken by a non-leader. They also found that when companies decrease their salesforce sizing, «*they mainly decrease the reach of their detailing across doctors, rather than decreasing the number of details to the most-visited doctors*» (p. 5)

1.2.3.6 Sales force structure and design

According to Zoltners, Sinha & Lorimer (2004), sales force structure answers two main questions: the first is how to divide the sales activities among different types of salespeople, and the second is how to coordinate and control the activities to meet the company's objectives. And by answering these two questions, the researchers defend that «*sales force structure defines how the sales force will execute the sales strategy*» (p. 126). Sales force structure includes a series of decisions, shown below on figure 1.14.

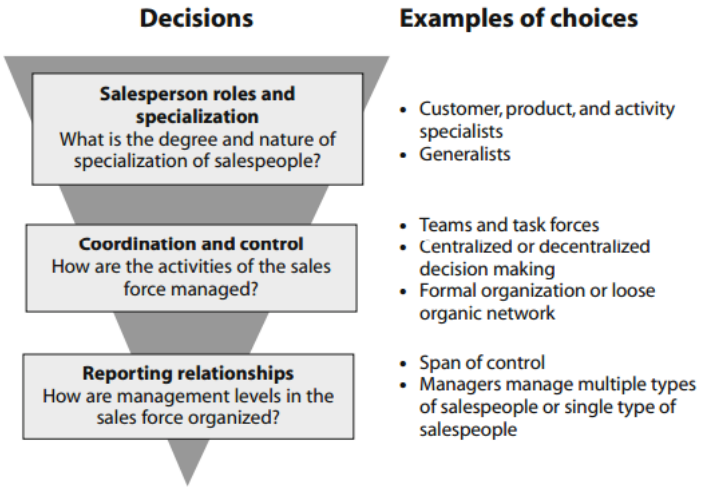


Figure 1.14 – Sales force structure decisions

Source: Zoltners, Sinha & Lorimer (2004)

As stressed by Zoltners, Sinha & Lorimer (2004), sales force structure has a direct impact on both customers and company.

Mantrala et al (2010) noted that pharmaceutical companies must decide on the type of salesperson to hire and allocate, whether they should be generalists (one salesperson promoting more than one product), or they should be product-specialized (two salespeople promoting two different products). Mantrala et al (2010) also highlighted the importance of the definition of sales roles and responsibilities as an area of decision in the scope of sales force structure, specifically concerning the existence of key account managers for institutional contact and negotiation, or PSRs only. Zoltners & Sinha (2004) referred the degree of specialization of pharmaceutical companies' sales force teams, which can be generalist, specialist, or both. They noted that, due to complex and diverse product lines, pharmaceutical companies may benefit from sales teams specialized by product. In cases where there are several products promoted that require specific PSR skills and backgrounds, a multiple sales teams scenario with product specialization may be advisable, where a company may promote different products to different medical specialties, using different sales teams.

A simple example may be a company detailing drug A to oncologists with a sales team, and detailing drugs B and C to general practitioners a different sales team. Regarding the number of sales teams, Zoltners, Sinha & Lorimer (2004) noted that many pharmaceutical companies have multiple product-based sales teams promoting medicines to physicians, also underlining that each team promotes its own product portfolio. Mantrala et al (2010) also addressed the importance of deciding the way the sales team will be organized, either product-based, or market-segment based.

Another decision regarding sales force structure is about the mirrored or synced structures. Mantrala et al (2010) explained that, with mirror teams, different PSRs from the same company promote the same drugs to the same physicians. Zoltners & Sinha (2005) referred this situation as mirrored structures, used by many companies to deploy almost identical sales territories, aiming to overlap multiple selling teams that will call common physicians. The goal is to increase the share of voice by having more PSRs promoting the drugs and increase the number of prescriptions. Mirrored structures may also be used to guarantee identical sales territories (number of targets), in a multiple team scenario. Zoltners, Sinha & Lorimer (2004) noted that this type of promotion allows companies to reach a higher frequency of contacts for

important drugs, impacting top potential prescribers, minimizing the impact of salesperson turnover, increasing the culture of co-operation between teams, and facilitating cross-selling.

Additional aspects regarding sales force structure are the decisions of implementing direct versus outsourced sales forces, as noted by Mantrala et al (2010). They explained that pharmaceutical companies must decide whether to invest in their own sales force (hiring a team of pharmaceutical sales representatives), develop an agreement with an external service provider - a contract sales organization -, which will provide an external sales force to promote the pharmaceutical company drugs, or chose an hybrid model (with both internal and external sales forces). Rogers (2008) noted that pharmaceutical companies may search contract sales organizations aiming cost minimization, a higher speed to market, and the reduction of financial risk, shifting a fixed cost to a variable cost.

As noted by Zoltners & Sinha (2004), the coordination and control, and reporting relationships are other important dimensions of sales force structure, defining the formal organogram, and the span of control (number of PSRs reporting to a sales or district manager).

1.2.3.7 Sales territory alignment

Another process related to sales force effectiveness is sales territory alignment, also known by sales territory assignment, realignment, deployment, districting, and design (Zoltners, Sinha & Lorimer, 2004). According to Mantrala et al (2010), decisions on sales team territory allocation are relevant to study, in an attempt to achieve an optimal compromise between good territory balancing for all team members, and travel time minimization.

Concepts

Zoltners, Sinha & Lorimer (2004) defined sales territory alignment as «*the assignment of accounts and their associated selling activities to salespeople and teams*» (p. 271). Good territory alignments allow companies to match sales force effort to customer needs, to foster fair performance evaluation and reward systems, and to keep travel time and costs under control, as noted by Zoltners, Sinha & Lorimer (2004). They underlined that minor territory alignments are an ongoing process, and that major alignments typically occur in the scope of a group of situations: when there is a change in sales force structure; a company increases or decreases its sales force; a merger or acquisition; market conditions change significantly; new products are launched; a new sales force team is created.

Development steps

Zoltners, Sinha & Lorimer (2004) proposed a methodology to develop territory alignments, consisting of six steps. The first is selecting the right alignment criteria. They summarize four main goals related to the alignment criteria: equalize marginal returns to the sales force effort (complex process, often not possible to observe), match territory workload to salesperson capacity, distribute sales potential fairly to salespeople, and develop compact, travel-efficient territories. Data sources can be internal (client list, prescription history), and external (market and demographics). The second step proposed by Zoltners, Sinha & Lorimer (2004) is managing disruption (to current salesperson-customer relationships). The third is managing incentive compensation issues (where there is the need of a careful selection of incentive variables, since the resistance to realign territories augments as the percentage of compensation based on incentive increases (diverging from situations where the salary component is stronger). The fourth is using a structured alignment process (developing a central territory alignment process, and then allowing for local adaptations).

The fifth step is utilizing alignment software, which can include three types of software: territory optimization software (which propose a territory solution optimizing alignment attributes such as number of calls, physician specialty, workload, travel time, territory potential, and other), territory alignment evaluation software (allowing managers to test specific alignment scenarios), and personnel matching software (allowing managers to assign people to territories using objective criteria). For instance, ZS Associates uses a territory alignment software called MAPS to optimize sales territory alignment processes. Cegedim used to use a software called Itops to optimize territories given certain attributes and criteria. IQVIA uses Regiograph, a software marketed by GfK, to optimize sales territories (groups of bricks, for instance). The sixth step proposed by Zoltners, Sinha & Lorimer (2004) is the annual alignment audit, an important step since, according to the researchers, territory alignments non-optimized for long periods of time may not be connected to current market needs.

Application in the pharmaceutical industry

Typical attributes - measures that reflect the workload and potential for the sales force, as noted by Zoltners, Sinha & Lorimer (2004) – applied to the pharmaceutical industry in the scope of territory alignment processes include physician specialty counts, patient volumes,

epidemiological data, influential physicians, teaching institutions, managed care / buying affiliations, surgical procedures, and hospital beds (figure 1.15).

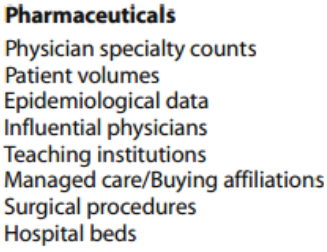


Figure 1.15 – Example of alignment attributes used in the pharmaceutical industry

Source: adapted from Zoltners, Sinha & Lorimer (2004)

This data can be complemented with drug class sales per brick / territory (to help quantify territory potential), drug prescriptions per territory, physician segmentation (number of A, B, C and D physicians per territory), call activity (defined in the call planning process), population, and other. For instance, by using territory alignment software such as Regiograph, pharmaceutical companies can define and align territories for its PSRs teams. Data is inserted in a spreadsheet-type format of a map layer consisting of all territories / bricks. By using for instance a brick layer, the software uses the geocode boundaries between bricks and allows data to be inserted in those bricks (for instance, sales potential, drug prescriptions, etc). Physician data can also be inserted in a different spreadsheet, allowing the insertion of physician-level information such as its segment, optimal number of calls and, critical to the alignment exercise, their geo coordinates, importing physicians' locations as points (main work address).

This nominative information can then be linked to other map layers (in our case, the brick layer), allowing the software to aggregate physician-level data by brick (adding the number of physicians per brick, number of calls, and their geo coordinates. Regiograph software also includes layers such as the road infrastructure, for travelling time optimization. By using a set of balancing criteria (ex: similar territory potential, prescriptions, proportion of physician segments, workload, travel time, distance from PSRs home), and by defining some criteria regarding travel time (preference for highway, of national roads, maximum driving time, and other), the software can then produce optimal territory alignment solutions given the attributes and criteria used. It can also set the percentage variation that will be accepted among territories. Zoltners, Sinha & Lorimer (2004) noted that it is unlikely that an alignment

exercise will produce ideal solutions, suggesting that a minus or more 15 per cent different can be reasonable given the existence of geographic restrictions, salesperson differences, trade area considerations, and data imperfections. Figure 1.16 shows an example proposed by Zoltners, Sinha & Lorimer (2004), regarding workload by territory (not optimized).

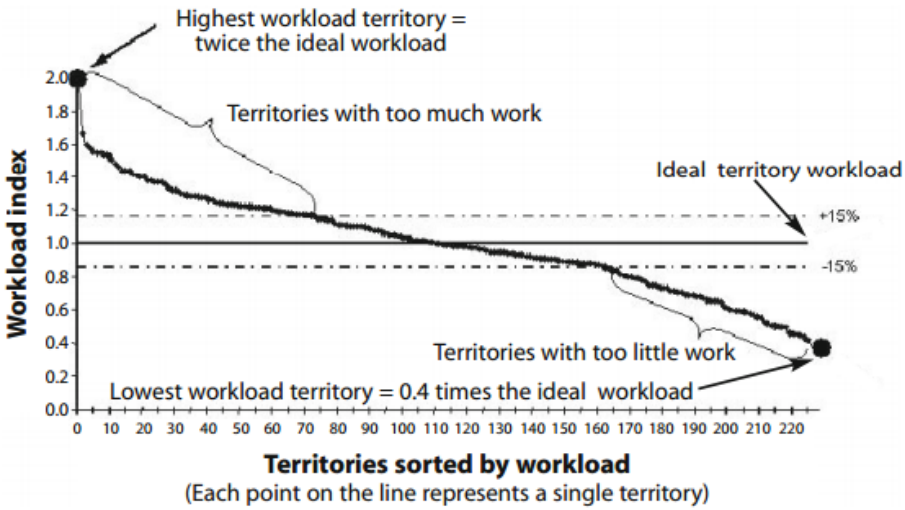


Figure 1.16 – Examples of mismatches in sales force capacity and customer coverage needs

Source: Zoltners, Sinha & Lorimer (2004)

Figure 1.17 shows an output example of a territory alignment optimization with two balancing criteria for territory creation (number of calls to dermatologists from segments A, B and C, and number of calls to dermatologists from segments A and B, conducted using Regiograph software.

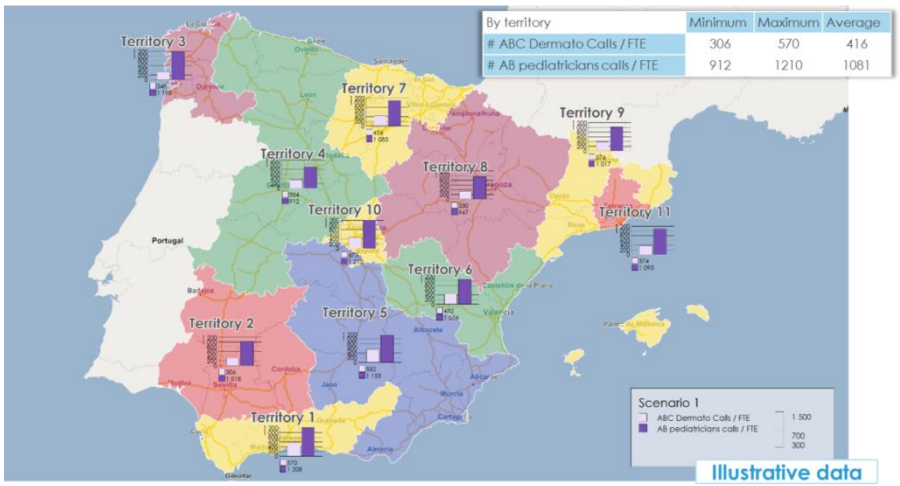


Figure 1.17 – Regiograph illustration of territory alignment using two balancing criteria

Source: Cegedim

Driving or travel time can be one of the optimization criteria used for territory creation or adjustment. Yi, Anandalingamb & Sorrell (2003) noted that software programs can be account for the travel distance of PSRs to physicians' offices, helping realign sales force territories. Figure 1.18 illustrates an example of driving times zones calculations using Regiograph. Driving times were calculated using road infrastructure layer and assumptions on traffic (low, medium, dense). Areas shaded in blue represent the several driving times boundaries, from 15 minutes to 90 minutes driving time.

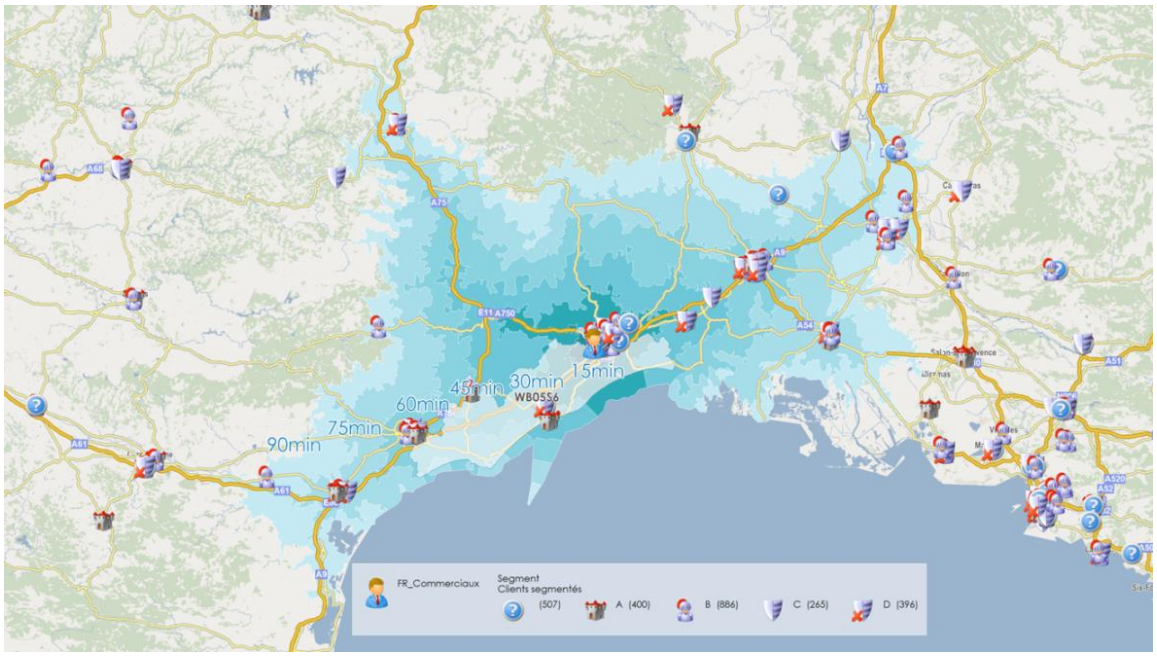


Figure 1.18 – Regiograph illustration of driving times zones calculations

Source: Cegedim

As highlighted by Zoltners, Sinha & Lorimer (2004), pharmaceutical companies promoting several different products for different pathologies which have different sales behaviors by season may establish two different sales territory alignments, where each PSR can have one territory for one season and another one for another season (for instance, for the cold and flu season, and for the allergy season, optimizing the sales force effectiveness).

Recruiting and selection

Fugh-Berman & Ahari (2007) noted that «*drug reps are selected for their presentability and outgoing natures, and are trained to be observant, personable, and helpful*» (p. 621). PSRs' recruiting and selection can be a very expensive process. Goldberg & Davenport (2005)

highlighted that the average cost of hiring a new PSR was USD$89.000, somewhat higher than the annual direct cost of the PSR.

Profile

Several scholars have addressed the importance of PSRs' profile adequacy in terms of skills, personality, and attributes valued by physicians in their professional relations with PSRs. Pettijohn, Rozell & Newman (2010), after surveying a sample of PSRs in the United Kingdom, found a positive correlation between PSRs emotional intelligence levels and customer-orientation. Stros & Lee (2014) suggested, in their review, that personal profile of the sales person (the pharmaceutical sales representative) is of relevance in pharmaceutical promotion.

PSRs' success in performing their job may be analyzed from two perspectives: one considering the attributes most valued by prescribers, and other considering the most important characteristics associated with superior sales performance. In the scope of the first perspective, Andaleeb & Tallman (1996) surveyed physicians to study their perceptions on their relationships with PSRs and the pharmaceutical industry. The attributes related to the relationship were scored high by the physicians participating in the study, suggesting that friendliness and trustiness are desirable characteristics of PSRs. In the scope of the second perspective, Sager & Ferris (1986), when studying the personality of PSRs in selection settings in the pharmaceutical industry, having as a goal the identification of the personal strengths and characteristics that distinguished excellent from good PSRs in terms of performance, found that excellent performers «*tended to be warm, easy going, and cooperative*» (p. 322), but also tended to be «*dominant and shrewd*» (p. 323), results gathered by using self-reported questionnaires filled by a sample of PSRs.

Thoresen, Bradley, Bliese & Thoresen (2004), on their study of the PSRs personality traits and on job growth trajectories, found that while in the maintenance group (PSRs that did not experience job reassignment, keeping their current position) sales performance differences were associated with conscientiousness and extraversion, but only conscientiousness was a predictor of sales performance growth, in the transitional group (consisting of PSRs that were reassigned from primary care to a new product launch) performance differences and evolution were associated with agreeableness and openness to experience. One of the main insights of this study is the evidence that PSRs' openness to experience appears to be more important as

a performance predictor in changing job environments, than in non-changing job environments.

Other authors have studied the importance of non-verbal factors. Peterson, Cannito & Brown (1995) conducted an exploratory investigation of voice characteristics and selling effectiveness, confirming the importance of voice characteristics in the communication process in the scope of direct selling. They found that «*rate of speaking, average pause duration, and fundamental frequency contour were significantly related to a measure of output sales performance*» (p. 1), stressing the importance of an adequate voice management during an interaction with a client. They suggest that sales representatives should speak at a slightly higher rate than in a normal conversation, use falling fundamental frequency contours when adequate, and receive coaching on vocal behavior in order to maximize their selling effectiveness. Non-verbal behavior also appears to be an important variable in selling settings. Leigh & Summers (2002) developed an experiment to evaluate the effect, on clients' impressions of the salesperson, of salespersons' use of nonverbal cues, which included eye gaze, speech hesitations, gestures, clothing, and posture. They found that steady eye gaze positively impacted the credibility of the sales presentation, and frequent speech hesitation decreased buyers' evaluation in terms of interest and persuasiveness.

More recently, Fraenkel, Haftor & Pashkevich (2016) studied salesforce management factors for successful new drugs launch in Sweden and found that successful launches. The PSRs more associated with successful new drug launches had innovative (creative) personality types, and manifested a higher emotional commitment.

Qualifications

In terms of minimum qualifications, it appears that the usual qualifications of hired PSRs tend to be a college (bachelor or associate) degree (Alkhateeb et al, 2011), but not compulsory. Regarding the preferred degrees by pharmaceutical companies, according to Alkhateeb et al (2011), the most common ones are business, marketing, chemistry, biochemistry, and biophysics (and some cases of English, public speaking, finance, economics and law).

Training

Training of the PSRs is, as noted by Fraenkel, Haftor & Pashkevich (2016), one of the most important factors in the success of new drug launches. Mantrala et al (2010) also emphasized the importance of training the PSRs, questioning how companies could define incentives to

encourage skills and knowledge sharing in its sales force team members. They also highlighted two different methods or approaches to training in large organizations. The first approach is characterized by a top-down flow of training (referred as "train the trainer" approach), whereas the second approach is characterized by an «*informal, voluntary transfer of selling knowledge and skills from more skilled salespeople to other members of the organization*» (p. 267).

PSRs are trained in hard skills, such as medical terminology, pharmacology, sales, marketing, and other areas related to selling medicinal products (Alkhateeb et al, 2011), but also in soft skills, such as non-verbal skills (Peterson, Cannito & Brown, 1995; Leigh & Summers, 2002). They also should have knowledge of diseases and pharmacology, and general knowledge of the human body (Alkhateeb et al, 2011). In addition to the training received from pharmaceutical companies, PSRs can receive external, certified training, from specialized companies dedicated to pharmaceutical selling activities (Alkhateeb et al, 2011). A certification known by CNPR (Certified National Sales Representative) Certification is provided by the US National Association of Pharmaceutical Sales Representatives (NAPSR). NAPSR (2017) created a CNPR Pharmaceutical Sales Training Manual providing information and training to PSRs search for a differentiation in their resumes. The entry level CNPR course can be also ministered in some US colleges and universities, through partnerships established by NAPSR with these higher education institutions. The CNPR certification, as of August 2017, and to the best of our knowledge, is not a compulsory requirement for the pharmaceutical sales representative profession. However, as noted by Alkhateeb et al (2011), «*certification for PSRs may become necessary, or even required, to help ensure that the prescribing patterns of physicians are not negatively affected due to false information coming from the PSRs*» (p. 222).

Compensation

Sales force cost includes, as noted by Zoltners, Sinha & Lorimer (2004), several items including recruiting and hiring, compensation, government requirement, on the job, facilities, marketing, account investment, and sales support. According to Mantrala et al (2010), sales force «*compensation strategy speaks to the firm's choices with respect to the level and ratio of fixed to variable pay*» (p. 264).

PSRs' compensation is usually not limited to a fixed salary, since the pharmaceutical sales business is a commission-based profession (Alkhateeb et al, 2011). The compensation plan

typically includes a fixed salary, a bonus, company car, medical and tuition reimbursement, and may include retirement plans (Santiago, 2017). Mantrala, Sinha & Zoltners (1994) suggested that compensation plans include a fixed (weighting on average 85% of the total PSR income) and a variable component, which they referred to as sales quota-bonus incentive scheme. They explained that while the fixed part of the salary «*provides security and encourages the performance of nonselling activities*» (p. 122), the «*quota-bonus plan, communicated to the salesperson at the beginning of the sales cycle, stimulates the active promotion of specified products*» (p. 122).

Morelli & Braganza (2012) presented a sales quotas development generic process, shown in figure 1.19. The process starts with the development of the national sales forecasts, which is followed by the determination of the nature of the sales territories and highlight of peculiarities. The third step consists of the development of sales quotas allocation formulas, followed by financial modelling of impact and territorial analysis of reasonability, ending with sales quotas finalization and communication to the sales force.

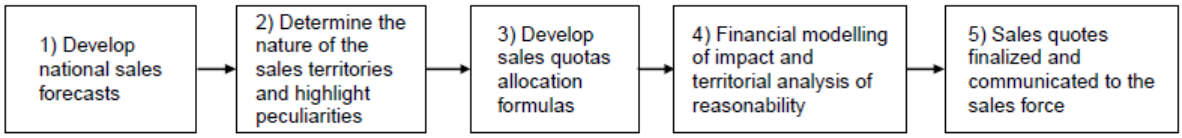


Figure 1.19 – Sales quotas development generic process

Source: Morelli & Braganza (2012)

ZS Associates developed a study titled Incentives Practice Research (ZS, 2015), studying the PSRs' sales compensation plan structure. The results showed that quota-based bonus is the most predominant incentive plan for PSRs (71% for retail-primary care PSRs, 76% for retail-specialty, and 85% for Oncology). The second most common incentive plan was relative-based bonus (for retail-primary care and specialty), and management by objectives (MBO), in the cases of managed care and key account manager (KAM) PSRs.

Fraenkel, Haftor & Pashkevich (2016), using pharmaceutical industry information from Sweden, studied the salesforce management factors that explain successful new product launches, and found that PSRs' salary fixed component do not appear to have influence on new product launch success. However, they found that the combination of both fixed and

variable compensation plans, as well as frequent and regular performance feedback from managers do have a relevant influence on the success of a new product launch in the market.

Goldberg & Davenport (2005) suggested that the average annual income of a PSR was USD$81.700 (including both the base salary and the bonuses). Medreps' 2017 Pharmaceutical Sales Salary Report (Medreps, 2017) points to values of USD$99.087 of salary and USD$31.965 of bonus, totaling USD$128.490 for a PSR' annual income. The values evidenced by the Bureau of Labor Statistics' 2016 Occupational Employment Statistics (Bureau of Labor Statistics, 2016) evidence average annual wages for PSRs from USD$76.380 (general) to USD$91.560 (scientific products). Alkhateeb et al (2011) proposed that an entry-level generalist PSR salary would average US$42.000, and that PSR specialist or a medical science liaison (MSL) would reach up to US$79.000.

Supervision and evaluation

Mantrala et al (2010) defined sales force control systems as «*performance metrics and procedures used to monitor, direct, and evaluate salespeople*» (p. 264). The supervision of the PSRs is typically made by the regional sales chief or district sales manager, who ensures that PSRs do their regular job and meet their quotas (both sales and call activity) in each month. District sales managers typically report to a national sales manager. PSRs are evaluated regarding the extent to which they meet sales goals and number of visits made to prescribers, defined by the management, in the districts they were allocated to.

Sales goals can be measured using pharmaceutical companies own data (which usually is not possible, given that companies do not have access to internal sales or prescriptions in small geographic units), or using data compiled by healthcare information organizations (HIO) such as IQVIA (spread all over the world) or hmR in Portugal, Spain, and Ireland (as of August 2017). Operational goals can be measured through CRM systems where PSRs register their daily activity (which physicians were visited, which products were promoted, which messages were presented). PSRs' supervisors can compare the target number of calls against the calls the PSRs enter the CRM system. CRM companies providing services to the pharmaceutical industry include, among others, IQVIA, Veeva, and Siebel.

Mantrala, Sinha & Zoltners (1994), in their research, noted that 60% of the PSRs' bonus was based on the individual sales performance in their territories (against sales goals), and the remaining 40% were based on management assessment of PSRs' performance in training sessions, physician profiling, and other discretionary qualitative criteria. Bonus can be

applicable after a minimum threshold (ex: minimum of 90% of sales in the territories), and capped if performance is higher than a maximum threshold (ex: bonus multiplier with a limit of 110%, such as the case referred by Mantrala, Sinha & Zoltners, 1994).

Sub-chapter synthesis of main findings

This chapter addressed the sales force effectiveness concepts and processes. It demonstrated the importance of SFE for pharmaceutical manufacturers, to collect, process, classify and disseminate information about their stakeholders, to efficiently manage sales force sizing, structure and territory alignment, and to properly manage salesforce recruiting, evaluation and compensation. SFE therefore covers several processes from planning to operationalization in the field.

Pharmaceutical companies need accurate customer profiling data to monitor and try to modify physicians' prescription behavior, by using both internal and external sources of data, both nominative (or disaggregate) and non-nominative (or aggregate-level). Data used to profile physicians can have its origin in multiple sources, both primary and secondary, and internal (gathered from the company own records and from PSRs) and external (provided by healthcare information organizations, healthcare database providers, and statistics institutes). Segmentation variables (the raw material that will feed the segmentation algorithm) can be related to some dimensions including healthcare institutions, physicians, and population and patients. Regarding the first dimension, variables can include size and type of institution, and acccessibility / restrictions. Concerning the second dimension, it can be dividided in five sub-dimensions (demographics, geographics, practice, market potential, and usage and behavior). About the third dimension, it can be divided in three sub-dimensions (geographics, demographics, and psychographics).

Pharmaceutical companies usually use a combination of market potential variables and physician behavior (loyalty) to develop segmentation algorithms and matrixes. Companies can use both direct and indirect variables to capture physician prescription potential. Direct measures provide a direct measurement of the current prescription potential of each physician and include total prescription volume, product category prescription volume, physician lifetime value, product prescription volume / share (loyalty), percentage of new prescriptions, and product switching. When direct measures are not available (in countries where disaggreagete prescription-related information is not allowed), companies use surrogate (or indirect) variables, which can allow an approximation of the real potential of each physician,

by means of tangencial information such as physician office size, size of patient waiting area, doctor demographics, call pressure by PSRs, population and patient demographics, geographics and psychographics, prevalence of specific diseases in each region, population purchase power, prescriptions per region or territory, physician specialty, key opinion leader status, and other. Whenever disaggregate prescription level information is not available, companies use aggregate prescription data such as prescriptions or drug sales per territory or brick, to help qualify physicians in those geographic areas. Segmentation variables are then computed into algorithms that produce physician segments.

Targeting involves the evaluation of each segment's attractiveness and the selection of the ones most appropriate to be impacted by promotion activities. Depending on the type of data available (physician-level or aggregate-level), the targeting exercise can be more or less sophisticated, using physician responsiveness and linear programming to obtain the optimal frequency of contact for detailing activities (with physician-level data), or analyzing each segment contribution for the cumulative potential (with aggregate-level data).

Call planning follows targeting, and is defined as the planning of activities related to promotion and sale of medicines, optimizing the total sales over a period of time, given a specific set of physicians, allocating calls to each segment. The call planning can be performed using nominative-level data (optimizing the number of calls to each physician segment), or aggregate-level data (using information by region or territory).

The next process and step is sales force sizing, where the company will define the optimized sales force size, using several assumptions, and recurring to one or more sizing models (including status quo, pay as you go, chase the leader, workload buildup, profitable coverage, and sales response. Sales force structure and design are another critical element of SFE, where a series of decisions must be taken. These decisions include the type of PSRs to hire (generalists or product-specialized), sales roles definition, mirrored or synced structures, direct or outsourced sales forces, coordination, control and reporting.

Territory alignment, where companies will try to define an optimal compromise between good territory balancing and travel time minimization, using a series of balancing criteria such as prescriptions, number of patients, number of teaching institutions, number of hospital bed, PSRs residence, among other.

SFE also include PSRs recruiting, training, compensation, and supervision and evaluation. PSRs are selected for their presentability and outgoing natures, and trained to be observant, personable, and helpful to doctors. They are hired based on their emotional intelligence and customer orientation, and friendliness and trustiness, demonstrating personality traits of cordiality, cooperation, openness to experience, innovation (creativity) and higher overall emotional commitment. PSRs' recruiting and selection can be a very expensive process, reaching an average of USD$89.000. PSRs' qualifications typically include a bachelor degree. PSRs' adequate training is one of the most critical success factors of a new drug launch. Training can be given in hard skills (medical terminology, pharmacology, sales, marketing, and other), or soft skills (non-verbal skills). PSRs' compensation usually includes a fixed salary, and a variable component (consisting of a bonus, company car, medical and tuition reimbursement, and may include retirement plans). The average income of a PSRs is situated around USD$82.000. PSRs are typically supervised and evaluated by regional sales chief or district sales manager, who guarantee that PSRs perform adequately in terms of their monthly quotas (sales and calls).

Figure 1.20 below summarizes SFE processes, based on Zoltners, Sinha & Lorimer (2005), then completed with additional processes highlighted during the literature review. It includes upstream processes, which are the base for downstream processes after upstream decisions have been made. This figure attempts to visualize the typical process of a company that has decided to launch a new drug in the market, having to take a complete set of decisions in the scope of SFE. Hired PSRs will then detail the physicians selected in the targeting, with the frequency decided in the call planning phase, and with the territories and structure that were set as optimal.

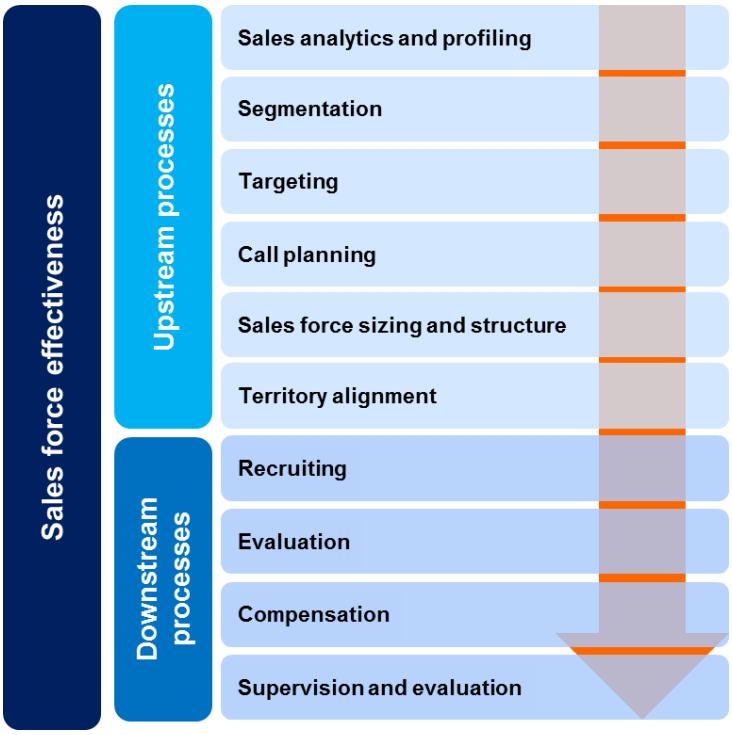


Figure 1.20 – Sales force effectiveness processes

Source: Adapted from Zoltners, Sinha & Lorimer (2005)

1.2.4 Customer relationship management and sales force automation

The concepts of CRM and SFA have been interchangeably addressed in the sales literature, as noted by Avlonitis & Panagopoulos (2005). According to these researchers, while CRM is «*a business strategy that consists of processes and technologies that enhance customer relationships*», SFA «*deals only with technological tools*» (p. 355). Therefore, CRM is a more comprehensive concept than SFA or, by other words, SFA is a concept in the scope of CRM. Both CRM and SFA can be positioned however inside a broader concept, which is sales force technology, which includes, in addition to CRM and SFA, communication technology, as stressed by Widmier, Jackson & McCabe (2002). Other authors have proposed definitions for CRM and SFA. For instance, Croteau (2003) defined CRM as «*a customer-focused business strategy that aims to increase customer satisfaction and customer loyalty by offering a more responsive and customized service to each customer*» (p. 21), and Honeycutt, Thelen, Thelen & Hodge (2005) suggested that SFA occurs «*when firms computerize routine tasks or adopt technological tools to improve the efficiency or precision of sales force activities*» (p. 313). SFA can have several applications. Widmier, Jackson & McCabe (2002) analyzed where and

how technology can be used to improve sales performance, and noted that SFA can be used to organize (contacts, schedules, sales plans, geographic sales, and plan routes), present (develop proposals, use multimedia and make presentations), report (sales call reports, expense reports, calendar reports), inform (prospecting, product information, product configuration, and information), support and process (inventory control, customer qualification), and transactions (inventory inquiry, and order status inquiry).

CRM initiatives need to observe some critical success factors in order to achieve implementation success: possessing knowledge management capabilities, guarantee of top management support, and a suitable information technology infrastructure, with adequate technological readiness (Croteau, 2003), and its ultimate goal is to tie the customer to the brand or company (Lundstrom & Wright, 2005).

The pharmaceutical industry is one of the most data intensive industries, and one of the ones that can benefit more from sales technology by managing large amounts of data (Tanner, Ahearne, Leigh, Mason & Moncrief (2005). This industry was one of the first to adopt SFA, as underlined by Engle & Barnes (2000), and physicians have historically been the main targets of CRM deployments by pharmaceutical companies (Puschmann & Alt, 2001).

CRM can be viewed both as a tool, and as a process or perspective, involving a long process in the development of a true relationship between a pharmaceutical company and a physician, according to Lundstrom & Wright (2005). They noted that most pharmaceutical companies, instead of using CRM to collect intelligence for the implementation of a customer-driven strategy and development of customer loyalty, use CRM instead as a technological tool delivered by a CRM system provider (Siebel, and other), used to develop a customer intelligence database to manage calls (details), increase prescriptions in high-level physician segments, and improve targeting of physicians. By other words, CRM utilization by pharmaceutical companies may have been limited mainly to tactical and operational aspects, and less as a philosophy and strategy. Bhalla, Evgeniou & Lerer (2004) had also noted that pharmaceutical companies have been largely using CRM as a sales force automation tool, in the scope of marketing and sales interactions with prescribers.

SFA tools can include not only CRM systems (software managing sales-related processes, such as the ones provided by IQVIA or Veeva), but also other tools. Donaldson & Wright (2004) explained that, in order to reach higher levels of effectiveness and efficiency in interactions with physicians, pharmaceutical companies invested in CRM systems and data

mining, data warehousing, sales people, call centers staff and other people to manage interactions with their customers. Morgan & Inks (2001) noted that SFA applications include «*contact management, enhancement of sales presentations, automation of administrative tasks, strategic information exchange throughout the organization, and computer-based training*» (p. 464).

1.2.4.1 Customer information databases

Puschmann & Alt (2001) summarized the type of information that can be incorporated into a customer information database, which can be used by a CRM system: customers (including name, address, phone, email, interests and position within the customer power structure such as for instance the hospital where he or she works at), products (including positioning, prescription guidelines, clinical activities, availability, promotional activities, etc), financials: potentials, spend, sales (forecast, actual budget), and activities (such as marketing campaigns, clinical trials, participation in congresses, in events, etc). Donaldson & Wright (2005), when studying the adoption and sophistication of SFA within the pharmaceutical industry at the UK, highlighted that the main fields present at customer information databases are name and address, post code, telephone number, fax, and names of all contacts.

1.2.4.2 Tools

CRM systems, utilized as a sales force automation tool, can be used to track prescription information by sales territory, to plan calls with physicians, but also to register the calls with follow-up, and to register and manage less costly communication and promotion tools such as e-detailing, mailing, and outbound call centers, especially regarding low-volume prescribers and physicians working at rural areas, as addressed by Bhalla, Evgeniou & Lerer (2004). These researchers noted that pharmaceutical companies use CRM systems to schedule sales calls given physician profile, specialty, prescription behavior, age, key opinion leader status, and geographic location. CRM systems can also integrate nominative information at physician level, regarding prescriptions (drug and category, in the USA and New Zealand), doctor segments (deciles, or other classification), doctor personal information (date of birth, for instance), and other information that can help companies to better target and interact with this important target. Donaldson & Wright (2004) noted that the sales force automation systems main uses alleged by interviewed marketing included, as the four most important aspects, the preparation of mailing lists, segmentation purposes and customer profiling, and analyze campaign effectiveness.

Pharmaceutical companies are engaging into the development of two-ways interactions with physicians, as emphasized by Puschmann & Alt (2001) such as physician portals and e-detailing, reinforcing the relations with prescribers. As noted by Bhalla, Evgeniou & Lerer (2004), pharmaceutical companies are integrating e-detailing with CRM systems databases. This may provide pharmaceutical companies insightful information about physician usage of companies' e-detailing platforms and contents, allowing a better knowledge of its customers' digital usage of contents, and allowing a better segmentation of physicians in terms of willingness to use digital channels.

1.2.4.3 Data access

SFA allows salesforce management to obtain real-time access to salesperson performance information, as noted by Morgan & Inks (2001), including «*the number of sales calls per day, the amount of attention given to each customer, the position of customers in the sales cycle, and the implementation of promotional programs information will be instantly available to management*» (p. 471). This information also allows PSRs managers to assess the call productivity of their team members, measured as the number of sales calls made in a defined period of time. Managers can likewise use this information to evaluate PSRs compliance with ethical behavior such as absence of falsified call logging (daily call reporting), which would happen if PSRs would falsify sales calls (insert data in the CRM system as if an inexistent call had in fact been made). Currently there are systems that can minimize the reporting of false calls, by using GPS tracking (an example is Medismo Pharma Mobile CRM, a CRM system provided by Medismo). Lundstrom & Wright (2005) addressed, in their article, that some pharmaceutical companies demand their PSRs to get a certain amount of physician signatures throughout the day, so that the PSR can reach his or her daily call objectives. Other companies demand their PSRs to leave prescription drug samples for the signature to be eligible for call goals purposes. Managers can extract maps where they can compare the targeted calls versus the calls PSRs had inserted into the CRM system.

1.2.4.4 Closed loop marketing

The pharmaceutical industry has seen, in addition to an increased complexity of the pharmaceutical network, the emergence of novel business models on the Internet, which is provoking high pressure in the healthcare sector, noted Puschmann & Alt (2001). They explained that internet-based healthcare portals have been developed to connect several players on the sector, helping create value not only to pharmaceutical companies, but also to several players such as wholesalers, pharmacies, institutions (hospitals and other), and

physicians. In Portugal, Grasshopper, a CRM company providing services to the pharmaceutical industry, developed ePharma Report, a web-based CRM system that allows companies to manage the relations with several stakeholders, including call activity, stock availability in wholesalers' warehouses, place orders at pharmacies, manage promotions, and track all steps of the relationship process, which can be classified as a process portal, since is integrates services for specific customer processes (ordering, in the case). Healthcare portals transfer the typical processes in the healthcare to the internet (Puschmann & Alt, 2001).

By integrating nominative prescription and promotion activities at physician level in CRM systems, companies may be able to know the profit they are obtaining from each physician, and to reach estimates of physician profitability and potential for particular drugs (Padhy & Patnaik, 2008). Also, pharmaceutical companies are increasingly using tablets in the scope of detailing activities to physicians (Katsanis, 2015). IMS Channel Dynamics Global Reference, in its 2016 edition regarding the year 2015, evidenced that 7,1% of the calls were made by using a tablet as detailing support (versus 6,3% in 2014). According to IMS Health (2016) in this report, Belgium (21,5%) and Brazil (19,4%) are the leading countries in terms of tablet detailing penetration, where approximately one out of five PSRs calls were made with tablet support in 2015. Conversely, USA (9,8%) and the UK (12,6%), more mature markets, evidence much lower levels of tablet detailing. Portugal appears with a percentage of 10,1%, above the worldwide average of 7,1%. As noted by Vecchione (2008), tablets allow pharmaceutical companies to profile and segment physicians and deliver segment specific messages to each segment. Typical interaction with tablets may allow doctors to interact with the presentations, and this interaction is registered and can be subject of analysis (data capture).

As noted by Katsanis (2015), the increasing use of tablets by PSRs and the increased penetration of e-detailing has led some companies to adopt closed loop marketing (CLM). She explained that, in the context of the pharmaceutical industry, «*companies identify and refine the materials their physician audience find most interesting and then seek to use this information to adapt their promotion efforts and direct it back to the physician – in other words – closing the loop*». Vecchione (2008) defined CLM as «*a system where data can be shared between sales and marketing and customer-patterns can be tracked*» (p. 41), in a 360 degree communication with a customer. Another definition addressed by Vecchione (2008) underlines that CLM «*is the ability to use multichannel communications to drive several*

channels to create interactions with customers and to get a better understanding of what their needs are» (p. 41).

Katsanis (2015) explained how CLM works in the scope of detailing activities. It starts when a pharmaceutical company provides its PSRs with a tablet with a detailing application. The PSR then shows several promotional aids to physicians, videos, and clinical articles. The application monitors the activity of the physician, and how much time he or she spent on each one. Katsanis (2015) continued by explaining that this information is then sent to the pharmaceutical company central system, and inserted into the CRM system to add this tracking information to the physician data. CRM and tablet utilization data is analyzed, generating insights on the types of contents most preferred by individual physicians. Finally, as underlined by Katsanis (2015), PSRs and brand managers are given access to this information, allowing them to adjust their tactics to each physician, including presentations in the case of PSRs, and brand strategies in the case of brand managers. Therefore, CLM presupposes the existence of integrated CRM infrastructure, where multiple information sources are compiled at physician level, through an ongoing relationship with physicians.

Additional researcher has been developed regarding CLM in the pharmaceutical industry. Vecchione (2008) quoted an interviewed manager of a research company, noting that CLM is basically «*saying we are going to connect the dots of information and touch points*» (p. 41). It is the integration of information regarding physicians in a centralized customer information database that allows a CLM approach. With CLM software, PSRs can have real-time access to physician viewing profile and prescribing patterns, as noted by Vecchione (2008). Following a CLM approach, pharmaceutical companies can aggregate detailing and e-detailing interactions in their CRM systems. They can also aggregate, as noted by Vecchione (2008), information regarding on-line sample ordering, visited webpages, past presentations, formulary information, and other services and educational contents which can equip PSRs before a call with a physician.

1.2.4.5 Benefits

Several benefits of using CRM systems (SFA) have been identified in previous research. CRM technologies allow pharmaceutical companies to more effectively collect data about customers and develop standardized approaches to apply in the management of relations with physicians (Bhalla, Evgeniou & Lerer, 2004), increasingly enhancing customers' experience and loyalty in relation to the pharmaceutical company (Padhy & Patnaik, 2008).

PSRs can minimize the amount of time they dedicate to nonselling activities, such as call reports and expense reports (Morgan & Inks, 2001). Call reports are managed in CRM systems, in laptops and mobile devices such as tablets or smartphones. This is the case of Mobile Intelligence, a CRM solution provided by IQVIA. PSR can also benefit from additional selling time, shorter sales cycles, and less administrative burden (Morgan & Inks, 2001).

Alt, Österle, Puschmann, Barak & Huber (2003) identified several benefits pharmaceutical companies can obtain by using CRM systems. These include improved information about customers, allowing a systematic segmentation and a differentiated approach of various groups; a better fine-grained segmentation permitting companies to offer additional services to the segments; enhanced revenues by allowing the identification of interdependencies between company products, in the scope of the communication with physicians. Other benefits obtained from the usage of information technology in the scope of sales activities in the pharmaceutical industry were presented by Ahearne, Hughes & Schillewaert (2007), in their qualitative research about the impact of CRM-based technology on sales effectiveness. They found that PSRs who integrate information technology tools into sales activities had greater performance and obtained stronger gains in efficiency, sales benefits, sales skills and behaviors.

1.2.4.6 Implementation barriers

Morgan & Inks (2001), in their research on SFA acceptance, found that there are four main reasons why salespeople resist to the implementation of a SFA. The first is fear of technology, given that salespeople will be less motivated to use SFA when they believe they are not capable of using it. Another barrier is salespeople fear of interference, since sales managers can have direct and real-time access to salespersons' metrics such as number of calls per day, messages underlined during calls, and other information. Another barrier is fear of loss of power, where salespeople fear that by providing the company they work for with nominative information about each customer, which can then be transferred to a customer information database in a standardized format and that is readily accessible and easily transferable, they may lose power and the company may become less dependent on the salesperson work. A fourth barrier highlighted by Morgan & Inks (2001) is general resistance to change, since it is a deviation from the salespersons' status quo.

Donaldson & Wright (2004) also studied the adoption of SFA, but in a sales and marketing managers' perspective. In a context of the UK pharmaceutical industry, and by using

quantitative survey, they found that the main barriers are the high cost of development, the data quality, highly fragmented systems, and no clear sales automation strategy. The rest of the barriers can be seen below in figure 1.21.

		Means from this study	SD
B1	High cost of development	4.81	1.49
B2	Data quality (quality of information availability)	4.15	1.85
B3	Highly fragmented systems (i.e. fragmented market of sales information)	4.05	1.90
B4	No clear sales automation strategy	4.00	1.91
B5	Lack of board-level backing	3.70	2.22
B6	Lack of information technology specialists	3.60	2.01
B7	Lack of company-wide commitment to the sales function	3.36	2.12
B8	Poor relations between the sales function in IT	3.24	1.88
B9	Fragmented sales and marketing organisation	3.09	1.85
B10	Account-based customer records	3.00	1.80
B11	Relationships with suppliers	2.73	1.65

Figure 1.21 – Barriers to implementing sales automation systems

Source: Donaldson & Wright (2004)

1.2.4.7 Sub-chapter synthesis of main findings

The sub-chapter addressed literature on CRM and SFA. It allowed the understanding of the concepts of CRM, which consist of a business strategy with processes and technologies to enhance customer relationships, and SFA, which deals mainly with the technological tools associated with CRM. The pharmaceutical industry was one of the first to adopt SFA and physicians have historically been the main targets of CRM processes. SFA tools include, along with CRM systems, tablets and applications PSRs and their managers use to manage information regarding their customers. Pharmaceutical companies use customer information databases connected to their CRM systems to gather information about their customers (with a series of fields including personal information, products, financials and activities. By combining several sources of data, and the interactions generated with physicians, pharmaceutical manufacturers can develop a closed-loop marketing (CLM) approach. This can be done by integrating the customer information databases with promotion activities such as detailing, e-detailing, and other such as e-mailing, visited webpages, and one-line sample ordering, allowing companies to have real-time information about customer profile and customer profitability. The use of tablets by PSRs and the interaction physicians generate in those tablets (in presentations) can be integrated into the CRM systems, allowing a more complete and better understanding of what physician needs are. The literature evidences

several benefits of using SFA in the scope of the pharmaceutical industry. Manufacturers can benefit from a more effective data about customers allowing a better segmentation, the development of standardized approaches to apply in the management of relations with physicians, enhancement of customers' experience and loyalty in relation to the pharmaceutical company, contributing to enhanced revenues. PSRs can reduce the time dedicated to nonselling activities (call reports and expense reports), benefiting from additional selling time, shorter sales cycles, less administrative burden, and having greater performance and achieving stronger gains in efficiency, sales benefits, sales skills and behaviors. The literature also evidences barriers to the implementation of SFA, from both the perspectives of salespeople and sales and marketing managers. The former evidence fear of technology, have fear of interference (from their managers), have fear of loss of power (company may become less dependent on the salesperson work), and demonstrate general resistance to change (deviation from the salespersons' status quo). The latter suggest that the main barriers include the high cost of development, the data quality, highly fragmented systems, and no clear sales automation strategy.

2. Appendix 2 - Background of economics of health in Portugal

In this section, we will present some metrics about Health Economics indicators in Portugal, and their comparison against other European countries.

According to Pordata (2017), Portugal had, in 2015, a resident population of 10,36 million, almost two thirds of which (65%) concentrated in the age group between 15 and 64 years old, proportion that has been relatively stable since 1981. The extremes of the age pyramid reveal, however, a switch in terms of proportion: while in 1981 there were 2,2 citizens with 15 or less years of age for each citizen with 65 or older, in 2015 this proportion was 0,7 (or 143,9 elders by 100 young people).

The number of births per year has been steadily declining since the eighties, from 213.895 in 1981 to 85.500 in 2015 (Pordata, 2017). In 2011 and 2015 Statistics Portugal data, the number of deaths were higher than the number of births, representing a negative natural population growth.

Gross domestic product in 2016 reached €184.931,1 million, representing an estimated real growth of 1,4% from 2015 (Pordata, 2017). The economy has suffered, since 2005, two main negative impacts: the first one was the 2009 international crisis, provoking a decline of 3% in the GDP in that year; the second was the impact of budget austerity measures imposed by the Troika composed by the International Monetary Fund, European Commission and the Central European Bank, after Portugal's request for budget assistance in April 2011. The austerity resulted in three consecutive years with negative GDP growth rates, reaching – 1,8% in 2011, -4,0% in 2012 and -1,1% in 2013. In 2014 the GDP started to recover, but modestly (+0,9%), and in 2015 and 2016 the growth rate was estimated at 1,6% and 1,4%, respectively (Pordata, 2017).The average growth rate from 2005 to 2016 reached 0,1%, substantially lower than the 1.0% verified in Spain, 3,6% in Ireland, 1,1% in the EU28, and 0,9% in the EU19 Euro zone.

2.1 Current health expenditure

According to the Statistics Portugal definition, current health expenditure measures the end-use of residents in health goods and services. Includes current expenditure on personal health care, public health and prevention services, and expenditure on health administration and health insurance. It also includes imports (health expenditure outside the economic territory by residents) and excludes exports of health services (provided by residents to non-residents). It integrates curative care and rehabilitation (inpatient, outpatient, day hospital and home care), long term nursing care (inpatient, day hospital and home care), auxiliary health care

services and medical articles available to outpatients (Pharmaceuticals and other non-durable medical devices and therapeutic appliances and durable medical equipment).

The current health expenditure in Portugal has been stable in the €15.000 million range, from 2012 to 2015 (Pordata, 2017).

2.2 Health expenditure as a percentage of the GDP

Portugal has evidenced a relatively stable proportion of the GDP allocated to health expenditures, in the 8,9% (2015 estimate) to 9,9% (year 2009) range. Comparing Portugal against the southern European countries, the most similar 2015 percentages are evidenced by Spain and Italy. Greece evidences a lower percentage (Troika austerity may have been more severe than in Portugal) and France evidences a higher proportion (in line with Germany's). Portugal evidences a proportion of GDP allocated to health marginally lower than Ireland (another country which requested budget assistance to Troika, in 2010). Relatively to the EU28, Portugal evidences one percentage point less in this indicator.

Table 2.1 - Health Expenditure as a percentage of the GDP – Europe Big 5 + South European countries + Ireland

Percentage	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015e
France	10,2%	10,1%	10,0%	10,1%	10,8%	10,7%	10,7%	10,8%	10,9%	11,1%	11,0%
Germany	10,2%	10,1%	10,0%	10,1%	11,1%	11,0%	10,7%	10,8%	10,9%	11,0%	11,1%
Greece	9,0%	9,0%	9,1%	9,8%	9,8%	9,9%	9,5%	8,9%	8,7%	8,3%	8,2%
Ireland	7,7%	7,5%	7,8%	9,1%	10,5%	10,6%	9,9%	10,1%	10,5%	10,1%	9,4%
Italy	8,4%	8,5%	8,2%	8,6%	9,0%	9,0%	8,8%	8,8%	8,8%	9,1%	9,1%
Portugal	9,4%	9,1%	9,1%	9,4%	9,9%	9,8%	9,5%	9,3%	9,1%	9,0%	8,9%
Spain	7,7%	7,8%	7,8%	8,3%	9,0%	9,0%	9,1%	9,1%	9,0%	9,1%	9,0%
United Kingdom	7,4%	7,5%	7,6%	7,9%	8,7%	8,5%	8,4%	8,5%	9,9%	9,9%	9,8%
EU28	8,7%	8,7%	8,7%	8,9%	9,7%	9,6%	9,5%	9,6%	9,9%	10,0%	9,9%

Source: OECD (2016b)

2.3 Financing of health expenditures

Public administrations have historically been the main contributor to the current health expenditures in Portugal, reaching a proportion of almost two thirds in 2015 (Pordata, 2017). Private financing has been growing its importance, reaching a 34% weight in 2015. Insurance societies contribution has been growing (from 1,5% in 2000 to 3,7% in 2015), while families contributions (or out-of-pocket costs, as the family health costs that are not reimbursed by public or private systems or insurance) have been relatively steady in the 27% range from 2013 to 2015.

Table 2.2 - Portugal health current expenditure – Type and financing agents

Year	Public administrations	Private sector				
		Total	Insurance societies	Societies (except insurance)	Non-profit institutions	Families
2000	70,5%	29,5%	1,5%	0,8%	2,2%	25,0%
2001	70,8%	29,2%	1,5%	0,8%	2,4%	24,5%
2002	72,6%	27,4%	1,9%	0,8%	2,2%	22,6%
2003	71,0%	29,0%	2,2%	0,8%	2,8%	23,2%
2004	71,0%	29,0%	2,4%	0,8%	2,8%	23,0%
2005	71,3%	28,7%	2,2%	0,8%	2,4%	23,3%
2006	69,1%	30,9%	2,5%	0,8%	2,4%	25,1%
2007	68,7%	31,3%	2,7%	0,8%	2,2%	25,7%
2008	68,4%	31,6%	2,8%	0,8%	2,2%	25,8%
2009	69,9%	30,1%	2,8%	0,8%	1,9%	24,6%
2010	69,8%	30,2%	3,0%	0,9%	1,8%	24,6%
2011	67,7%	32,3%	3,2%	0,9%	1,8%	26,3%
2012	65,6%	34,4%	3,4%	0,9%	1,9%	28,2%
2013	66,9%	33,1%	3,5%	0,8%	1,8%	27,0%
2014 (provisional)	66,2%	33,8%	3,6%	0,8%	1,8%	27,5%
2015 (preliminary)	66,0%	34,0%	3,7%	0,8%	1,8%	27,6%

Source: PORDATA (2017)

Table 2.3 evidences the comparison between Portugal current health expenditures financing sources and other countries sources. France and Germany appear to have different health expenditures financing models, with compulsory health insurance. Portugal is globally closest in financing model to Spain.

Table 2.3 - Current health expenditure by type of financing, 2014 - Europe Big 5 + South European countries + Ireland

Country	Government schemes	Compulsory health insurance	Out-of-pocket	Voluntary health insurance	Other
France	4,1%	74,5%	7,0%	13,7%	0,7%
Germany	6,6%	78,0%	13,0%	1,5%	0,9%
Greece	28,4%	31,3%	35,4%	3,6%	1,3%
Ireland	69,0%	0,3%	15,4%	12,7%	2,6%
Italy	75,5%	0,3%	22,0%	1,5%	0,7%
Portugal	64,9%	1,3%	27,5%	5,4%	0,8%
Spain	65,0%	4,8%	24,7%	5,2%	0,4%
United Kingdom	79,5%	0,1%	14,8%	3,6%	2,1%
EU28	**36,6%**	**42,1%**	**15,3%**	**4,8%**	**1,1%**

Source: OECD (2016b)

2.4 Main death causes

The main causes of deaths in the EU-28 are circulatory disease (such as high blood pressure and aneurism), cancer, heart disease and respiratory diseases. This pattern is also noted in Portugal, with the exception of the third and fourth causes of death, which switch. Portugal

appears to be relatively well positioned in most of the causes of death, only evidencing averages higher than the EU-28 average in colorectal cancer, respiratory diseases, and transport accidents.

Table 2.4 - Causes of death — standardized death rate, 2013 (per 100.000 inhabitants)

Units: Per 100 000 inhabitants

	Total									Females		
	Circulatory disease	Heart disease (1)	Cancer (2)	Lung cancer (3)	Colorectal cancer	Respiratory diseases	Nervous system	Transport accidents	Suicide	Breast cancer	Cancer of the cervix	Cancer of the uterus
Germany	433,1	155,0	256,2	51,1	29,6	76,8	29,9	4,7	11,8	36,3	3,3	5,1
Ireland	343,9	166,5	286,2	60,0	34,4	131,3	48,6	4,0	11,1	40,3	4,0	6,7
Greece	404,7	97,9	250,2	61,5	21,8	95,7	15,6	9,5	4,8	32,1	2,3	5,5
Spain	253,1	72,1	238,9	49,5	34,5	91,7	45,7	4,4	8,1	25,3	2,6	6,6
France	212,9	51,8	245,0	49,1	26,8	56,5	52,8	5,1	15,5	32,9	2,3	7,1
Italy	322,8	104,2	250,6	50,5	27,8	60,3	34,6	5,8	6,6	31,6	1,2	6,7
Portugal	304,8	65,6	243,0	37,6	36,1	123,7	33,4	7,3	9,8	26,8	3,4	6,6
United Kingdom	276,4	126,1	279,6	61,6	28,1	144,2	44,2	2,7	7,4	35,2	2,8	6,4
EU-28 (4)	**383,4**	**131,9**	**265,1**	**55,2**	**31,3**	**82,5**	**38,1**	**5,9**	**11,7**	**33,2**	**4,0**	**6,6**

(1) Ischaemic heart diseases. (2) Malignant neoplasms. (3) Malignant neoplasm of trachea, bronchus and lung. (4) For the age standardisation, among older people, the age group aged 85 and over was used rather than separate age groups for 85–89, 90–94 and 95 and over. (5) 2012.

Source: Eurostat (2017)

2.5 Pharmaceutical Spending

2.5.1 OECD selected countries

Pharmaceutical spending per capita (on prescription medicines and self-medication (often referred to as OTC products)) evidenced a peak of $522 in 2009, in Portugal, then decreasing to $399 in 2014 (a reduction of 23,6%). Greece, another country that has requested budget assistance to Troika, also revealed a similar pattern, with a peak of $888 per capita, reaching 2014 with a reduction of 29,1%).

Table 2.5 - Pharmaceutical spending per capita – prescription medicines and self-medications (USD) – 2005 to 2014

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
France	545	564	589	606	626	631	643	631	643	656
Germany	509	527	563	600	630	655	646	665	693	741
Great Britain									471	485
Greece	510	599	685		888	868	877	683	685	630
Ireland	479	544	597	638	667	679	651	656	723	703
Italy	505	544	550	578	581	583	588	575	584	544
Portugal	460	487	506	517	522	510	472	422	396	399
Spain	442	470	489	517	538	532	527	512	553	547

Source: OECD (2015a)

Graphically, this evidence is clearer, especially for Greece, which had a value substantially higher than the other countries selected for analysis. Germany, Ireland and France appear to evidence a similar pattern, and the same with Italy and Spain.

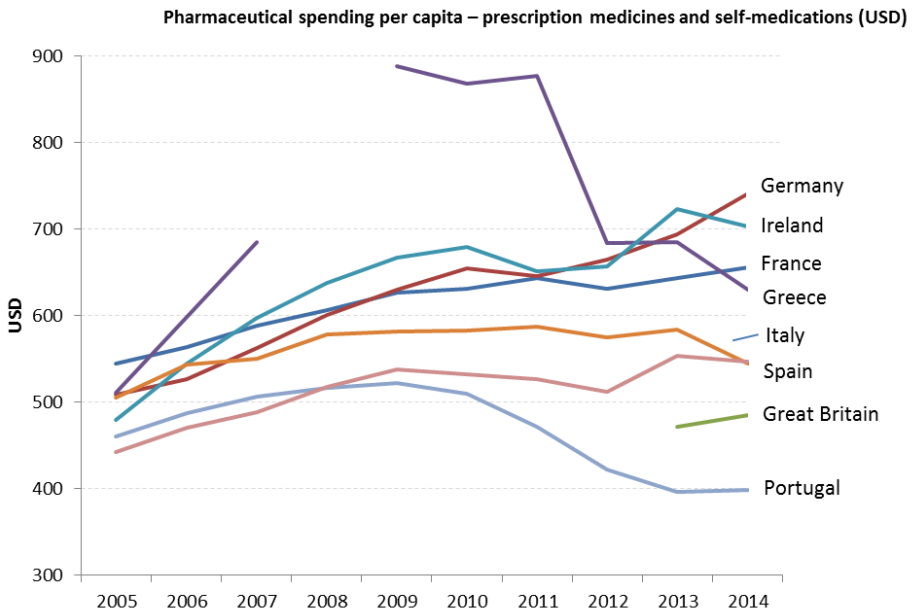


Figure 2.1 - Pharmaceutical spending per capita – prescription medicines and self-medications (USD) – 2005 to 2014

Source: OECD (2015a)

Figure 2.2 compares the annual average growth rate of public expenditure on pharmaceuticals (x axis), against the annual average growth rate of total expenditure on pharmaceuticals (y axis). Portugal, Greece and Spain (and Italy, to a less extent) both evidence negative growth rates in the two axis.

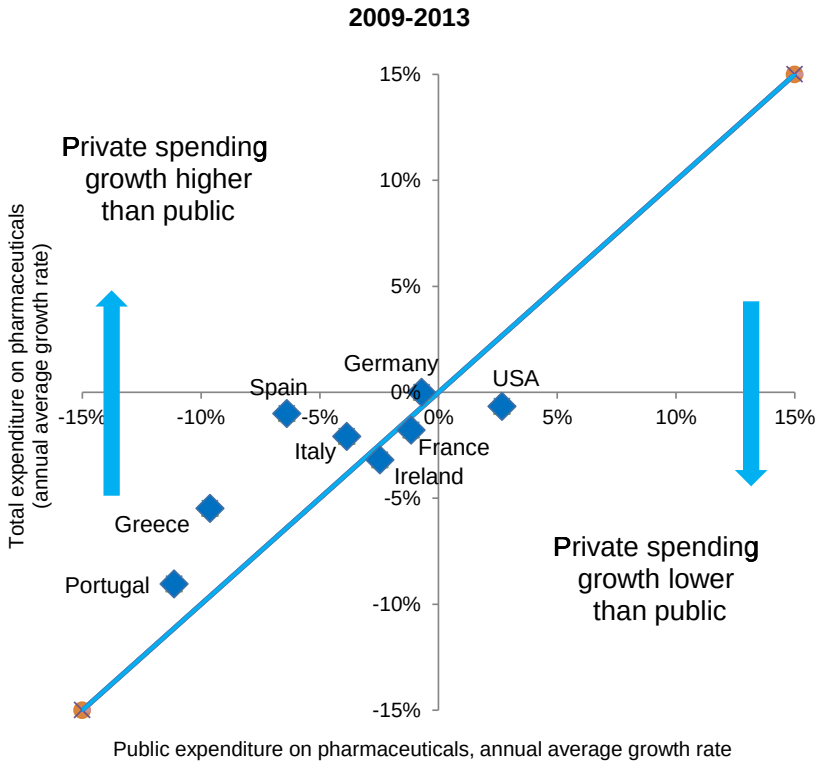


Figure 2.2 - Annual growth in public and total retail pharmaceutical spending, selected OECD countries, 2005-2013

Source: OECD (2015b)

2.5.2 Portugal in detail

Direct comparison against OECD data (shown in the previous point) may not be possible due to probable different criteria in aggregating data (OECD data for Portugal includes medical non-durables), and are expressed in a different currency.

Analyzing Portugal related data in terms of evolution from 2010 to 2014, it is evident a substantial reduction of the drug consumption per capita in terms of retail price, especially regarding NHS expenditure (reduction of 39,4%). Despite the reduction in the average reimbursement in the NHS (from 69,9% to 62,5%), the average yearly cost borne by patients (out-of-pocket) also suffered an important reduction (-15,7%).

Table 2.6 - Per capita medicines consumption in Portugal – 2010 to 2014

	Unit: Euro					Unit: % var.
	2010	2011	2012	2013	2014	2014 vs 2010
Total Market (retail price)	319,2	292,9	262,0	242,9	242,9	-23,9%
NHS Market (retail price)	287,0	260,6	229,0	228,6	194,4	-32,3%
NHS Expenditure	200,5	162,7	144,8	143,4	121,5	-39,4%
User co-payment	86,5	98,0	84,2	85,2	72,9	-15,7%
	Unit: Percentage					
Average NHS reimbursement	69,9%	62,4%	63,2%	62,7%	62,5%	

Source: INFARMED (2015)

2.6 Health care expenditures by type of provider

In terms of health care expenditures allocation by type of provider, hospitals and ambulatory represent the highest weights. These two types of providers have been exhibiting a small, but evident increase in their intensity on the total current health expenditures.

Table 2.7 - Type of health care provider in Portugal

	Type of health care provider				
Years	Hospitals	Continued residential care units	Ambulatory health care providers	Retail trade and other suppliers of medical goods	Other
2000	38,8%	1,0%	24,9%	26,4%	8,9%
2001	37,3%	0,9%	26,0%	26,7%	9,2%
2002	38,1%	1,0%	25,3%	26,7%	8,9%
2003	38,0%	0,9%	26,3%	25,9%	8,9%
2004	37,7%	0,9%	26,6%	25,6%	9,3%
2005	38,7%	0,8%	26,1%	25,3%	9,0%
2006	37,8%	0,8%	26,5%	25,7%	9,1%
2007	38,0%	1,0%	26,4%	25,6%	9,1%
2008	38,3%	1,0%	26,7%	24,9%	9,2%
2009	39,1%	1,2%	26,8%	23,9%	9,0%
2010	39,2%	1,2%	27,3%	23,1%	9,1%
2011	39,5%	1,5%	27,7%	22,3%	9,0%
2012	41,2%	1,6%	27,4%	20,6%	9,1%
2013	42,1%	1,7%	27,5%	19,6%	9,0%
2014	42,0%	1,7%	27,6%	19,6%	9,1%

Source: PORDATA (2017)

2.7 Health care infrastructure – Institutional nature

2.7.1 National Health System

Created in the year of 1979, the Portuguese National Health Service (NHS) is a structure through which the Portuguese State assures the right to health (promotion, prevention and surveillance) to all citizens of Portugal.

The number of healthcare infrastructures in the NHS has remained relatively stable since the early 2010's, especially the number of General Hospitals.

Table 2.8 - Portuguese National Health System infrastructure – Health establishments

Year	Health establishment			
	General Hospitals	Specialized Hospitals	Health Centers	Health Centers extensions
2010	80	31	346	1 087
2011	80	29	358	1 063
2012	82	27	357	x
2013	82	25	x	x
2014	83	24	x	x
2015	85	23	x	x

Source: PORDATA (2017)

2.7.2 Private sector

2.7.2.1 Number of hospitals

The number of private hospitals has been increasing in the last decade, reaching 111 units in 2015, representing a growth of 22% from 2005. In 2015 there were four hospitals in public-private partnership.

Table 2.9 - Portuguese Hospital network, according to the institutional nature

Institutional nature	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 (Po)
Total	204	200	198	189	186	229	226	229	226	225	225
Public hospitals + public-private partnerships	113	107	99	92	86	127	123	122	119	118	114
Private Hospitals	91	93	99	97	100	102	103	107	107	107	111

Source: INE (2017)

2.7.2.2 Number of pharmacies

The number of pharmacies has been stable since the year 2010, on the 2.880 to 2.900 interval. The reduction seen from 2012 to 2015 may be related to the economic crisis Portugal suffered, and to the regulatory changes implemented with respect to margins of the distribution channel operators (including pharmacies). The Portuguese National Association of Pharmacies (ANF) has issued a press release in August 2016, stating that there were 549 pharmacies in situation of attachment of assets or insolvency, representing a growth of 132% from December 2012 to July 2016. During this period, the insolvency numbers increased

from 61 to 196 pharmacies, and the attachment of assets situations increased from 180 to 363 (ANF, 2016).

Table 2.10 - Number of community pharmacies and mobile pharmaceutical posts in Portugal (2005 to 2015)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Community pharmacies	2 775	2 775	2 775	2 774	2 803	2 879	2 900	2 910	2 881	2 889	2 892
Mobile pharmaceutical posts	259	262	263	263	243	176	174	186	184	196	192

Source: INE (2017)

2.8 Health care provision

2.8.1 Hospital stays, medical consultations and urgencies

Considering both the public and private health care sector, the number of hospital stays has evidenced a tendency of stabilization around 1,2 million per year, while the number of urgencies has been registering a steady reduction. This result may be linked to the health policy developed by the last governments, where a focus on ambulatory care, on screening health channels such as Saúde 24 (a telephone line available to help citizens to address health issues, to a team of nurses, dispensing many times a visit to a hospital urgency) and the raise in costs in urgencies may be linked to these results.

The number of health consultations (both in ambulatory and hospital settings) has been stable in the 42 to 43 million range, since 2009.

Table 2.11 - Public + Private sector: Number of hospital stays, medical consultations and urgencies in Portugal (2005 to 2015)

	Hospital stay	Medical consultations	Urgencies
2005	1 229	40 656	13 718
2006	1 220	41 427	13 372
2007	1 249	43 017	13 037
2008	1 239	47 284	11 229
2009	1 211	42 797	11 717
2010	1 202	43 734	10 396
2011	1 182	43 970	9 602
2012	1 182	43 001	8 674

Source: PORDATA (2017)

Considering the National Health System only, and according to Pordata (2017), it is evident that the health centers (ambulatory) capture the majority of medical consultations, while the opposite is verified on urgencies, and mainly on medical stays. For instance, in 2012, 69,4% of the medical consultations were made in health center setting, while 82,1% of urgencies and practically 100% of medical stays happened in hospital setting.

Table 2.12 - National Health System only: Number of medical consultations + Medical stays + Urgencies, by type of care, in Portugal (2005 to 2015)

Unit: thousads

	Medical consultations			Medical stay			Urgencies		
	Total	Hospitals	Health Centers	Total	Hospitals	Health Centers	Total	Hospitals	Health Centers
2005	37.015	8.898	28.117	970,0	959,0	10,9	12.425	6.447	5.978
2006	37.457	9.257	28.200	956,0	948,0	7,6	12.022	6.366	5.656
2007	38.712	9.725	28.987	953,0	949,0	3,9	11.633	6.595	5.038
2008	41.220	10.212	31.008	931,0	929,0	2,2	9.805	6.409	3.396
2009	37.792	10.683	27.109	910,0	909,0	1,4	10.151	6.376	3.775
2010	38.330	10.998	27.332	907,8	906,9	0,8	8.904	6.450	2.454
2011	38.394	11.167	27.227	881,5	881,3	0,2	8.123	6.341	1.783
2012	36.933	11.319	25.614	887,5	887,3	0,2	7.204	5.914	1.289
2013	40.230	11.669	28.561	x	881,9	x	x	5.966	x
2014	40.566	11.840	28.726	x	860,7	x	x	5.961	x
2015	41.009	12.232	28.777	x	863,8	x	x	5.902	x

Sources: PORDATA (2017) | SNS (2016)

Table 2.13 evidences the growing weight of private health care providers in terms of Medical consultations (reaching 14,1% in 2012) and Urgencies (reaching 16,9% in 2012), according to Pordata (2017). Notwithstanding, the National Health Service still accounts for the majority of health care provision in Portugal.

Table 2.13 - Percentage of private health care providers in Hospital stays + Medical consultations + Urgencies in Portugal (2005 to 2015)

Unit: percentage Private / (Public + Private)

Private only	Hospital stay	Medical consultations	Urgencies
2005	21,1%	9,0%	9,4%
2006	21,6%	9,6%	10,1%
2007	23,7%	10,0%	10,8%
2008	24,9%	12,8%	12,7%
2009	24,9%	11,7%	13,4%
2010	24,5%	12,4%	14,4%
2011	25,4%	12,7%	15,4%
2012	24,9%	14,1%	16,9%

Source: PORDATA (2017)

2.8.2 Number of consultations per person

In terms of the average number of doctor consultations per person, Portugal stands in the last place when compared to a selected group of European countries (EU5, for their magnitude, and Greece and Ireland, also assisted by Troika).

Table 2.14 - Average number of doctor consultations per person, 2013 (or nearest year) – selected OECD countries

Country	Average	Year
France	6,4	2013
Germany	9,9	2013
Ireland	3,8	2010
Italy	6,8	2013
Portugal	4,1	2012
Spain	7,4	2011
United Kingdom	5,0	2009

Source: OECD (2015b)

2.9 Health care professionals

According to Decree-Law 20/2013, number 3, point aaa, 14th of February, a health professional is a person legally entitled to prescribe, dispense or administer medicines, namely physicians, dentists, veterinary doctors, odontologists, pharmacists or nurses.

Physicians are the only professional category which is given the responsibility to prescribe medicines in Portugal (Decree-Law 20/2013, number 3, point fff, 14th of February). Dentists

and odontologists are also given to right to prescribe certain medicines. Pharmacists are given the responsibility to dispense medicines prescribed by physicians, and to dispense non-prescription medicines. Nurses are given the responsibility to administer the medicines, especially vaccines (however, pharmacists can also legally administer vaccines, since 2008).

2.9.1 Number of physicians, nurses and pharmacists

The number of physicians in 2015 was 34,2% higher than in 2005. This grow has not been however similar between specialists (+28,4%) and-specialists (+44,7%). In the same period, the number of nurses increased 40,6% (from 48.155 to 67.730) and the number of pharmacists increased 27,6% (from 9.494 to 12.119).

Table 2.15 - Number of physicians + Nurses + Pharmacists in Portugal (2005 to 2015)

Unit: number

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Physicians	Specialists	23 307	23 704	24 087	24 449	25 034	25 534	26 289	27 422	28 488	29 127	29 919
	Non-especialists	12 831	13 220	13 817	14 483	15 061	15 897	16 507	16 441	16 801	17 612	18 568
	Total	36 138	36 924	37 904	38 932	40 095	41 431	42 796	43 863	45 289	46 739	48 487
Nurses		48 155	50 955	54 079	56 709	59 601	62 433	64 478	65 404	65 809	66 340	67 730
Pharmacists		9 494	10 091	10 117	10 729	11 347	10 895	11 887	10 980	---	11 762	12 119

Source: INE (2017)

2.9.2 Main medical specialties

Among the more than 70 specialties and subspecialties, the three most representative in terms of weight are General Practice, Internal Medicine and Pediatrics (INE, 2017).

Table 2.16 - Top 10 physician specialties in Portugal (2015)

Specialty - Top 10	Number	%
General Practitioners	6 372	18,1
Internal Medicine	2 361	6,7
Pediatricians	1 973	5,6
Anestesiology	1 827	5,2
Obstetrician-gynecologist	1 666	4,7
General Surgery	1 658	4,7
Orthopedists	1 120	3,2
Psychiatrist	1 071	3,0
Ophthalmologist	1 005	2,9
Occupational health	975	2,8

Source: INE (2017)

2.9.3 Physician density

In terms of physician density per 100.000 inhabitants, Portugal ranks second on the list, when considering the five biggest countries, and the countries assisted by Troika in the recent past (Portugal, Greece and Ireland).

Table 2.17 - Practicing physicians per 100.000 inhabitants (2009 and 2014) – Europe Big 5 + Portugal + Greece + Ireland

Unit: physicians per 100 000 inhabitants

	2009	2014
Greece	612	632
Portugal	370	443
Germany	362	411
Italy	368	388
Spain	363	380
France	327	334
Ireland	306	304
United Kingdom	267	279

Source: OECD (2016b)

3. Appendix 3 - The pharmaceutical market in Portugal

In this point, we will summarize the organization and characterization of the Portuguese pharmaceutical market.

3.1 Pharmaceutical distribution channels

The distribution channels of the pharmaceutical industry in Portugal are shown below, in a simplified scheme:

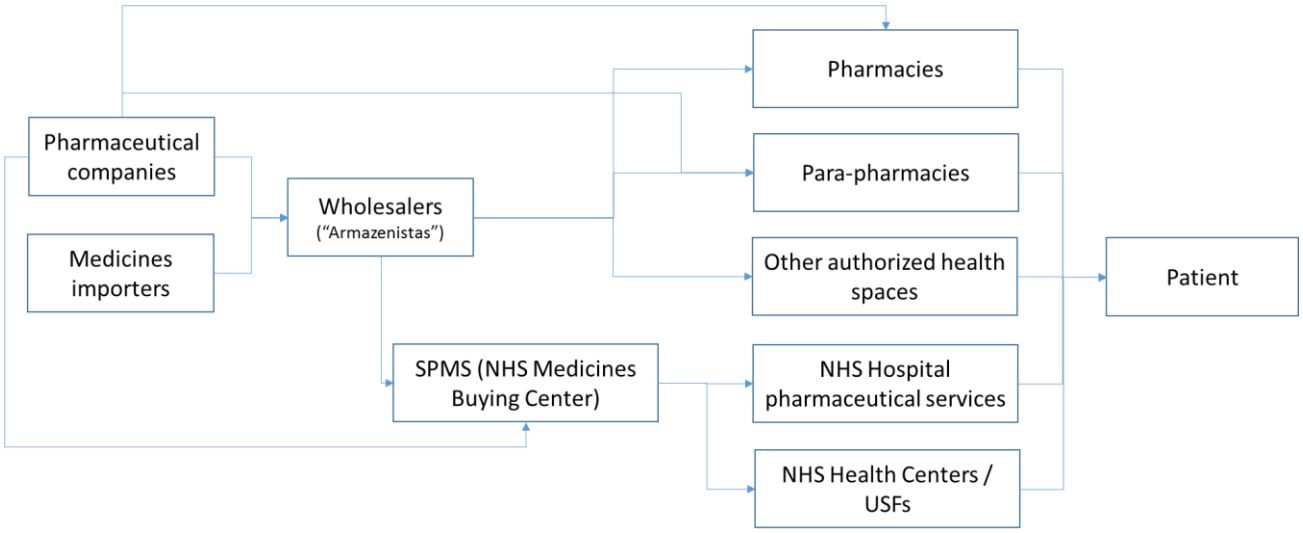


Figure 3.1 – Simplified pharmaceutical industry distribution channel in Portugal

Source: own elaboration

In terms of upstream distribution channel, medicines are either provided by pharmaceutical companies (which can produce the medicines in Portugal or in other country) or by importers of medicines. Wholesalers (called "Armazenistas") by the medicines the pharmaceutical companies, or from importers. Considering the National Health System (NHS) institutions, medicines are bought by a buying center called SPMS (in Portuguese, "Serviços Partilhados do Ministério da Saúde", or Shared services of the Ministry of Health). This buying center will negotiate tenders with wholesalers, or with pharmaceutical companies directly. At a NHS hospital setting, and for patients suffering from chronic diseases eligible for 100% state reimbursement (such as Crohn and ulcerative colitis diseases), patients can collect their medicines (at no cost) at a hospital pharmacy, upon presentation of a medical prescription. In terms of non-NHS hospital settings, pharmacies can buy their medicines from wholesalers (typical situation), or from the pharmaceutical companies directly (less frequent situation). Patients can buy or collect (depending on the reimbursement level) their prescription

medicines at community pharmacies, and can buy non-prescription medicines at community pharmacies, parapharmacies and other authorized health spaces (ex: supermarkets such as Pingo Doce, which have small spaces selling over-the-counter medicines).

The number of pharmaceutical companies operating in Portugal has increased from 311 in 2010 to 419 in 419 (this number includes small companies). The number of pharmaceutical companies registered at APIFARMA (the association of the Portuguese pharmaceutical companies, mainly constituted by the large and medium-size companies) has been relatively stable, ranging from 130 in 2010, to 121 in 2015. The number of wholesalers has also been relatively stable, reaching 443 in 2014. As covered previously, the number of pharmacies has been stable too, reaching around 2.900 (the number of pharmacy extensions was slightly below 200 in 2015). The number of drugstores authorized to sell non-prescription (OTC) medicines (constituted by both parapharmacies and small health spaces at commercial areas) reached 1.010 in 2014.

Table 3.1 - Number of companies per distribution channel function in Portugal

Unit: number

	2010	2011	2012	2013	2014	2015
Pharmaceutical companies[1]	311	334	367	378	419	---
Pharmaceutical companies associated to APIFARMA[2]	130	130	122	121	123	121
Wholesalers[3]	402	406	409	409	443	---
Community pharmacies[4]	2 879	2 900	2 910	2 881	2 889	2 892
Pharmacy extensions (Posts)[5]	176	174	186	184	196	192
Drug stores (authorized to sell non-prescription medicines)[6]	915	926	950	1 014	1 015	1 090

Sources: (1) and (3) INFARMED (2015) | (2) and (6) APIFARMA (2016) | (4) and (5) INE (2017)

3.2 Pharmaceutical market value

The next sub-points will address the Portuguese medicines market, valued at retail price (price that is charged either to the patient or to the NHS or other system).

3.2.1 Macro view

The total medicines market is divided in ambulatory market (prescription and non-prescription medicines), and hospital market (NHS only).

Table 3.2 - Macro view of the medicines market – 2010 to 2015 – Portugal – retail price

Unit: € Million (retail price)

	2010	2011	2012	2013	2014	2015
Prescription medicines	3 065	2 768	2 438	2 219	2 228	2 293
Non-prescription medicines	202	206	209	227	212	243
Total Ambulatory market	**3 266**	**2 973**	**2 646**	**2 446**	**2 439**	**2 536**
NHS Hospital market	1 028	1 022	989	975	990	1 034
Total market (ambulatory + NHS hospital)	**4 294**	**3 995**	**3 635**	**3 421**	**3 429**	**3 570**

Source: APIFARMA (2016)

The medicines market evidenced a substantial negative growth from 2010 to 2015 (-16,9%), decreasing from €4.294 million to €3.570 million. This decrease was especially evident from 2010 to 2011 (-7%) and from 2011 to 2012 (-9%), the two main years of austerity in Portugal.

Table 3.3 - Medicines total market value 2010 – 2015 – Growth rates

Unit: percentage variation vs previous period

	2011	2012	2013	2014	2015	2015 vs 2010
Prescription medicines	-9,7%	-11,9%	-9,0%	0,4%	2,9%	-25,2%
Non-prescription medicines	1,9%	1,4%	9,0%	-6,9%	14,7%	20,3%
Total Ambulatory market	**-9,0%**	**-11,0%**	**-7,6%**	**-0,3%**	**4,0%**	**-22,4%**
NHS Hospital market	-0,6%	-3,2%	-1,4%	1,5%	4,4%	0,6%
Total market (ambulatory + NHS hospital)	**-7,0%**	**-9,0%**	**-5,9%**	**0,2%**	**4,1%**	**-16,9%**

Source: APIFARMA (2016)

In terms of importance (weight on total medicines market), the NHS hospital market has been gaining relevance, growing from 23,9% in 2010 to 29% in 2015. This increase has been compensated by a decrease in the ambulatory market importance, especially on the prescription medicines market.

Table 3.4 - Medicines total market weight - 2010 – 2015

Unit: weight (%) on total market - 2010 to 2015

	2010	2011	2012	2013	2014	2015
Prescription medicines	71,4%	69,3%	67,1%	64,9%	65,0%	64,2%
Non-prescription medicines	4,7%	5,2%	5,7%	6,6%	6,2%	6,8%
Total Ambulatory market	**76,1%**	**74,4%**	**72,8%**	**71,5%**	**71,1%**	**71,0%**
NHS Hospital	23,9%	25,6%	27,2%	28,5%	28,9%	29,0%
Total market (ambulatory + NHS hospital)	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**

Source: APIFARMA (2016)

3.2.2 Detailed view – NHS vs non-NHS

The NHS is the main medicines financier in the Portuguese market. While NHS reimbursement costs decreased from €1.639 million in 2010 to 1.190 million in 2016, a reduction of 27,4%, the out-of-pocket patients' costs remained relatively stable in the €683 million to €799 million range.

The non-NHS market comprises sub-systems and the remaining market. The subsystems included the health subsystem of Ministry of Justice, which, in 2011, was transferred to ADSE (Civil Servants Health Care Assistance, or "Assistência na Doença aos Servidores Civis do Estado", in Portuguese. Then, in April 2013, ADSE and other health subsystems belonging to the Clinical and Drug Assistance to the Members of Military and Militarized Forces were incorporated in the NHS. The remaining market includes the market outside the NHS, such as private clinical practice.

Table 3.5 - Detailed view of the medicines market – 2010 to 2015 – Portugal – retail price – NHS vs non-NHS

Unit: € Million (retail price)

				2010	2011	2012	2013	2014	2015	2016
Ambulatory (outpatient) market: Prescription + non-prescription medicines	National Health System (NHS)	NHS reimbursed		1 639	1 326	1 173	1 160	1 170	1 182	1 190
		Patients (out-of-pocket)		707	799	683	689	703	710	697
		Total NHS		**2 347**	**2 125**	**1 856**	**1 850**	**1 873**	**1 892**	**1 886**
	Non-NHS	Sub-systems	Sub-systems costs	292	166	132	69	21	20	N/A
			Patients (out-of-pocket)	114	76	58	29	5	5	N/A
			Total sub-systems	406	242	190	98	26	25	N/A
		Remaining market		513	607	600	498	540	619	N/A
	Total Ambulatory (out-patient) market)			**3 266**	**2 973**	**2 646**	**2 446**	**2 439**	**2 536**	**N/A**
NHS Hospital Market				**1 028**	**1 022**	**989**	**975**	**990**	**1 034**	**N/A**
Total Market (ambulatory + NHS hospital)				**4 294**	**3 995**	**3 635**	**3 421**	**3 429**	**3 570**	**N/A**

Sources: APIFARMA (2016) | INFARMED (2015) | INFARMED (2017a)

The total market, consisting of the sum of the ambulatory and NHS hospital market, suffered a loss of 16,9% in value from 2010 to 2015. The loss was not more pronounced due to the relative stability of the NHS hospital market expenditures with medicines (which were stable around €1.000 million.

Table 3.6 - Detailed view of the medicines market – 2010 to 2015 – Portugal – retail price – NHS vs non-NHS

Unit: percentage variation vs previous year

Unit: % variation

				2011	2012	2013	2014	2015	2016	2016 vs 2010
Ambulatory (outpatient) market	National Health System (NHS)	NHS reimbursed		-19,1%	-11,5%	-1,1%	0,9%	1,0%	0,6%	-27,4%
		Patients (out-of-pocket)		12,9%	-14,5%	1,0%	1,9%	1,0%	-1,9%	-1,5%
		Total NHS		**-9,5%**	**-12,7%**	**-0,3%**	**1,3%**	**1,0%**	**-0,3%**	**-19,6%**
	Non-NHS	Sub-systems	Sub-systems costs	-43,2%	-20,4%	-47,6%	-69,4%	-4,1%	N/A	N/A
			Patients (out-of-pocket)	-33,8%	-22,8%	-49,8%	-82,0%	-4,1%	N/A	N/A
			Total sub-systems	-40,6%	-21,2%	-48,3%	-73,1%	-4,1%	N/A	N/A
		Remaining market		18,3%	-1,1%	-17,0%	8,4%	14,7%	N/A	N/A
	Total Ambulatory (out-patient) market)			**-9,0%**	**-11,0%**	**-7,6%**	**-0,3%**	**4,0%**	**N/A**	**N/A**
NHS Hospital Market				**-0,6%**	**-3,2%**	**-1,4%**	**1,5%**	**4,4%**	**N/A**	**N/A**
Total Market (ambulatory + NHS hospital)				**-7,0%**	**-9,0%**	**-5,9%**	**0,2%**	**4,1%**	**N/A**	**N/A**

Source: APIFARMA (2016) | INFARMED (2015)

3.2.3 NHS medicines sales and NHS expenditure by origin of prescription

Analyzing the distribution of NHS medicines sales in retail price, NHS expenditure and pack (presentation), it is evident that the great majority of the NHS medicines prescriptions in 2014 were based on NHS health infrastructure, consisting of health centers and public hospitals. For instance, from a NHS expenditure point of view, the sum of these two health institution types was 74,2%.

Table 3.7 - NHS medicines sales and NHS expenditure by origin of prescription (health institution) - 2014

Units: percentage

Health institution	Retail price	NHS Expenditure	Pack
Health Centers	55,0%	55,7%	56,8%
Private doctors and hospitals	3,6%	3,1%	3,6%
Public hospitals	16,8%	18,5%	15,0%
Non-governmental social solidarity institutions	2,6%	2,8%	2,8%
Companies medical office	1,4%	1,2%	1,4%
Disease specialized centers	0,4%	0,4%	0,5%
Other situations	20,3%	18,3%	20,1%

Source: INFARMED (2015)

3.2.4 Main therapeutic groups in ambulatory market

In terms of the main therapeutic groups in ambulatory market, the most impacting one in terms of value in the year 2016 was oral antidiabetics (medicines taken to reduce the glucose levels in the blood, in the scope of the treatment of diabetes mellitus). The second one is modifiers of the renin angiotensin, medicines to reduce the risk of cardiovascular events and overall mortality). Anticoagulants appear in the third place, but evidence a substantial growth when compared against 2015. This was mainly, as will be addressed later, due to the launch of two new oral anticoagulant drugs in the market: Pradaxa from Boehringer Ingelheim, and Xarelto from Bayer / Janssen.

Table 3.8 - Top 10 therapeutic groups in terms of NHS expenses – Retail value – 2015 and 2016

Unit: Percentage

Therapeutic groups	2015		2016	
	Market weight (in value)	% growth vs previous year	Market weight (in value)	% growth vs previous year
Oral antidiabetics	14,8%	8,8%	15,3%	4,3%
Modifiers of the renin angiotensin	9,0%	-12,0%	8,4%	-4,8%
Anticoagulants	6,1%	33,9%	7,8%	27,0%
Antipsychotics and tranquilizers	5,8%	3,5%	5,8%	1,1%
Injectable antidiabetics	5,4%	4,6%	5,6%	3,6%
Lipid-lowering	5,3%	0,7%	5,1%	-2,0%
Other antiasthmatic and bronchodilators	N/A	N/A	4,2%	8,9%
Antiepileptics and anticonvulsants	4,6%	-14,8%	3,8%	-18,4%
Antidepressants	2,9%	-1,4%	2,7%	-3,1%
Other antihypertensive	N/A	N/A	2,6%	1,0%
Others	39,4%	N/A	38,6%	-2,1%

Sources: INFARMED (2015) | INFARMED (2017a)

3.2.5 Main international nonproprietary name (INN) in ambulatory market

Considering the main international nonproprietary names (INN) in ambulatory market, the most impacting in terms of NHS expenditures in the year 2016 were Metformine + Vildagliptine, Metformine + Sitagliptine, and Rivaroxaban. The first two are medicines for the treatment of diabetes mellitus type 2, and the third is an anticoagulant (drug name: Xarelto).

Table 3.9 - Top 10 international nonproprietary name (INN) in terms of NHS expenses – Retail value – 2016

	Unit: Thousand Euros	Unit: Percentage	
	2016		
International Nonproprietary Name (INN)	NHS Expenditure	Market weight (in value)	% growth vs previous year
Metformine + Vildagliptine	52 841	4,4%	-4,6%
Metformine + Sitagliptine	44 892	3,8%	-1,0%
Rivaroxaban	27 499	2,3%	65,1%
Glargine insulin	23 124	1,9%	7,7%
Fluticasone + Salmeterol	20 666	1,7%	-16,4%
Rusovastatin	19 689	1,7%	-12,5%
Quetiapine	19 476	1,6%	0,4%
Dabigatran etexilate	19 342	1,6%	-0,1%
Paliperidone	17 353	1,5%	26,5%
Olmesartan medoxomil + Hydrochlorothiazide	17 159	1,4%	-0,5%
Other NNIs	927 780	78,0%	0,2%
	1 189 820	**100,0%**	**0,6%**

Source: INFARMED (2017a)

3.2.6 Main commercial brands in ambulatory market

Considering the main commercial brands in ambulatory market, the most impacting in terms of NHS expenditures in the year 2016 were Janumet (an antidiabetic medicine from Sanofi), Eucreas (an antidiabetic medicine from Novartis) and Xarelto (an anticoagulant from Bayer). In fifth and eighth places are other anticoagulants, Pradaxa from Boehringer Ingelheim, and Eliquis from Bristol-Myers Squibb, which demonstrates the importance of this therapeutic group.

Table 3.10 - Top 10 commercial brands in terms of NHS expenses – Retail value – 2016

Unit: Thousand Euros Unit: Percentage

				2016			
Commercial name	International Nonproprietary Name (INN)	Marketing authorization holder	Therapeutic group	NHS Expenditure	Market weight (in value)	% growth vs previous year	Average reimbursement rate (%)
Janumet	Metformine + Sitagliptine	Sanofi-Aventis	Other antidiabetics	29 697	2,5%	0,5%	91,5%
Eucreas	Metformine + Vildagliptine	Novartis Europharm	Other antidiabetics	28 393	2,4%	-3,1%	91,6%
Xarelto	Rivaroxaban	Bayer Pharma	Anticoagulants	27 499	2,3%	65,1%	75,4%
Lantus	Glargine insulin	Sanofi-Aventis	Insulins	23 024	1,9%	7,3%	100,0%
Pradaxa	Dabigatran etexilate	Boehringer Ingelheim International	Anticoagulants	19 342	1,6%	-0,1%	75,7%
Zomarist	Metformine + Vildagliptine	Novartis Europharm	Other antidiabetics	15 777	1,3%	-8,3%	91,7%
Olsar Plus	Olmesartan medoxomil + Hydrochlorothiazide	Menarini International	Modifiers of the renin angiotensin	14 369	1,2%	0,5%	74,3%
Eliquis	Apixaban	Bristol-Myers Squibb	Anticoagulants	13 133	1,1%	142,8%	76,1%
Januvia	Sitagliptine	Merck Sharp & Dohme	Other antidiabetics	12 523	1,1%	-8,8%	92,0%
Seroquel SR	Quetiapine	AstraZeneca	Antipsychotics	12 048	1,0%	0,2%	91,8%
				195 804	**16,5%**		

Source: INFARMED (2017a)

3.2.7 Main marketing authorization holders in ambulatory market

The main marketing holders (pharmaceutical companies) in terms of NHS expenditure in the year of 2016 were Merck Sharp & Dohme (with a market share of 8,2%), Novartis Europharm (market share of 7,5%) and AstraZeneca (market share of 6,5%).

Table 3.11 - Top 10 marketing authorization holders in terms of NHS expenses – Retail value – 2016

	Unit: Thousand Euros	Unit: Percentage	
	2016		
Marketing authorization holder	NHS Expenditure	Market share (in value)	% growth vs previous year
Merck Sharp & Dohme	97.384	8,2%	-3,5%
Novartis	89.447	7,5%	-3,8%
AstraZeneca	77.233	6,5%	8,9%
Boehringer Ingelheim	48.582	4,1%	7,4%
Sanofi-Aventis	43.103	3,6%	0,8%
Generis	41.849	3,5%	-7,1%
Novo Nordisk	36.592	3,1%	2,7%
Menarini	35.192	3,0%	1,6%
Ratiopharm	31.647	2,7%	1,0%
Bayer	28.523	2,4%	61,0%
Remaining holders	660.267	55,5%	-0,7%
	1 189 820	**100,0%**	**0,6%**

Source: INFARMED (2017a)

The weight of the top 10 marketing authorization holders (pharmaceutical companies) on the NHS medicines expenditure reached 44,5% in 2016.

3.3 Medicines

3.3.1 Global number of medicines

The number of medicines with marketing authorization (AIM, or "Autorização de Introdução no Mercado", in Portuguese) reached 16.428 in 2014, 10,9% more than in 2010. The number of presentations (or different forms the medicines can be presented, such as for instance packages of 10 pills, 2o pills, syrup, tube, or other), increased more than the number of brand names (7,4% vs 3,7% respectively, from 2010 to 2014).

Table 3.12 - Number of medicines with marketing authorization (AIM), brand names and presentations – 2010 to 2014

	Units: number				
	2010	**2011**	**2012**	**2013**	**2014**
Medicines with marketing authorization (AIM)	14 817	15 859	16 253	16 484	16 428
Brand names	8 535	8 738	8 788	8 878	8 852
Presentations	53 777	57 733	58 781	58 957	57 742

Source: INFARMED (2015)

In 2014, 93% of the medicines were prescription medicines, and 39% were reimbursed by the NHS (Infarmed, 2015).

3.3.2 Detail by prescription classification

The great majority of prescription medicines are of regular prescription type. Special and restricted types include medicines subject to special and restricted medical prescription, for hospital use only.

Table 3.13 - Number of medicines with marketing authorization (AIM), brand names and presentations – Detail by prescription classification - 2014

Units: number

	Prescription-only medicines				Non-prescription (OTC)	Total
	Regular	Special	Restricted	Total prescription		
Medicines with marketing authorization (AIM)	12 052	246	3 058	15 356	1 072	16 428
Brand names	6 355	64	1 673	8 092	760	8 852
Presentations	46 254	944	8 385	55 583	2 159	57 742

Source: INFARMED (2015)

3.4 NHS prescriptions

3.4.1 Number of prescriptions

The number of prescriptions on the NHS reached 72.916 million in 2015, an 8,8% increase when compared to 2010. In the same five-year period, the number of packages increased 9,4%, to 153.020 million units.

Table 3.14 - Number of NHS medical consultations (ambulatory + hospital), number of prescriptions and number of packages – 2010 to 2014

Unit: thousand

	2010	2011	2012	2013	2014
Number of medical consultations (NHS, ambulatory + hospital)	38 330	38 394	36 933	40 230	40 566
Number of prescriptions	67 045	68 300	70 190	70 920	72 916
Number of packages	139 907	139 851	140 017	149 086	153 020

Sources: INFARMED (2015) | SNS (2016)

3.4.2 Average number of prescriptions and packages

In 2014, the average number of prescriptions per consultation was 1,8, the average number of packages per prescription was 2,1, and the average number of packages per consultation was 3,77.

Table 3.15 - NHS - Average number of prescriptions per consultation, average number of packages per prescription, average number of packages per consultation – 2010 to 2014

Unit: number

	2010	2011	2012	2013	2014
Average number of prescriptions per consultation	1,75	1,78	1,90	1,76	1,80
Average number of packages per prescription	2,09	2,05	1,99	2,10	2,10
Average number of packages per consultation	3,65	3,64	3,79	3,71	3,77

Sources: INFARMED (2015) | SNS (2016)

3.4.3 Average cost per prescription in the NHS

The average cost per prescription borne by the NHS evidenced, from 2010 to 2015, a reduction of 44,4%. By dividing the 16,05€ by 25,69€ (in 2014), one obtains the average NHS medicines reimbursement percentage of 62,5%.

Table 3.16 - NHS average cost per prescription in the NHS – 2010 to 2016

Units: Euros

	Scope	2010	2011	2012	2013	2014	2015	2016	% variation 2015 vs 2010
Average cost of prescription (Global)	Retail price	35,00	31,11	26,44	24,05	25,69	N/A	N/A	---
	NHS expenditure	24,45	19,41	16,71	15,08	16,05	13,60	N/A	-44,4%
	Patient charge (out-of-pocket)	10,55	11,70	9,73	8,97	9,64	N/A	N/A	

Source: INFARMED (2017a)

3.4.4 Average cost per package in the NHS

The average cost per package has suffered substantial reductions too, especially regarding the generics, where the NHS expenditures per package decreased 68,1%, with the retail price decreasing 53,5% in the period of 2010 to 2016.

Table 3.17 - NHS average cost per package in the NHS – 2010 to 2016

Units: Euros

		Scope	2010	2011	2012	2013	2014	2015	2016	% variation 2016 vs 2010
Average cost per package	Global (brands + generics)	Retail price	16,77	15,19	13,25	12,41	12,24	12,21	12,10	-27,8%
		NHS expenditure	11,72	9,48	8,38	7,78	7,65	7,63	7,63	-34,9%
		Patient charge (out-of-pocket)	5,06	5,71	4,87	4,62	4,59	4,58	4,47	-11,7%
	Brands	Retail price	17,23	16,79	16,19	15,72	15,70	15,74	15,55	-9,8%
		NHS expenditure	11,46	10,73	10,44	10,07	10,12	10,19	10,20	-11,0%
		Patient charge (out-of-pocket)	5,77	6,06	5,75	5,65	5,58	5,55	5,35	-7,3%
	Generics	Retail price	15,48	11,5	7,87	7,24	7,23	7,19	7,20	-53,5%
		NHS expenditure	12,46	6,6	4,60	4,21	4,07	4,00	3,98	-68,1%
		Patient charge (out-of-pocket)	3,02	4,9	3,27	3,03	3,16	3,19	3,22	6,6%

Source: INFARMED (2017a)

3.5 NHS reimbursement

3.5.1 Reimbursement categories

The Portuguese National Health System defined four reimbursement categories, defined by Ordinance nr 195-D/2015, 30th of June:

Table 3.18 - Reimbursement categories and examples of eligible medicines

Category	Reimbursement	Examples of eligible medicines / diseases
A	90%	Hormones and medicines used to treat endocrine diseases; Medications used in ocular affections; Antineoplastic and immunomodulatory drugs
B	69%	Anti-infective drugs; Central nervous system; Cardiovascular system
C	37%	Genitourinary system; Locomotor system; Antiallergic medications
D	15%	New medicines, medicines with adjusted co-payment or medicinal products which, for specific reasons and after a reasoned opinion issued in the framework of the evaluation process of the co-payment application, are covered by a transitional co-payment scheme

The reimbursement categories vary according to: the therapeutic indications of the medicine; its use; the entities that prescribe it; and the increased consumption for patients suffering from certain pathologies.

Ordinance nr 1319/2010, 28th of December, foresees that there is a special reimbursement regime eligible for two types of contribution: depending on the beneficiaries, and depending on the pathologies or special groups of users. Decree-Law nr 106-A/2010, 1st October,

foresees that NHS reimbursement in category A is increased by 5% and in categories B, C and D is increased by 15% for pensioners whose total annual income does not exceed 14 times the minimum monthly guaranteed payment in force in the year, or 14 times the value of the index of social assistance in force, when it exceeds that amount.

There is also a special reimbursement category of 100% for certain types of pathologies, either for medicines dispensing in the scope of community pharmacies (such as for instance the medicines addressed by Ordinance nr 141/2017 (1st series), 18th of April, which include rheumatoid arthritis, juvenile idiopathic arthritis, psoriatic arthritis, and Spondylarthritis, when prescribed by rheumatology and internal medicine physicians), or for medicines dispensing in the scope of hospital pharmacies (such as for instance the medicines addressed by Dispatch nr 9767/2014, 21st July, which include medicines for the treatment of Crohn or ulcerative colitis diseases).

3.5.2 NHS medicines sales and NHS expenditure by reimbursement category

While reimbursement category A medicines represented 24,7% of the NHS medicines sales in 2014, the NHS expenditure with the same medicines represented 35,2%. The opposite can be verified with reimbursement category C, with 37% vs 24,6%, respectively, also for 2014. This evidence suggests that the NHS is supporting proportionally a higher percentage of category A medicines, than the natural sales percentage of those medicines.

Table 3.19 - NHS medicines sales distribution and NHS expenditure by reimbursement categories

Units: percentage

Reimbursement Category	Scope	2010	2011	2012	2013	2014
A	Retail price	18,5%	21,2%	23,4%	24,0%	24,7%
	NHS expenditure	25,0%	30,3%	32,9%	33,9%	35,2%
B	Retail price	38,4%	40,0%	40,3%	39,2%	38,3%
	NHS expenditure	40,1%	43,7%	43,1%	41,9%	40,2%
C	Retail price	41,5%	38,8%	36,3%	36,7%	37,0%
	NHS expenditure	34,4%	26,0%	24,0%	24,2%	24,6%
D	Retail price	1,5%	0,0%	0,0%	0,0%	0,0%
	NHS expenditure	0,5%	0,0%	0,0%	0,0%	0,0%

Source: INFARMED (2015)

3.5.3 Average reimbursement

Concerning the medications dispensed through the NHS market, the average rate of reimbursement decreased from 69,9% in 2010 to 62,5% in 2014, a loss of 7,4 percentage points. This loss did not seem to affect the patients, as the patients' out-of-pocket costs did not increase substantially.

Table 3.20 - NHS – Percentage of reimbursement vs user co-payment – 2010 to 2014

Unit: percentage

	2010	2011	2012	2013	2014
NHS Reimbursement	69,9%	62,4%	63,2%	62,7%	62,5%
User co-payment	30,1%	37,6%	36,8%	37,3%	37,5%

Source: INFARMED (2015)

Analyzing the average NHS reimbursement by origin of prescription (health institution) in 2014, it appears that the public hospitals (69%) and non-governmental social solidarity institutions (67,1%) are associated with the higher average percentage or reimbursement. Conversely, the lower average reimbursement percentages are associated with companies' medical offices (53,6%) and private doctors and hospitals (54,3%).

Table 3.21 - NHS – Average reimbursement percentage by origin of prescription – 2014

Units: percentage

Health institution	Average % of NHS reimbursement
Health Centers	63,3%
Private doctors and hospitals	54,3%
Public hospitals	69,0%
Non-governmental social solidarity institutions	67,1%
Companies medical office	53,6%
Disease specialized centers	60,7%
Other situations	56,4%
Total	62,5%

Source: INFARMED (2015)

3.6 Medicines price

3.6.1 Average price evolution (ambulatory market)

The average price of medicines in the ambulatory market was €12,09 in 2015, representing a reduction of 27,9% from the average price in 2010 (€16,77). The most intense reduction occurred in 2012, with a decrease of 12,8% in the average medicines price.

Considering generics medicines only, this reduction was significantly more pronounced, reaching 53,5% in the same period of analysis. The loss on average price is even more extreme if we compare the year 2016 against the generics average retail price in January 2007 (20,38€, according to Infarmed, 2017): 64,7% reduction.

Table 3.22 - Average price evolution in ambulatory market – Retail value – 2010 to 2016

Units: Euro

		2010	2011	2012	2013	2014	2015	2016	2016 vs 2010
Global (brands + generics)	Average price (retail price)	16,77	15,19	13,25	12,41	12,24	12,21	12,09	---
	Variation vs previous year	---	-9,4%	-12,8%	-6,3%	-1,4%	-0,2%	-1,0%	-27,9%
Brands	Average price (retail price)	17,22	16,80	16,19	15,72	15,69	15,75	15,55	---
	Variation vs previous year	---	-2,4%	-3,6%	-2,9%	-0,2%	0,4%	-1,3%	-9,7%
Generics	Average price (retail price)	15,48	11,50	7,87	7,23	7,24	7,19	7,20	---
	Variation vs previous year	---	-25,7%	-31,6%	-8,1%	0,1%	-0,7%	0,1%	-53,5%

Source: INFARMED (2017a)

3.6.2 The role of health policy on average medicines price evolution in Portugal

In this chapter we will develop an analysis of the average monthly prices of medicines (brands and generics), also creating a time analysis chart.

3.6.3 NHS medicines sales and NHS expenditure by price range

The medicines sales distribution by price range, in the scope of the NHS, is shown in table 3.23. The NHS expenditure with medicines was proportionally higher with more expensive drugs, when compared against all the medicines sold in the scope of the NHS (retail price). More than two thirds (68,6%) of the medicines' packs were priced below 10€.

Table 3.23 - NHS medicines sales and NHS expenditure by price range - 2014

Units: percentage

Price range	Retail price	NHS Expenditure	Pack
< 5€	11,6%	10,2%	37,9%
5€ - 9.99€	18,4%	15,9%	30,7%
10€ - 24.99€	26,5%	22,8%	20,3%
25€ - 49.99€	26,4%	28,7%	8,1%
50€ - 149.99€	16,0%	20,7%	3,0%
150€ - 249.99€	0,6%	0,8%	0,0%
≥ 250€	0,6%	0,8%	0,0%
< 10€	30,0%	26,1%	68,6%
10€ - 49.99€	52,9%	51,5%	28,4%
≥ 50€	17,2%	22,3%	3,0%

Source: INFARMED (2015)

As expected, the proportion of generics medicines in the first two price intervals is substantially higher than the proportion of all medicines (brand and generics).

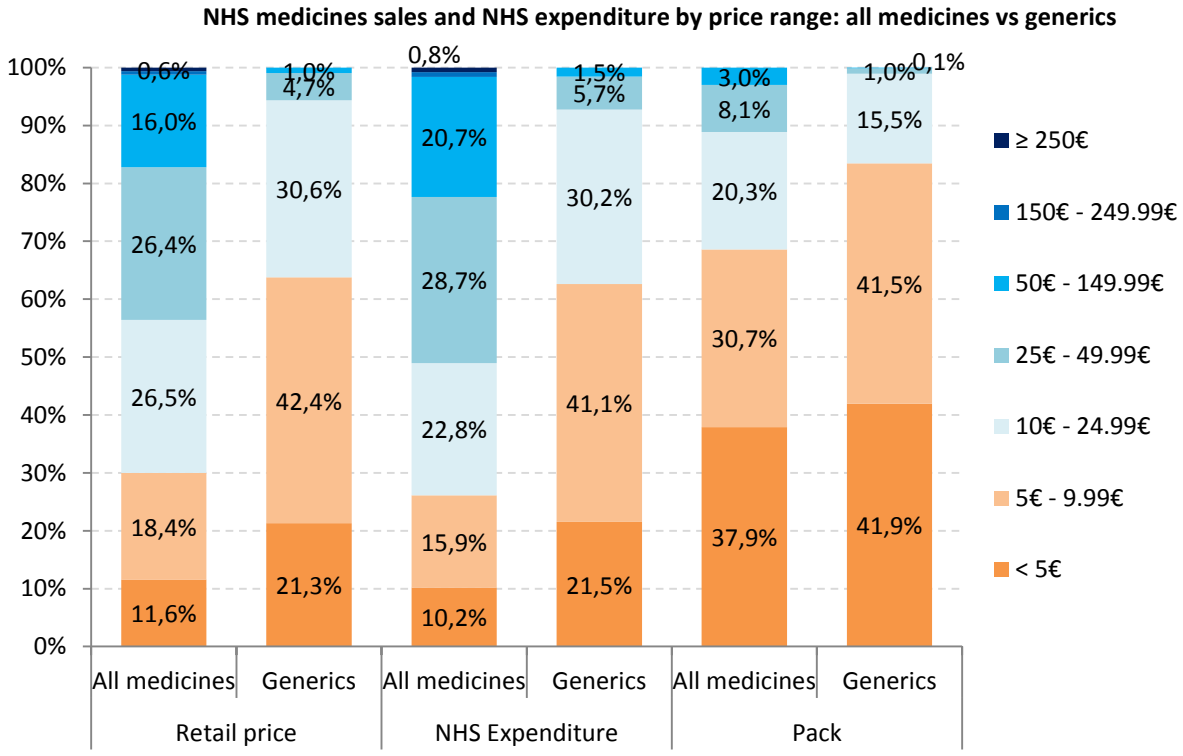


Figure 3.2 - NHS medicines sales and NHS expenditure by price range: all medicines vs generics – 2014

Source: INFARMED (2015)

3.6.4 Average cost per package, by origin of prescription

Average medicines retail price in the scope of the NHS was 12,24€ in 2014, for a correspondent NHS average expenditure of 7,65€. By dividing 7,65€ by 12,24€, one obtain the average NHS reimbursement for medicines (62,5%, as previously addressed in this work).

Table 3.24 - Average cost per package, by origin of prescription (health institution) - 2014

Units: Euros

Health institution	Retail price	NHS Expenditure
Health Centers	11,85	7,50
Private doctors and hospitals	12,30	6,68
Public hospitals	13,72	9,46
Non-governmental social solidarity institutions	11,68	7,84
Companies medical office	12,10	6,48
Disease specialized centers	10,33	6,27
Other situations	12,36	6,97
Total	12,24	7,65

Source: INFARMED (2015)

3.7 Generics

3.7.1 Introduction

Generics medicines are faithful copies of a mature drug, no longer protected by a patent, marketed with the chemical name of the active ingredient, according to Garattini & Tediosi (2010). These authors argue that, despite the fact that, by definition, a generic medicine should not have a commercial brand name, but only the International Non-proprietary Name (INN), in practice there are three generics categories: in a first category there are generics with a brand (or branded generics), which are copies of medicines but without their brand; in a second category there are what the authors call semi-branded generics, which are marketed under the INN, but followed by the name of the pharmaceutical company manufacturer (ex: Simvastatin Lab.X); and in a third category there are unbranded generics, which are marketed under the INN, with no additional reference either to a brand or to a manufacturer.

Garattini & Tediosi (2010) highlight the reasoning why the generics market has registered substantial development. As a first reason, they underline the demand side, where countries have reformed their health systems to help contain health care expenditures. As a second reason, they refer the supply side, since the decreasing number of new innovative drugs may

be putting pressure on manufacturers' profitability, due to an increase in price competition, supporting generics.

3.7.2 Number of approved generics

The number of generic medicines with AIM increased 20,5% between 2010 and 2014, and the number of presentations increased 11,8% in the same period. The percentage of generics in the total drugs (brands and generics) gained five percentage points, from 2010 to 2014, and may have helped to contribute to the reduction of the average medicines price borne both by the NHS and by the patients.

Table 3.25 - Number of generic medicines with marketing authorization (AIM), and presentations – 2010 to 2014

Units: number

	2010	2011	2012	2013	2014
Number of generic drugs	7 891	8 979	9 376	9 574	9 510
Presentations	32 983	37 138	37 627	37 930	36 876
% in the total drugs	53%	57%	58%	58%	58%
% in the total presentations	61%	64%	64%	64%	64%

Source: INFARMED (2015)

3.7.3 Generics penetration

In terms of interpretation of the generics market share (table 3.26), it is relevant to understand the different market share perspectives. Generics market share in value (retail value) consists of the percentage of value of generic medicines in the total of medicines reimbursed by the NHS. Generics market share in units is the percentage of units of generic medicines in the total of medicines reimbursed by the NHS. Generics market share in defined daily doses (DDD) is the percentage of defined daily doses (DDD) of generic drugs in the total of medicines reimbursed by the NHS. The DDD is a unit of measure that represents the average daily dose of maintenance of a certain active substance in its main therapeutic indication in adults. Generics market share in packages is the percentage of packages of generic medicines in the total of medicines reimbursed by the SNS. Finally, generics share in generified market is the percentage of units of generic medicines marketed in the set of medicines in which the active substances have generics marketed in pharmacies.

Table 3.26 - Generics market share in value and volume - 2010 to 2015

Units: Percentage

In ambulatory market (NHS)	2010	2011	2012	2013	2014	2015	2016
Share in value (retail value)	24,0%	23,0%	21,0%	21,0%	22,8%	24,3%	24,6%
Share in units	31,4%	36,2%	41,2%	44,7%	46,5%	47,0%	47,3%
Share in DDD	37,6%	42,0%	47,3%	51,6%	53,0%	52,9%	52,7%
Share in packages	25,9%	30,3%	35,3%	39,0%	40,8%	41,3%	41,4%
Share in volume in NHS generified market	52,8%	54,2%	57,1%	60,4%	62,8%	64,4%	64,4%
Share in units / Share in value	1,31	1,58	1,96	2,13	2,04	1,93	1,92
% mercado concorrencial no SNS	N/A	N/A	N/A	N/A	73,2%	72,9%	73,5%

Sources: INFARMED (2015) | INFARMED (2017a)

The generics penetration in units increased 15,9 percentage points from 2010 (31,4%) to 2016 (47,3%). A similar increase was observed in market share in DDD and in packages (with 15,1 and 15,5 percentage points increases, respectively). Considering the generified market only, generics market share reached 64,4% in 2015 and 2016, representing an increase of 11,6 percentage points from 2010.

3.7.4 NHS generics medicines sales by price range

The generics medicines sales distribution by price range, in the scope of the NHS, is shown in table 3.27. Unlike the evidence seen regarding all the medicines (brands and generics), in generics medicines there does not seem to be a substantial difference in the percentages of medicines by price range, when comparing NHS retail price against NHS expenditure.

Table 3.27 - NHS generics medicines sales distribution by price range - 2014

Units: percentage

Price range	Retail price	NHS Expenditure	Pack
< 5€	21,3%	21,5%	41,9%
5€ - 9.99€	42,4%	41,1%	41,5%
10€ - 24.99€	30,6%	30,2%	15,5%
25€ - 49.99€	4,7%	5,7%	1,0%
50€ - 149.99€	1,0%	1,5%	0,1%
< 10€	63,7%	62,6%	83,4%
10€ - 49.99€	35,3%	35,9%	16,5%
≥ 50€	1,0%	1,5%	0,1%

Source: INFARMED (2015)

4. Appendix 4 - Portuguese pharmaceutical legislative framework overview – 2000 to 2017

4.1 Introduction

This chapter will address the Portuguese pharmaceutical market dynamic in terms of legislative changes, including changes in prices, reimbursement, and other considered relevant (medicines legislation in general), to allow a better understanding of an important period from 2000 to 2017 (where the Portuguese economy and pharmaceutical industry had registered periods of positive and negative growth).

The successive governments implemented several measures in order to control the medicines expenditures, including the creation of reference prices in the scope of price formation, compulsory price reductions, development of protocols with the pharmaceutical industry to define maximum expenditures ceilings, and other measures.

Leopold et al (2014), when comparing the effect of the economic recession on pharmaceutical policy and medicine sales in eight European countries, presented evidence of the number of measures implemented between 2008 and 2011 in the scope of pricing, reimbursement, and generics, underlining that Portugal reached 22 measures (10 for pricing, eight for reimbursement, and four for generics), information shown in figure 4.1 below.

Policy measure	No. of measures implemented between 2008 and 2011[a]								Total
	Economically stable countries[b]			Economically less stable countries[b]					
	Austria	Estonia	Finland	Greece	Ireland	Portugal	Slovakia	Spain	
Pricing									
Price cuts	0	0	0	2	2	3	0	4	11
External price referencing	0	0	0	3	0	2	2	1	8
Distribution remuneration	0	1	0	3	3	3	0	3	13
VAT on medicines	1	1	0	1	1	1	0	1	6
Extraordinary price review	0	0	0	2	2	1	1	1	7
Reimbursement									
Internal reference pricing	0	1	1	1	0	2	2	1	8
Out-of-pocket payments	4	1	0	0	1	5	3	2	16
Delisting	0	0	1	2	0	1	0	1	5
Generics									
INN prescribing	0	1	0	0	0	1	1	1	4
Generic substitution	0	0	0	0	0	0	0	0	0
Public campaigns and other generic policies	1	2	0	0	1	3	1	2	10
Total	**6**	**7**	**2**	**14**	**10**	**22**	**10**	**17**	**88**

INN: international nonproprietary name; VAT: value-added tax.
[a] The number of measures implemented in each year was: 4 in 2008; 11 in 2009; 33 in 2010; and 40 in 2011.
[b] The three economically stable countries implemented 15 measures during 2008–2011 compared with 73 in the five economically less stable countries.

Figure 4.1 - Policy measures influencing pharmaceutical sales in eight European countries, 2008–2011

Source: Leopold et al (2014)

Figure 4.1 also makes clear that Portugal was the country with the highest number of measures implemented in this period. Leopold et al (2014) identified the different policy measures by using the Pharmaceutical Pricing and Reimbursement Information Network (Austrian Health Institute, Vienna, Austria), the PharmaQuery database from IMS Health, and information on policy changes present in published literature. However, no profound analysis of the several diplomas appears to have been conducted, on a country basis, which let us to develop an alternative – and complementary – approach to understand, by the one hand, the complexity of the granular legislative changes that occurred in Portugal not from 1986 to 2017 (and not only from 2008 to 2011), and to quantify, by the other, all changes including laws, decree-laws, orders, ordinances, and other legislative instruments such as protocols.

Due to the magnitude of the number of legislative initiatives, we observed the following methodology in order to identify the relevant diplomas: first, we consulted INFARMED website, which compiles, in its page "Legislação farmacêutica compilada", the legislation relative to the pharmaceutical activity, medicines, prices, and reimbursements. Of all the categories presented, we selected the most relevant for the purpose of this thesis: prices, reimbursements and medicines (general part), which resulted in a number of diplomas (laws, decree laws, ordinances, orders, and protocols). Since INFARMED website did not appear to be totally updated as of August 2017 (it missed some legislation published in the years 2016 and 2017), two other sources of data were selected. These consisted of APOGEN (Associação Portuguesa de Medicamentos Genéricos e Biossimilares) website, on its "Legislação" page (which compiles the pharmaceutical industry related legislation), and PLATAFORMA (a non-profit association, made up of patient associations, promoters and health professionals and consumers, providing several services including the listing of all legislative changes related to health), on its "Legislação" page. INFARMED, APOGEN and PLATAFORMA data was merged, and shown below in figure 4.2.

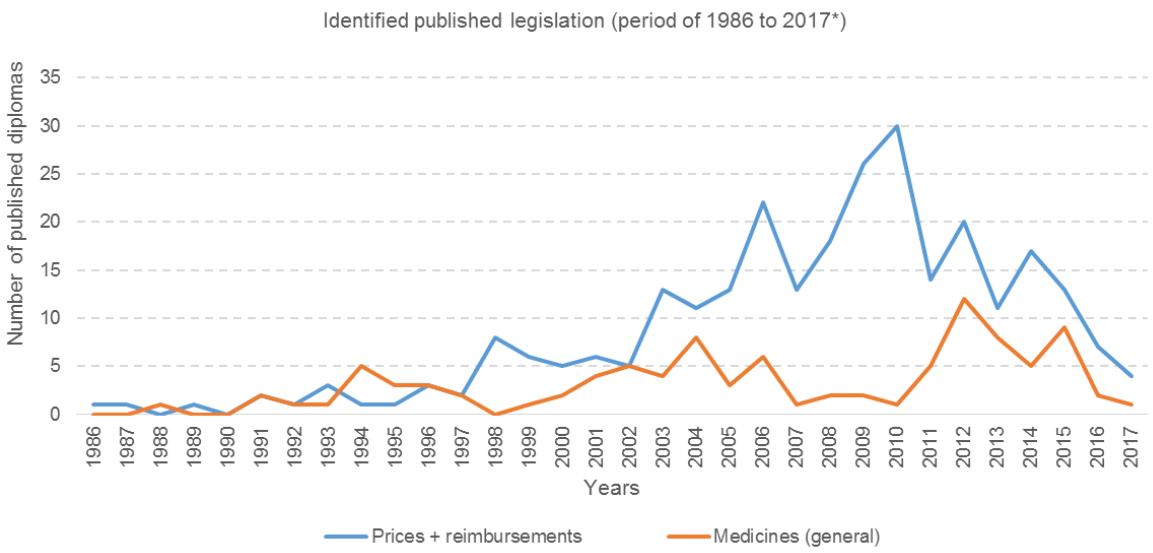


Figure 4.2 – Number of health related legislative diplomas identified in the period of 1986 to 2017

Source: compilation of data from INFARMED (2017b), APOGEN (2017) and PLATAFORMA (2017)

* The year of 2017 includes legislative diplomas up to August the 9th, 2017.

Table 4.1 evidences the same data, but from 2000 to 2017.

Table 4.1 – Number of health related legislative diplomas identified in the period of 2000 to 2017

Year	Prices + reimbursements	Medicines (general)
2000	5	2
2001	6	4
2002	5	5
2003	13	4
2004	11	8
2005	13	3
2006	22	6
2007	13	1
2008	18	2
2009	26	2
2010	30	1
2011	14	5
2012	20	12
2013	11	8
2014	17	5
2015	13	9
2016	7	2
2017	4	1

Source: compilation of data from INFARMED (2017b), APOGEN (2017) and PLATAFORMA (2017)

The data contained in figure 4.2 and table 4.1 may not contain the totality of legislative initiatives in the scope of pharmaceutical industry, prices, reimbursements and medicines in general. More than perform a systematic and detailed inventory of the legislative changes (which was not the objective of this endeavor), the process developed aimed at targeting several goals. The first one consisted of the identification of the main legislative initiatives that could have had an impact on the market development in terms of pricing, generics penetration and market growth, for a better understanding of its dynamics. These insights were expected to help identify the therapeutic class and drug perimeter, selected for the quantitative phase of the research design, which consisted of the second objective. A third objective consisted of the critical analysis of the impact of history when interpreting the results from the quantitative and qualitative steps of the research design, especially when analyzing the internal validity.

In the next topics, we will highlight some of the apparently most important legislative changes that may have had a substantial impact on the pharmaceutical market dynamics.

4.2 Protocols with the pharmaceutical industry

Since 1997, the Ministry of Health, and APIFARMA, the institutional representative of the pharmaceutical industry in Portugal, have been signing agreements to safeguard the introduction of innovation and payment of debt, and a limit to the NHS expenditures with medicines, defining ceilings. Twelve agreements or protocols have been signed, as of August 2017 (APIFARMA, 2017).

In the year of 2006, protocol 7/2006 (10th February) - aimed at controlling the growth with medicines expenses, taking effect from 2006 to 2009 – defined a maximum ceiling of expenditures growth. This protocol, signed by the Ministry of Health and by APIFARMA, as representative of the pharmaceutical industry, was the first attempt to involve the pharmaceutical industry in the effort of guaranteeing a sustainable medicines market not only regarding ambulatory market but, for the first time, including also the hospital market. The goal of the protocol was to proceed with the planning, in the short and medium term, of the budgetary and financial sustainability of the National Health Service.

While the first protocols' main goal was to define limits to the growth of expenditures with medicines, after 2011 the magnitude of the contribution had grown substantially, since the

protocols' main goal was to reduce expenditures with medicines. This was one of the consequences of the assistance program implementation, after Portugal's request for assistance to a Troika composed by the European Union, the European Central Bank and the International Monetary Fund in 2011. According to APIFARMA (2017), such a reversal has resulted in a "very significant increase in the contribution value and serious difficulties in accessing medicines, since the evolution of the sociodemographic context, with the increase in the incidence of chronic diseases, demands precisely the opposite. Since 2012, pharmaceutical industry's contribution has been a huge effort for the member companies, in particular by the congregation of two factors: the difficult macroeconomic environment and the very high contribution value that has been requested" (http://www.apifarma.pt/cidadania/protocolos/protgov/Paginas/default.aspx?scqPage=1). For instance, for the year 2016, a referential is set for public expenditure with medicines of €2.000 million (clause 2, number 1, 2016 Agreement between the Portuguese State, represented by the Ministers of Finance, Economy and Health and the Pharmaceutical Industry). For the year 2017, the minimum contribution pharmaceutical industry had to guarantee was €200 million, which was quarterly updated according to the public expenditure with medicinal products of the NHS (clause 2, 2017 Amendment to the Agreement between the Ministries of Finance, Economy and Health and the Pharmaceutical Industry). This protocol also foresaw that, should the value of the public expenditure on medicines be exceeded, the adherent companies to the agreement had to pay the amount that exceeded the maximum goal set during the first quarter of 2017. Each company contribution was proportional to its market share.

According to APIFARMA (2017), in the 2017 protocol, the contribution solicited to the pharmaceutical industry represented more than 1% of the initial NHS budget, corresponding to approximately 5% of the annual public expenditures with medicines.

4.3 Prices and reimbursements

Decree law 205/2000 (1st September), in article 3, point 6, established a temporary 10 percentage points increase in the reimbursement of generics in reimbursement categories B, C and D. This measure had the goal of promoting the commercialization and usage of generic medicines.

Ordinance 577/2001 (7th June), foresaw that the generics price would have to be at least 35% lower than the reference medicines.

Decree law 270/2002 (2nd December) established, as noted by Pinto (2014), the reference price system applicable to State reimbursement. The rule was the following: for each homogeneous group of medicines, the reference price corresponds to the retail selling price of the generic with the highest retail selling price in the group. Sousa (2013) explicated that the reference price calculation is based on five different prices, which may correspond to more than five medicines, regardless of whether they are generic, and that the reference price is the average of the lowest prices.

Ordinance 914/2003 (1st September) continued the pressure on medicines prices, defining that any new generics price would have to be equal or inferior to homogenous group reference price.

The year of 2005 represented the beginning of the compulsory price reductions in non-generic medicines (until then, only generics prices had been subject to reduction). Ordinance 618-A/2005 (27th July) foresaw that all medicines subject to reimbursement (both generics and non-generics) retail selling price would be subject to a 6% reduction (with some exceptions for companies investing more than €5 million in research and development). This price reduction was revoked by ordinance 30-B/2007 (5th January). Ordinance 618-A/2005 also defined maximum commercialization margins for the members of the distribution channels (pharmaceutical wholesalers and pharmacies). In the same year, some changes in the reimbursement percentages were implemented, by decree law 129/2005 (11th August), in order to reduce abuses in medicines utilization (reimbursement in category A was reduced from 100% to 95%). This decree also revoked the temporary 10 percentage points increase in the reimbursement of generics in reimbursement categories B, C and D, given that, according to the Ministry of Health in the introductory note on the decree law, generics already had an adequate market introduction at that time.

Protocol 7/2006 (10th February), in addition to defining the pharmaceutical monetary contribution to the medicines NHS budget, also foresaw two important measures: first, it revised the medicines price formation methodology. From that moment onwards, the reference price (of products with a retail selling price higher than €15) started being formed through the comparison of the average of the prices of original products of those medicines in a group of four reference countries (Spain, France, Italy and Greece). The obtained price was then considered as the maximum price by the agents in the pharmaceutical sector. This change was set with the goal of limiting substantial discrepancies of prices in Portugal, versus

other countries. Second, protocol 7/2006 also foresaw another compulsory price reduction on generic medicines, between 3% and 5%, depending on the generics market share evolution of the respective active substance (applicable to market shares higher than 50%).

As noted by Pinto (2014), law 53-A/2006 (29th December), set new commercialization margins of medicines: 6,87% to wholesalers, and 18,25% to pharmacies (both on retailing price, excluding VAT). The same law reduced the reimbursement rates for categories B (to 69%), C (to 37%) and D (to 15%).

Decree law 65/2007 (14th March) updated the medicines price formation methodology, establishing maximum prices for medicines for human use subject to medical prescription, with the exception of medicines subject to restricted medical prescription exclusively for hospital use, as well as non-prescription medicines reimbursed.

Ordinance 1016-A/2008 (8th September) implemented another compulsory price reduction: generics whose retailing prices were higher than €5 should suffer a price reduction of 30% (medicines approved until 31st March 2008).

Decree law 48-A/2010 (13th May) updated the medicines commercialization margins to 8% (in the case of wholesalers) and 20% (in the case of pharmacies). It also foresaw, in article 21, that the economic advantage of each generic medicine for reimbursement from the fifth generic medicine, inclusive, would be achieved by setting a maximum retail price that is 5% lower than the maximum retail price of the generic drug whose valid request had been immediately prior, irrespective of the reimbursement decision. The apparent goal was to put additional pressure on generics prices, since most of the homogenous groups had more than five generics competing. In the same year, ordinance 312-A/2010 (11th June) updated the medicines price formation methodology and its regular revision. In October, decree law 106-A/2010 (1st October) reduced the reimbursement in category A from 95% to 90%, also changing the reference price calculation methodology (changing to the average of the five least expensive medicines in each homogenous group). Decree law 106-A/2010 also implemented a very important change: it decisively encouraged the prescription of medicines by electronic means, establishing that, as from 1 March 2011, only prescriptions prescribed by this route would be reimbursed. Still in 2010, ordinance 1041-A/2010 (7th October) foresaw a reduction of 6% in prescription medicines prices, relative to the maximum retailing approved price.

Decree law 112/2011 (29th November) updated the price formation of prescription drugs and reimbursed of non-prescription medicines. One of the initiatives was to define that maximum generics price to be introduced in the market, as well as medicines object to switch from non-generics to generics, had to be at least 50% lower than the price of the non-generic brand with the same active substance (for retailing prices equal or higher than €10), or at least 25% lower than the non-generic brand with the same active substance (for retailing prices lower than €10). This decree set, for the first time, regressive commercialization margins for wholesales and pharmacies and by price ranges, the latter of which is a fixed value irrespective of the price of the medicine, with margins incorporating variable and fixed values, instead of a linear margin only (percentage). The fixed component of the margin had been subject of discussion with ANF, since the average medicines prices suffered a substantial price reduction in the previous years, eroding, according to ANF, the distribution channel members' profitability.

In 2013, decree law 34/2013 (27th February) as an amendment to decree-law 112/2011 of 29th November, approved the system of price formation of prescription drugs and reimbursed non-prescription medicines and established a mechanism of definition of the prices of prescription drugs that had not been subject of prior evaluation for the purpose of acquisition by the hospitals of the NHS, nor of a decision to reimbursement. Ordinance 91/2013 (28th February) set an updated list of countries for price reference price definition purposes. The countries were Spain, France and Slovakia, and the criteria observed by the Portuguese Ministry of Health for this selection was to include countries from the European Union which, vis-à-vis Portugal, had either a comparable per capita gross domestic product in purchasing power parity, or a lower level of medicines prices. This ordinance also revoked the 6% reduction in prices, set by ordinance 1041-A/2010 (7th October). Later in 2013, ordinance 335-A/2013 (15th November) set a new country perimeter for reference prices: Slovenia, Spain and France.

Ordinance 45/2014 (21st February) defined the pharmacotherapeutic groups and subgroups that integrated the different reimbursement categories. Ordinance 231-A/2014 (12th November) kept the country perimeter for reference prices purposes: Slovenia, Spain and France. Decree law 19/2014 (5th February) defined a minimum retail price for generic medicines, updated the commercialization margins (give a higher weight to the fixed part), and predicted the possibility of attributing incentives to pharmacies that promoted the increased use of generic drugs and, of these, the cheaper ones.

Ordinance 195-C/2015 (30th June) updated the commercialization margins for wholesalers and pharmacies, keeping the variable and fixed components.

Ordinance 290-A/2016 (15th November) foresaw that, in the case of generic medicines, the price must be at least 30% lower than the maximum price of the reference product with the same dosage and pharmaceutical form.

Ordinance 290-B/2016 (15th November) defined the reference countries to consider in 2017 (Spain, France and Italy) for the authorization of the prices of new medicines and for the purpose of annual review of the prices of medicines in the hospital and ambulatory markets and introduced an exceptional criterion to be applied in the regime of prices revision and its suspension for generic medicines.

4.4 Restriction policies to regulate access to physicians

The activity of the Pharmaceutical Sales Representatives (PSRs) is referred in article 157 of Decree Law 176/2006. This article remains unchanged from the initial writing of the diploma. It provides, among other aspects, that the exercise of the professional activity of the PSRs is regulated by Order of the Minister of Health.

The legal regime for medicines before Decree-Law 176/2006 was regulated by Decree Law 100/94, which had no reference about the specific norms of the activity of the PSRs (including access limitation to health infrastructures and number of visits per day), nor did it envisage doing so by Order.

Order 9630/2001, from April the 11th, only stated that any restrictions could only be set from an eventual decision of the Regional Health Administrations, but they would neither be generalized, nor applied in a uniform way to the activity and to the pharmaceutical community, since they did not derive from legal norms.

Order 2837/2004, from January the 8th, established general restrictions applied to all professionals in this activity. This Order revoked Order 9630/2001, and set limits on PSRs access to National Health System (NHS) institutions and physicians. It set a limit of two PSRs per day in Hospital services, or three PSRs per day in other NHS infrastructures, independently from the represented pharmaceutical companies. The maximum number of visits per day, per PSR, was set at 10 (this limit could however be exceeded in the case of

collective information sessions, which were understood to include at least five health professionals). In the same Order, the maximum number of visits per pharmaceutical company to NHS institutions was set at six per year. Point 10 of this Order explicated that, exceptionally, the director of the establishment or service of the NHS, or another person designated by him or her, may, under the conditions set out in paragraph 11, authorize visits beyond the provisions of the previous numbers, in particular when new therapies or different health technologies are introduced, and when, on the part of the health professionals, it is necessary to obtain clarification on therapeutics or health technologies. This authorization, explained in point 11, should be preceded by an opinion from INFARMED, which should be presented to the director of the health center or to the clinical director in the case of hospital services.

APIFARMA, the Portuguese association representing pharmaceutical companies, asked the Public Prosecution to evaluate the constitutionality of Order 2837/2004. The document was in force until it was declared unconstitutional on December the 5th, 2006, by Constitutional Court Judgment 666/2006, published in Diário da República on January the 4th, 2007. It was declared unconstitutional given that the restrictions it imposed had no legal basis, as they did not have empowering norms because Decree Law 100/94 did not have any provision on the subject (in other words, the document did not contain the express indication of the law that aimed to regulate). As a consequence, Order 9630/2001 became applicable again, since Order 2837/2004 was declared unconstitutional with mandatory general force, meaning it could no longer be applied. The provision norm came up with Decree Law 176/2006.

So, although the Law established the possibility of regulating the activity by Order still in 2006, with Decree Law 176/2006, and becoming the provision norm, the 2004 Order still did not have a provision norm since it was issued in force of Decree Law 100/94. Therefore, eventual limitations to the activity of PSRs were only on the hands of the Regional Administrations of Health (ARS), which may or may not apply them, in the absence of a central limit imposed by the central health tutelage (Ministry of Health), as foreseen by Order 9630/2001 of April the 11th.

The regulation of the activity and the respective restrictions by Order of the Minister of Health, authorized by Decree Law 176/2006, only was set in 2013, with Order 8213-B/2013, which revoked Order 9630/2001. Order 8213-B/2013 represented the entry into force, not dependent on the decision of the regional health administrations, of a nationally-wide

detailing ceiling. This Order had some similarities with Order Order 2837/2004. It kept the same limits on PSRs access to the NHS institutions at two PSRs per day in each Hospital service, or three PSRs per day in other NHS infrastructures, again, independently from the represented pharmaceutical companies, and not being admissible, in each visit, the representation of more than one laboratory per PSR. The Order set PSRs a maximum of eight visits per day to doctors working at NHS institutions (reducing two days from Order 2837/2004). This limit may be exceeded in the case of collective information sessions, but up to a maximum of two per year for each laboratory, and covering, simultaneously, at least five health professionals. These collective information sessions shall be authorized by the Executive Director of the Health Centers Grouping in the case of health primary care of ACES (grouping of health centers), or by the board of directors, In the case of hospital entities. Pharmaceutical companies can make a maximum of six visits per year to a NHS establishment or service, according to their size and the number of professionals of the different specialties that PSRs visit (in type B units integrated in the NHS - USFs, or family health units -, this number can exceptionally increase to eight visits per year, subject of notification to INFARMED

Order 8213-B/2013 also regulates the credentialing of PSRs and their access to NHS services and establishments. In the exercise of PSRs professional activity, this access is permitted only when PSRs are registered, identified and accredited (but the access to NHS infrastructures does not depend on the payment of any amount). The accreditation of PSRs is obtained by registering with INFARMED, promoted by holders of valid authorization of health products market introduction, or by their representatives, generically designated by laboratories, to which PSRs are bounded by contract. At the time of registration of PSRs, laboratories shall deliver a series of documents, including a statement issued by the laboratory relating to each PSR, attesting he or she has adequate training, and deontological training enabling him or her to provide information as complete and accurate as possible with regard to medicinal products and health products he or she presents. The registration of PSRs is computerized and is processed until January 31st of the year for which access is sought, and laboratories must notify INFARMED within a period not exceeding 10 days from the date of eventual changes, in order for this registry to be permanently updated.

The appointment of visits in each establishment or service of the NHS is made previously, with the administrative staff of the health infrastructure, in order to ensure its weekly programming, with the identification data of the PSRs as well as the laboratory they represent.

A weekly list of visits will be posted in a suitable place, so that all health professionals of the service of the service may be aware of it, and is uploaded by computer, at the appropriate place at INFARMED website, on the Internet, for the purpose of control, also becoming available to all NHS establishments and services. PSR can schedule the next visit only on the day of their current visit.

The violation of the provisions of Order Order 8213-B/2013 by NHS employees is subject to disciplinary action. In case of violation of the rules contained in this Order by a PSR, the coordinator of the functional unit, in the case of ACES, or the clinical director, in the case of hospitals, will notify the competent Regional Health Administration (ARS) within 10 days, which shall immediately inform the respective laboratory and the employer's association representing it, where applicable. ARS, once the notification of the breach has been received, will proceed to the written hearing of the alleged offender and, after analyzing the situation, decides the time period of prohibition of access to the establishments and services of the NHS, to the PSR and to the correspondent laboratory, depending on the severity of the situation. The violation of the provisions of order 8213-B/2013 by a PSR implies the prohibition of their access to NHS establishments and services up to a maximum of three months. However, the reiteration in violation of the rules implies the prohibition of access of the PSR and the correspondent laboratory to the establishments and services of the NHS for a maximum period of three years, during which period they are excluded from the list of PSRs listed at INFARMED.

4.5 Other measures

Law 84/01 (3rd August) authorized, on article 20, the transfer of already existent medical specialties to generic medicines, as one of the first measures to encourage the development of the generics market.

In 2002, Dispatch 7145/2002 (07th March) defined measures allowing the distribution of the savings obtained from a higher prescription of generics, with the management boards of hospitals and health centers (50% destined to investment in the institutions, and 50% destined to physicians, as underlined by Pinto (2014)). This Dispatch was revoked in 2003 by Dispatch 1389/2003 (6th January).

Decree law 271/2002 (2nd December) foresaw that prescription of medicines containing active substances for which authorized generics were available would be affected by an indication of the international non-proprietary name (INN) or generic name. However, it was possible to include the brand name of the medicine product or the name of the proprietor of the marketing authorization. A few days later, ordinance 1501/2002 (12th December) introduced a single prescription model with uniform characteristics, especially regarding the rationalization of medicines prescription. It also introduced the regulation of the renewable medical prescriptions, facilitating the patients' access to the medicines they need for long-term treatment.

In the scope of the primary health care reform, initiated by resolution of the council of ministers 157/2005 (12th October), Afonso (2009) noted that a process of contracting with the Family Health Units (FHU) "would be a fundamental point in the process of change - inducing more responsibility and demanding, always with a view to achieving better results in health, with greater efficiency" (p. 59). According to ACSS (2017) definition, health family units (or USFs in Portuguese) are small operational units of the health centers with functional and technical autonomy, which contract the objectives of accessibility, adequacy, effectiveness, efficiency and quality, and which guarantee the enrolled citizens a basic portfolio of services. ACSS (2017) characterizes the main attributes of each USF model: model A corresponds to a phase of learning and improving family health work, while at the same time it constitutes an initial contribution to the development of the practice of internal contracting; model B is suitable for teams with greater organizational maturity where family health team work is an effective practice and are willing to accept a level of contracting of more demanding performance levels; and model C, characterized by the existence of a contract program (public sector teams or belong to the private, cooperative or social sector). The evolution of the number of USFs is presented in table 4.2.

Table 4.2 – Evolution of the number of USFs by model in the period of 2006 to 2016 (at the end of each year)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Model A	43	120	91	127	160	183	195	213	225	241	247
Model B	0	0	69	103	117	137	162	181	193	208	239
Total A + B	**43**	**120**	**160**	**230**	**277**	**320**	**357**	**394**	**418**	**449**	**486**

Source: ACSS (2016)

As seen previously, decree law 106-A/2010 had established the principle of compulsory electronic prescription to obtain the reimbursement of medicines. Ordinance 198/2011 (18th May) developed this process further. Until the electronic prescription can be completely dematerialized (sent by electronic means from the prescriber to the pharmacy), it defined that the solution passes through the electronic prescription, and the printing on paper for the purpose of dispensing the medication. This decree law set the requirements to which electronic prescriptions should obey, and also their control through information means.

Law 11/2012 (8th March), regulated by ordinance 137-A/2012 (11th May) established the legal regime that obeys the rules of prescription of medicines, models of medical prescription and conditions of dispensation of medicines, as well as defines the information obligations to be provided to the users. It defined, in the scope of prescription-only medicines, compulsory electronic prescription (with some exceptions where manual prescriptions were admitted), and by INN (allowing only three defined exceptions, where physicians could include the commercial name of the non-generic medicine). Ordinance 137-A/2012 also predicted that the patient can decide, at the pharmacy, which brand of generic medicine he or she wants to take, from a group of five least expensive alternatives (the pharmacies will be forced to have, in stock, at least three of those five least expensive alternatives of the active substance).

Ordinance 18-A/2015 (2nd February) defined the terms and conditions for the payment of additional remuneration to pharmacies participating in public health programs for the contribution to reduce the expenses of the NHS and drug users by increasing the share of generic medicines reimbursed by the National Health Service and dispensed by the pharmacy. As an example, if a pharmacy increased its generics share between five and ten percentage points, an incentive of €0,05 per generic medicine sold (unit) would be given to the pharmacy (should the generics penetration be higher, a higher incentive per generics unit would be attributed).

Order 2935-B/2016 (24th February) established dispositions promoting the generalization of dematerialized electronic medical prescriptions in the NHS, creating concrete goals for its effectiveness (contributing to a greater rationalization in the access to medicines, reduction of costs in the prescription and adequate monitoring of the whole system of medicines prescription and dispensing).

Resolution of the council of ministers 56/2016 approved the National Strategy for Medicines and Health Products 2016-2020, whose main pillars were: 1) Review of dispensing and

reimbursement mechanisms of medicines, especially regarding chronic outpatients (ambulatory); 2) Promotion of an increased quota of generics and biosimilars; 3) Hospital medical plan; 4) Collaboration with the Primary Health Care Network; 5) Development of health technology assessment models; 6) Valuing the role of community pharmacies and availing their services, in articulation with the units of the National Health Service; 7) Encourage and support national research and production in the field of medicine and medical devices; 8) Promotion of transparency.

Ordinance 138/2016 (13th May) extended the obligation of dematerialized electronic prescription to the remaining prescribers (who are not part of the NHS), as of September 1, 2016 (keeping however some specific exceptions, where a limited number of non-electronic prescriptions).

Decree law 5/2017 (6th January) approved the general principles of advertising for medicines and medical devices. One of the changes it implemented was the elimination of the double registration of benefits (received by physicians and by institutions, from the pharmaceutical industry), replaced by the validation of the registration of the sponsorship granted by the respective beneficiaries, with the advantages inherent to the simplification of the procedure.

4.6 Official communication initiatives to promote the penetration of generics

In addition to a series of legislative initiatives – covered in the previous topics – the Ministry of Health, through INFARMED, developed a series of communication initiatives to educate not only patients but also health care professionals regarding the benefits of generics medicines, stressing that they were equivalent in terms of efficacy (2001 and 2007), have quality (2002, 2004 and 2007), lower price (2004, 2009, 2010 and 2016), trust (2007), and safety (2007). Table 4.3 summarizes these campaigns in terms of year, campaign name, targets and media used to communicate the messages.

Table 4.3 – INFARMED communication campaigns to promote generic medicines

Year	Campaign name	Targets	Media
2001	"Medicamentos genéricos: descubra as diferenças"	General public	N/A
2002	"A qualidade por princípio"	General public	Newspapers, Radio, Television, ATMs and Outdoors
2002-2003	"Medicamentos genéricos, porque as pessoas merecem"	General public	N/A
2004	"Genéricos. Iguais na qualidade, diferentes no preço"	General public, Press, Health care professionals	Newspapers, Radio, Television, Outdoors
2007	"Qualidade, segurança e eficácia ao seu alcance. Pode Confiar!"	General public, Press, Health care professionals	Newspapers, Radio, Television, Brochures, Outdoors and Posters
2009	"Não acha que estar doente já custa o suficiente?"	General public, Press, Health care professionals	Brochures, Mail and Email Marketing (Advertising and Signature) and Internet (Advertising display)
2010	"Medicamentos Genéricos - Poupa você, poupamos todos"	General public, Press, Health care professionals	Radio and Television
2016	“De que marca é a sua dor?” and “De que marca é a sua infeção”	General public	Newspapers
2016	"Peça genéricos, não torne a saúde mais cara para todos"	General public, Press, Health care professionals	Newspapers, Brochures, Internet, Social Networks (Facebook) and Informative Video for Internal Circuits of TV

Source: Adapted from INFARMED (2010)

5. Appendix 5 - NVIVO additional inputs

In this appendix chapter we present some of the outputs obtained during the qualitative data analysis using NVIVO.

5.1 Coding statistics

Per interview (figure 5.1)

Interviews

Search Project

Name	Codes	References	Modified On	Modified By
I14 - Entrevista	154	676	17-04-2019 20:44	AV
I05 - Entrevista	146	614	17-04-2019 20:41	AV
I18 - Entrevista	133	612	17-04-2019 20:44	AV
I19 - Entrevista	141	565	17-04-2019 20:45	AV
I16 - Entrevista	143	563	17-04-2019 20:44	AV
I17 - Entrevista	140	542	17-04-2019 20:44	AV
I10 - Entrevista	139	525	17-04-2019 20:43	AV
I15 - Entrevista	139	518	17-04-2019 20:44	AV
I03 - Entrevista	137	512	17-04-2019 20:38	AV
I13 - Entrevista	134	481	17-04-2019 20:43	AV
I02 - Entrevista	124	477	17-04-2019 20:40	AV
I04 - Entrevista	140	460	17-04-2019 20:41	AV
I08 - Entrevista	139	454	17-04-2019 20:43	AV
I06 - Entrevista	130	450	17-04-2019 20:42	AV
I20 - Entrevista	119	436	17-04-2019 20:45	AV
I12 - Entrevista	119	423	25-04-2019 12:54	AV
I07 - Entrevista	128	422	17-04-2019 20:42	AV
I09 - Entrevista	116	339	26-04-2019 12:09	AV
I01 - Entrevista	83	269	26-04-2019 11:11	AV
I11 - Entrevista	71	247	25-04-2019 12:54	AV

Figure 5.1 – Coding statistics – Interviews

To guarantee confidentiality of the list of interviewees, we omitted their names in the figures.

Per researcher observation (figure 5.2)

Researcher observations

Search Project

Name	Codes	References	Modified On	Modified By
I14 - Feedback Entrevi	60	186	17-04-2019 20:49	AV
I05 - Feedback Entrevi	51	171	17-04-2019 20:52	AV
I04 - Feedback Entrevi	56	153	17-04-2019 20:51	AV
I11 + I12 - Feedback E	53	145	17-04-2019 20:49	AV
I03 - Feedback Entrevi	44	120	17-04-2019 20:51	AV
I19 - Feedback Entrevi	44	115	17-04-2019 20:50	AV
I10 - Feedback Entrevi	38	91	17-04-2019 20:49	AV
I13 - Feedback Entrevi	42	88	17-04-2019 20:49	AV
I20 - Feedback Entrevi	33	87	17-04-2019 20:51	AV
I17 - Feedback Entrevi	37	83	17-04-2019 20:50	AV
I08 - Feedback Entrevi	30	67	17-04-2019 20:53	AV
I06 - Feedback Entrevi	25	62	17-04-2019 20:52	AV
I02 - Feedback Entrevi	28	53	17-04-2019 20:51	AV
OBS I01 - Feedback En	20	50	24-04-2019 12:33	AV
I18 - Feedback Entrevi	23	45	17-04-2019 20:50	AV
I15 - Feedback Entrevi	19	33	17-04-2019 20:50	AV
I16 - Feedback Entrevi	14	33	17-04-2019 20:50	AV
I09 - Feedback Entrevi	18	31	17-04-2019 20:53	AV
I07 - Feedback Entrevi	11	13	17-04-2019 20:52	AV
Resposta do Infarmed após envio do guião - 20-12-2018	2	2	16-04-2019 22:13	AV

Figure 5.2 – Coding statistics – Researcher observations

Per legislation file (figure 5.3)

Legislation

Name	Codes	References	Modified On	Modified By
Order (Despacho) 8213-B2013	15	37	29-05-2019 20:58	AV
Decision (Acórdão) 666-2006	8	16	29-05-2019 20:58	AV
VDA (Lawyers firm) analysis - 2013	10	16	29-05-2019 20:58	AV
Order (Despacho) 9630-2001	9	15	29-05-2019 20:58	AV
Order (Despacho) 2837-2004	1	5	29-05-2019 20:58	AV

Figure 5.3 – Coding statistics – Legislation

Model (figure 5.4)

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
Model	43	1753	24-04-2019 11:03	AV	28-05-2019 21:25	AV
General Data	43	1753	24-04-2019 11:04	AV	28-05-2019 21:25	AV
1 - Pharma comm. channels & promo instrum.	37	827	24-04-2019 11:05	AV	28-05-2019 21:07	AV
2 - Implem. of the detailing ceiling in the NHS	42	550	24-04-2019 11:06	AV	28-05-2019 21:20	AV
3 - Effect of the detailing ceiling in the NHS	31	241	25-04-2019 12:06	AV	28-05-2019 21:25	AV
4 - Paradigm shift - NEW	28	135	01-05-2019 12:40	AV	28-05-2019 21:20	AV

Figure 5.4 – Coding statistics – Model

As seen in figure 5.4 above, the General Data reached 1753 references, with the first dimension accounting for 827, the second for 550, and the third for 241.

Per main node (figure 5.5)

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
Model	43	1753	24-04-2019 11:03	AV	28-05-2019 21:25	AV
General Data	43	1753	24-04-2019 11:04	AV	28-05-2019 21:25	AV
1 - Pharma comm. channels & promo instrum.	37	827	24-04-2019 11:05	AV	28-05-2019 21:07	AV
1.1 - Communication channels	25	115	24-04-2019 11:05	AV	28-05-2019 20:42	AV
1.2 - Promotion tools	33	241	24-04-2019 11:05	AV	28-05-2019 20:49	AV
1.3 - Effect of promotion tools on Rx behavior	33	471	24-04-2019 11:06	AV	28-05-2019 21:05	AV
2 - Implem. of the detailing ceiling in the NHS	42	550	24-04-2019 11:06	AV	28-05-2019 21:20	AV
2.1 - Motivations and goals of the detailing ceiling	33	135	25-04-2019 12:10	AV	28-05-2019 21:07	AV
2.2 - Implementation of the detailing ceiling	37	277	25-04-2019 12:11	AV	28-05-2019 21:18	AV
2.3 - Pharmaceutical companies reaction	31	138	25-04-2019 12:11	AV	28-05-2019 21:19	AV
3 - Effect of the detailing ceiling in the NHS	31	241	25-04-2019 12:06	AV	28-05-2019 21:25	AV
3.1 - Effect on PSRs	19	34	25-04-2019 12:12	AV	28-05-2019 21:21	AV
3.2 - Effect on pharmaceutical companies	20	53	25-04-2019 12:13	AV	18-06-2019 22:12	AV
3.3 - Effect on NHS institutions	19	25	25-04-2019 12:13	AV	28-05-2019 21:22	AV
3.4 - Effect on NHS physicians	25	52	25-04-2019 12:14	AV	28-05-2019 21:23	AV
3.5 - Goals attained	19	47	25-04-2019 12:14	AV	28-05-2019 21:24	AV
3.6 - Adjustments to the detailing ceiling	24	30	25-04-2019 12:16	AV	28-05-2019 21:25	AV
4 - Paradigm shift - NEW	28	135	01-05-2019 12:40	AV	28-05-2019 21:20	AV
4.1 - Reduction in the number of visits and reps not linked to the Order alone	13	27	10-05-2019 14:19	AV	28-05-2019 20:39	AV
4.2 - Legislative initiatives	21	63	28-05-2019 20:21	AV	28-05-2019 20:40	AV
4.3 - Market dynamics	14	25	28-05-2019 20:27	AV	28-05-2019 20:40	AV
4.4 - Economic & financial conjuncture	9	15	28-05-2019 20:22	AV	28-05-2019 20:40	AV
4.5 - NHS Administrative ecosystem	5	5	28-05-2019 20:27	AV	28-05-2019 20:40	AV

Figure 5.5 – Coding statistics – Main nodes in analysis model

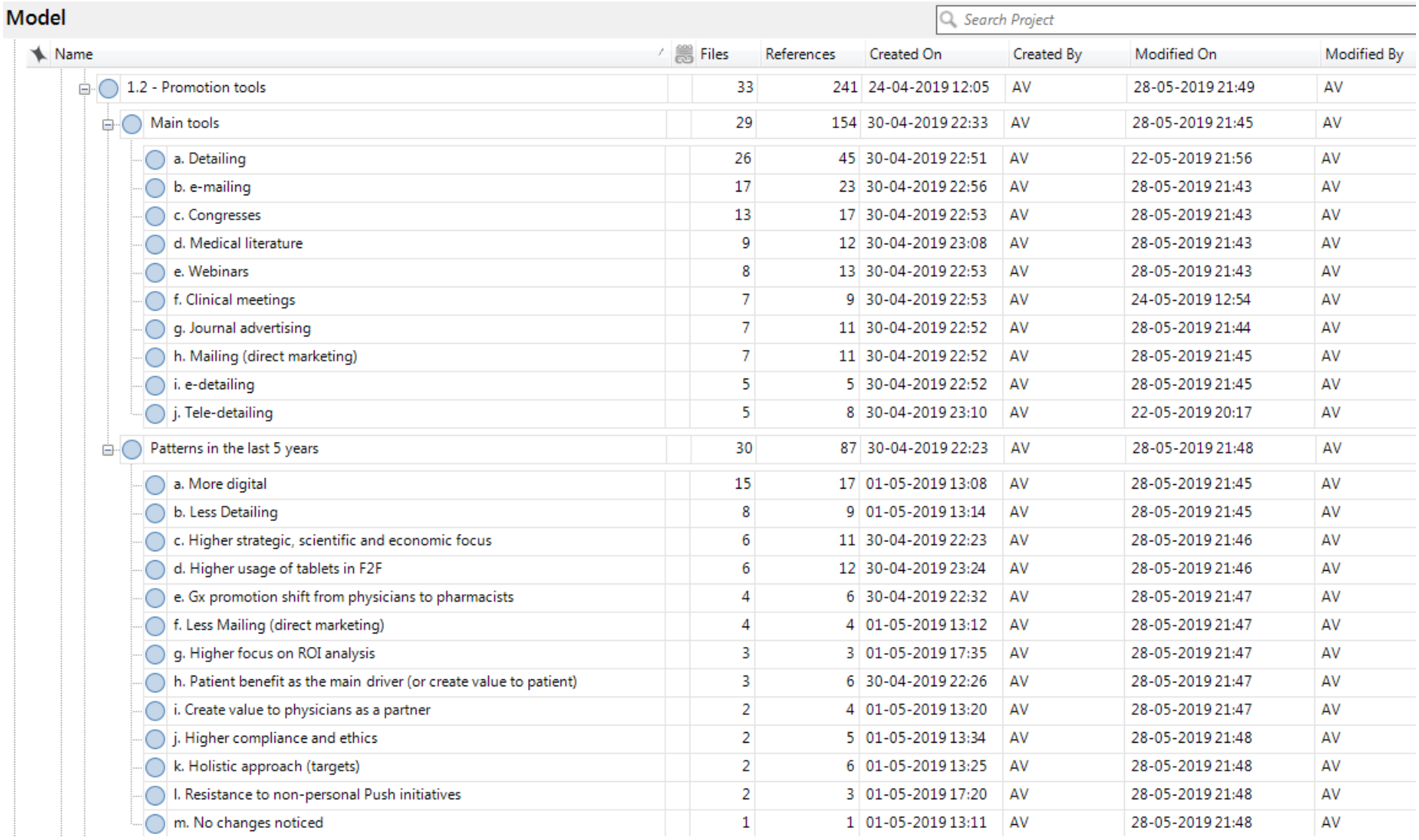
Per first and second level node (figures 5.6, to 5.21)

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
Model	43	1753	24-04-2019 11:03	AV	28-05-2019 21:25	AV
General Data	43	1753	24-04-2019 11:04	AV	28-05-2019 21:25	AV
1 - Pharma comm. channels & promo instrum.	37	827	24-04-2019 11:05	AV	28-05-2019 21:07	AV
1.1 - Communication channels	25	115	24-04-2019 11:05	AV	28-05-2019 20:42	AV
Main channels	23	64	30-04-2019 21:18	AV	28-05-2019 20:42	AV
a. Face-to-face	23	32	30-04-2019 20:46	AV	22-05-2019 20:44	AV
b. Digital	14	16	30-04-2019 20:50	AV	28-05-2019 20:41	AV
c. Mail	9	11	30-04-2019 20:50	AV	28-05-2019 20:41	AV
d. Telephone	5	5	30-04-2019 20:50	AV	28-05-2019 20:41	AV
Patterns in the last 5 years	20	51	30-04-2019 21:19	AV	28-05-2019 20:42	AV
a. More digital	17	31	30-04-2019 21:20	AV	22-05-2019 21:08	AV
b. Utilization of less expensive channels	5	6	30-04-2019 21:59	AV	28-05-2019 20:42	AV
c. Less face-to-face	4	6	30-04-2019 21:37	AV	28-05-2019 20:42	AV
d. No changes noticed	3	5	30-04-2019 21:29	AV	28-05-2019 20:42	AV
f. Less mail	2	3	30-04-2019 21:43	AV	30-04-2019 22:57	AV

Figure 5.6 – Coding statistics – First and second level nodes – 1.1 – Communication channels



Name	Files	References	Created On	Created By	Modified On	Modified By
1.2 - Promotion tools	33	241	24-04-2019 12:05	AV	28-05-2019 21:49	AV
Main tools	29	154	30-04-2019 22:33	AV	28-05-2019 21:45	AV
a. Detailing	26	45	30-04-2019 22:51	AV	22-05-2019 21:56	AV
b. e-mailing	17	23	30-04-2019 22:56	AV	28-05-2019 21:43	AV
c. Congresses	13	17	30-04-2019 22:53	AV	28-05-2019 21:43	AV
d. Medical literature	9	12	30-04-2019 23:08	AV	28-05-2019 21:43	AV
e. Webinars	8	13	30-04-2019 22:53	AV	28-05-2019 21:43	AV
f. Clinical meetings	7	9	30-04-2019 22:53	AV	24-05-2019 12:54	AV
g. Journal advertising	7	11	30-04-2019 22:52	AV	28-05-2019 21:44	AV
h. Mailing (direct marketing)	7	11	30-04-2019 22:52	AV	28-05-2019 21:45	AV
i. e-detailing	5	5	30-04-2019 22:52	AV	28-05-2019 21:45	AV
j. Tele-detailing	5	8	30-04-2019 23:10	AV	22-05-2019 20:17	AV
Patterns in the last 5 years	30	87	30-04-2019 22:23	AV	28-05-2019 21:48	AV
a. More digital	15	17	01-05-2019 13:08	AV	28-05-2019 21:45	AV
b. Less Detailing	8	9	01-05-2019 13:14	AV	28-05-2019 21:45	AV
c. Higher strategic, scientific and economic focus	6	11	30-04-2019 22:23	AV	28-05-2019 21:46	AV
d. Higher usage of tablets in F2F	6	12	30-04-2019 23:24	AV	28-05-2019 21:46	AV
e. Gx promotion shift from physicians to pharmacists	4	6	30-04-2019 22:32	AV	28-05-2019 21:47	AV
f. Less Mailing (direct marketing)	4	4	01-05-2019 13:12	AV	28-05-2019 21:47	AV
g. Higher focus on ROI analysis	3	3	01-05-2019 17:35	AV	28-05-2019 21:47	AV
h. Patient benefit as the main driver (or create value to patient)	3	6	30-04-2019 22:26	AV	28-05-2019 21:47	AV
i. Create value to physicians as a partner	2	4	01-05-2019 13:20	AV	28-05-2019 21:47	AV
j. Higher compliance and ethics	2	5	01-05-2019 13:34	AV	28-05-2019 21:48	AV
k. Holistic approach (targets)	2	6	01-05-2019 13:25	AV	28-05-2019 21:48	AV
l. Resistance to non-personal Push initiatives	2	3	01-05-2019 17:20	AV	28-05-2019 21:48	AV
m. No changes noticed	1	1	01-05-2019 13:11	AV	28-05-2019 21:48	AV

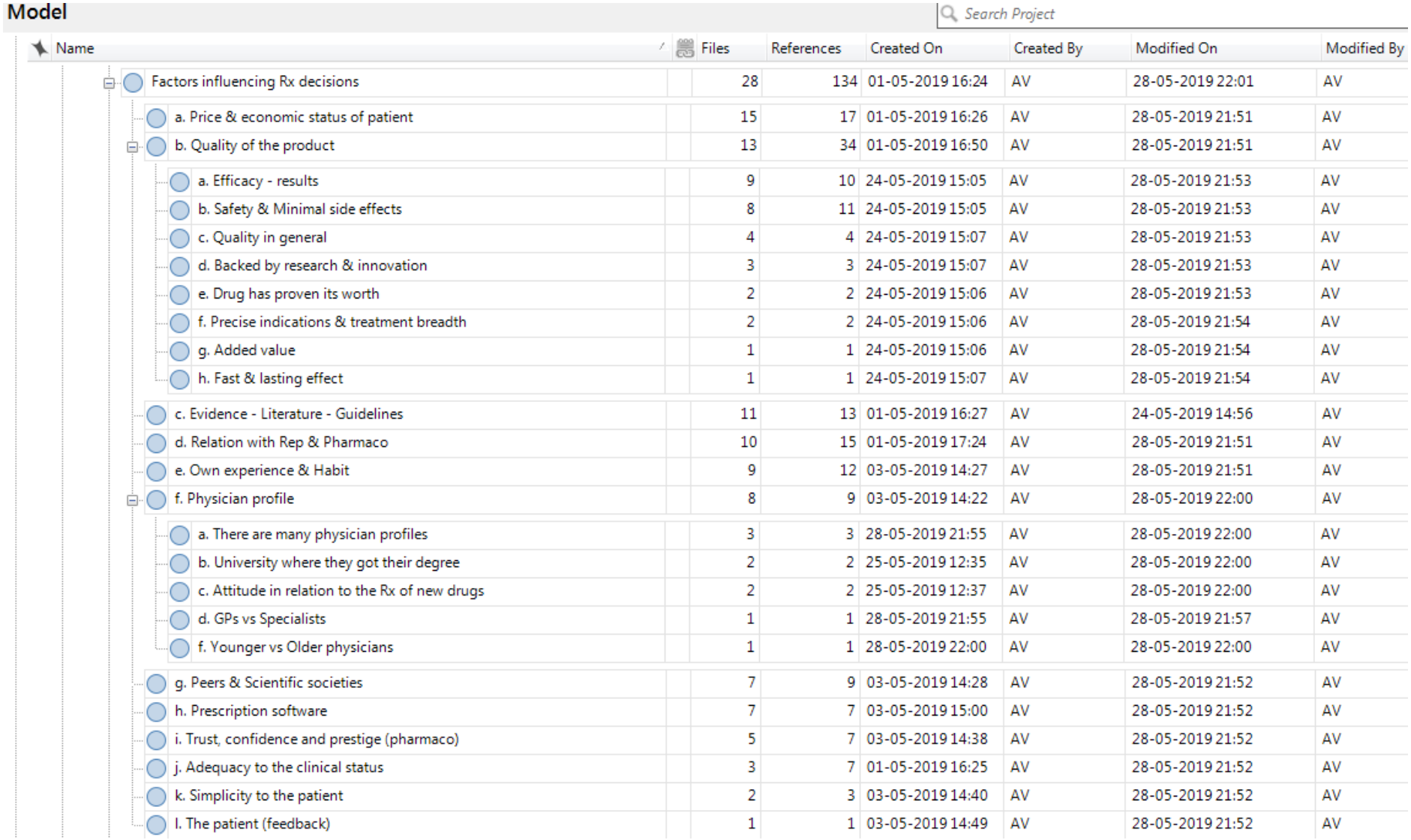
Figure 5.7 – Coding statistics – First and second level nodes – 1.2 – Promotion tools

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
1.3 - Effect of promotion tools on Rx behavior	33	471	24-04-2019 12:06	AV	28-05-2019 22:05	AV
Detailing vs different product scopes	16	29	01-05-2019 18:27	AV	28-05-2019 21:49	AV
a. Higher import. to originator drugs (vs generics)	14	14	01-05-2019 18:29	AV	01-05-2019 19:58	AV
b. Higher importance to newer drugs (vs older)	14	15	01-05-2019 18:30	AV	01-05-2019 19:59	AV
Doctor perception on comparative influence vs peers	7	7	03-05-2019 15:33	AV	28-05-2019 21:50	AV
a. Don´t know, comparatively to peers	5	5	03-05-2019 15:36	AV	28-05-2019 21:50	AV
b. Less influenced than peers	2	2	03-05-2019 15:34	AV	28-05-2019 21:50	AV
Doctor self-perception of detailing influence	7	10	03-05-2019 15:25	AV	28-05-2019 21:51	AV
a. Influences when reps bring me novel drugs	2	3	24-05-2019 14:42	AV	28-05-2019 21:50	AV
b. Influences due to affective component	2	2	24-05-2019 14:41	AV	28-05-2019 21:50	AV
c. Influences by alerting to some specificities	2	2	24-05-2019 14:42	AV	24-05-2019 14:50	AV
d. Influences by reminding doctors of the products	1	2	24-05-2019 14:45	AV	24-05-2019 14:51	AV
e. Influences by clarifying doubts	1	1	24-05-2019 14:46	AV	24-05-2019 14:51	AV

Figure 5.8 – Coding statistics – First and second level nodes – 1.3 – Effect of promotion tools on prescription behavior (1/4)



Name	Files	References	Created On	Created By	Modified On	Modified By
Factors influencing Rx decisions	28	134	01-05-2019 16:24	AV	28-05-2019 22:01	AV
a. Price & economic status of patient	15	17	01-05-2019 16:26	AV	28-05-2019 21:51	AV
b. Quality of the product	13	34	01-05-2019 16:50	AV	28-05-2019 21:51	AV
a. Efficacy - results	9	10	24-05-2019 15:05	AV	28-05-2019 21:53	AV
b. Safety & Minimal side effects	8	11	24-05-2019 15:05	AV	28-05-2019 21:53	AV
c. Quality in general	4	4	24-05-2019 15:07	AV	28-05-2019 21:53	AV
d. Backed by research & innovation	3	3	24-05-2019 15:07	AV	28-05-2019 21:53	AV
e. Drug has proven its worth	2	2	24-05-2019 15:06	AV	28-05-2019 21:53	AV
f. Precise indications & treatment breadth	2	2	24-05-2019 15:06	AV	28-05-2019 21:54	AV
g. Added value	1	1	24-05-2019 15:06	AV	28-05-2019 21:54	AV
h. Fast & lasting effect	1	1	24-05-2019 15:07	AV	28-05-2019 21:54	AV
c. Evidence - Literature - Guidelines	11	13	01-05-2019 16:27	AV	24-05-2019 14:56	AV
d. Relation with Rep & Pharmaco	10	15	01-05-2019 17:24	AV	28-05-2019 21:51	AV
e. Own experience & Habit	9	12	03-05-2019 14:27	AV	28-05-2019 21:51	AV
f. Physician profile	8	9	03-05-2019 14:22	AV	28-05-2019 22:00	AV
a. There are many physician profiles	3	3	28-05-2019 21:55	AV	28-05-2019 22:00	AV
b. University where they got their degree	2	2	25-05-2019 12:35	AV	28-05-2019 22:00	AV
c. Attitude in relation to the Rx of new drugs	2	2	25-05-2019 12:37	AV	28-05-2019 22:00	AV
d. GPs vs Specialists	1	1	28-05-2019 21:55	AV	28-05-2019 21:57	AV
f. Younger vs Older physicians	1	1	28-05-2019 22:00	AV	28-05-2019 22:00	AV
g. Peers & Scientific societies	7	9	03-05-2019 14:28	AV	28-05-2019 21:52	AV
h. Prescription software	7	7	03-05-2019 15:00	AV	28-05-2019 21:52	AV
i. Trust, confidence and prestige (pharmaco)	5	7	03-05-2019 14:38	AV	28-05-2019 21:52	AV
j. Adequacy to the clinical status	3	7	01-05-2019 16:25	AV	28-05-2019 21:52	AV
k. Simplicity to the patient	2	3	03-05-2019 14:40	AV	28-05-2019 21:52	AV
l. The patient (feedback)	1	1	03-05-2019 14:49	AV	28-05-2019 21:52	AV

Figure 5.9 – Coding statistics – First and second level nodes – 1.3 – Effect of promotion tools on prescription behavior (2/4)

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
Importance of detailing to pharmacos	18	56	01-05-2019 16:09	AV	28-05-2019 22:03	AV
a. Allow to explore relation - friendship - affectivity	15	32	01-05-2019 16:10	AV	24-05-2019 15:32	AV
b. Explore reciprocity (imp. to the labs)	10	12	01-05-2019 16:11	AV	24-05-2019 15:42	AV
c. Personal contact with physicians (a face)	6	8	01-05-2019 17:15	AV	28-05-2019 22:03	AV
d. Allow the maximization of SOV	4	4	01-05-2019 18:23	AV	28-05-2019 22:03	AV
Importance of detailing to physicians	23	63	01-05-2019 18:18	AV	28-05-2019 22:05	AV
a. Provide novelties and continuous training	13	19	01-05-2019 18:20	AV	24-05-2019 15:58	AV
b. Younger and older physicians value detailing differently	12	32	24-05-2019 15:54	AV	28-05-2019 22:05	AV
Older physicians tend to value detailing	11	14	01-05-2019 16:46	AV	24-05-2019 16:02	AV
Younger physicians tend to value other sources	11	18	01-05-2019 18:00	AV	24-05-2019 16:03	AV
c. Convenience (direct and quick access)	5	6	01-05-2019 18:35	AV	28-05-2019 22:05	AV
d. Remind older products	3	3	01-05-2019 18:54	AV	28-05-2019 22:05	AV
e. Preference for personal contact	3	3	01-05-2019 19:08	AV	28-05-2019 22:05	AV
Importance of new rep competences - NEW	5	7	01-05-2019 17:29	AV	27-05-2019 22:27	AV
Influence of promotion instruments on Rx behavior	19	36	01-05-2019 15:55	AV	28-05-2019 22:02	AV
a. Influence is indeed real	12	12	01-05-2019 16:02	AV	24-05-2019 16:12	AV
b. Through novelties (studies, presentations, products)	6	9	01-05-2019 16:04	AV	24-05-2019 16:12	AV
c. Assisting physician on Rx decision	4	4	01-05-2019 16:19	AV	24-05-2019 16:12	AV
d. Through persuasion	3	4	01-05-2019 15:59	AV	24-05-2019 16:13	AV
e. By reducing Rx risk of physicians	2	2	01-05-2019 16:13	AV	28-05-2019 22:02	AV
f. Raising awareness of pathology	2	4	01-05-2019 16:44	AV	28-05-2019 22:02	AV
g. There is no influence	1	1	01-05-2019 16:23	AV	28-05-2019 22:02	AV

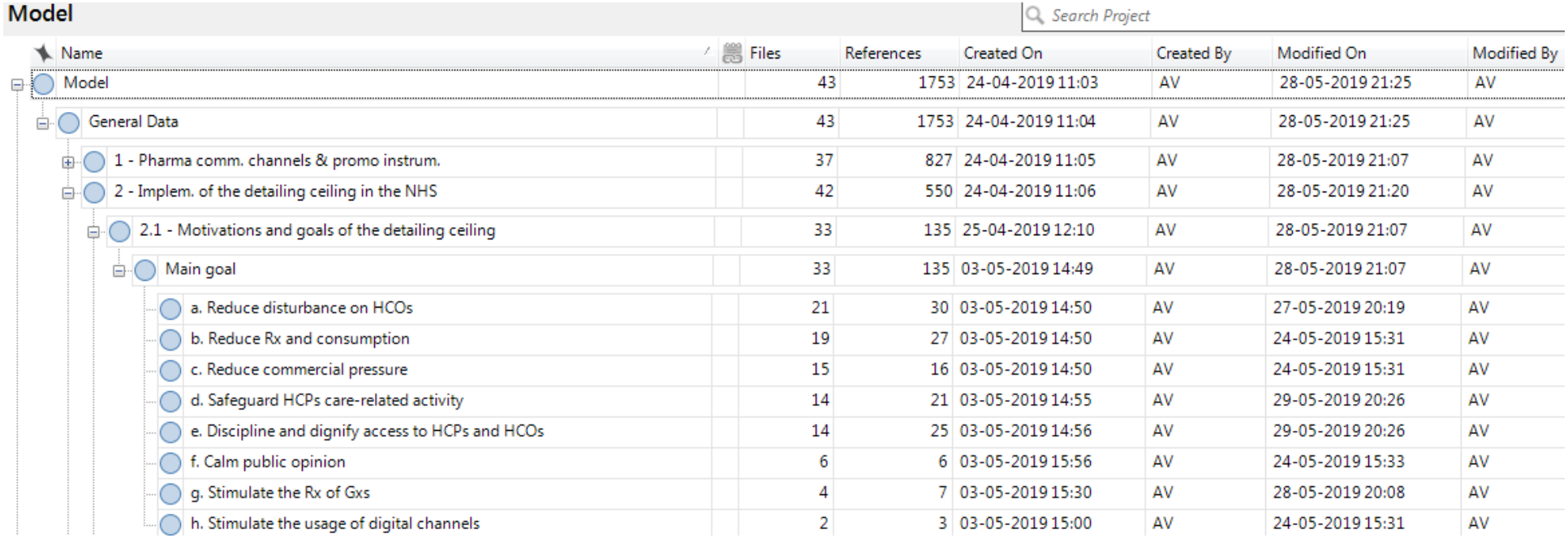
Figure 5.10 – Coding statistics – First and second level nodes – 1.3 – Effect of promotion tools on prescription behavior (3/4)

Model

Search Project

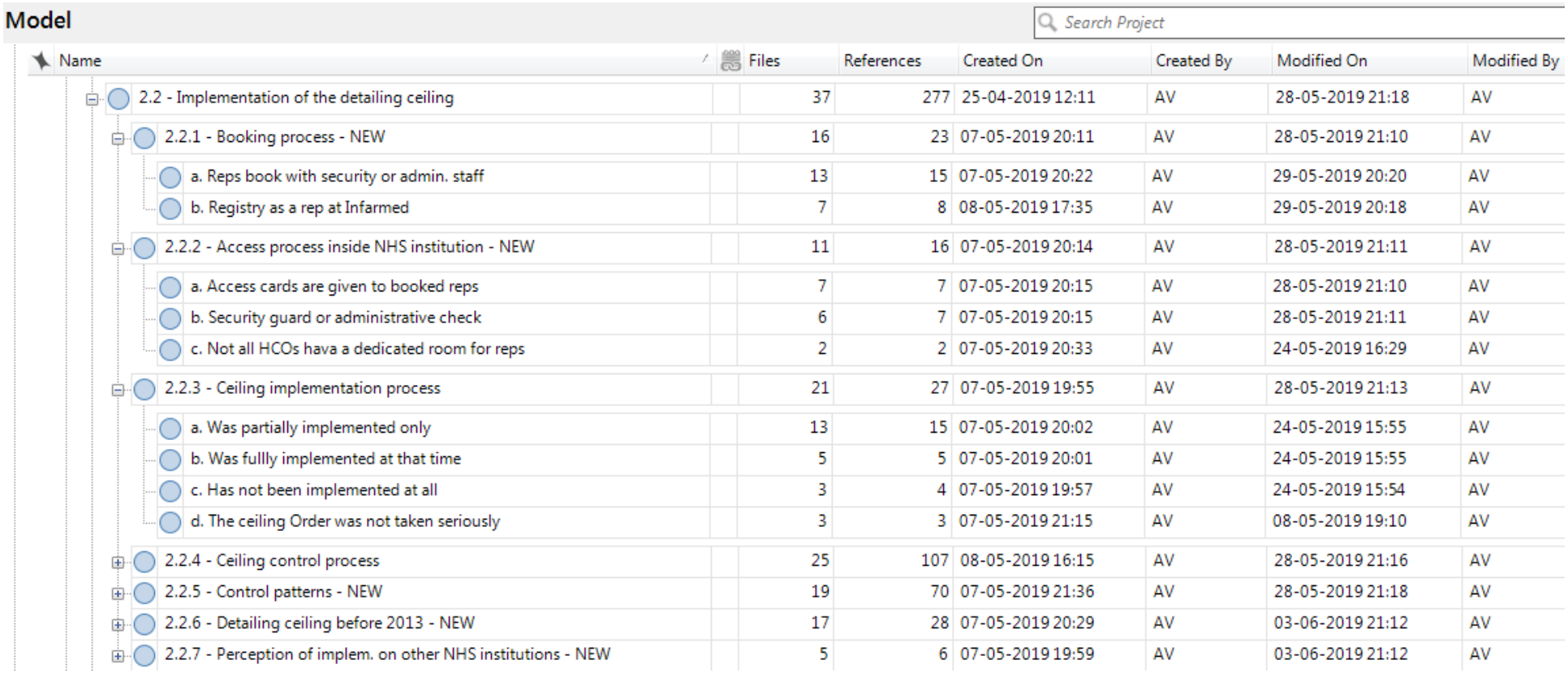
Name	Files	References	Created On	Created By	Modified On	Modified By
Most influential promotion instruments	27	74	01-05-2019 16:56	AV	28-05-2019 22:03	AV
a. Detailing	25	26	01-05-2019 17:02	AV	22-05-2019 21:45	AV
b. Congresses	19	19	01-05-2019 17:08	AV	24-05-2019 16:13	AV
c. Clinical meetings	13	13	01-05-2019 17:08	AV	22-05-2019 21:21	AV
d. Medical literature	6	6	01-05-2019 17:10	AV	24-05-2019 16:13	AV
e. Journal advertising	5	5	01-05-2019 17:11	AV	24-05-2019 16:14	AV
f. e-mailing	2	3	01-05-2019 17:05	AV	24-05-2019 16:14	AV
g. Webinars	2	2	01-05-2019 17:48	AV	01-05-2019 17:54	AV
Pharmaceutical companies goals	28	55	01-05-2019 14:04	AV	28-05-2019 22:02	AV
a. Commercial goals (sales & profits)	25	29	01-05-2019 14:06	AV	22-05-2019 21:38	AV
b. Share information & train on product and pathology	14	15	01-05-2019 14:09	AV	24-05-2019 16:28	AV
c. Substitute the omission of the Ministry of Health on training	7	11	01-05-2019 14:12	AV	24-05-2019 16:28	AV

Figure 5.11 – Coding statistics – First and second level nodes – 1.3 – Effect of promotion tools on prescription behavior (4/4)



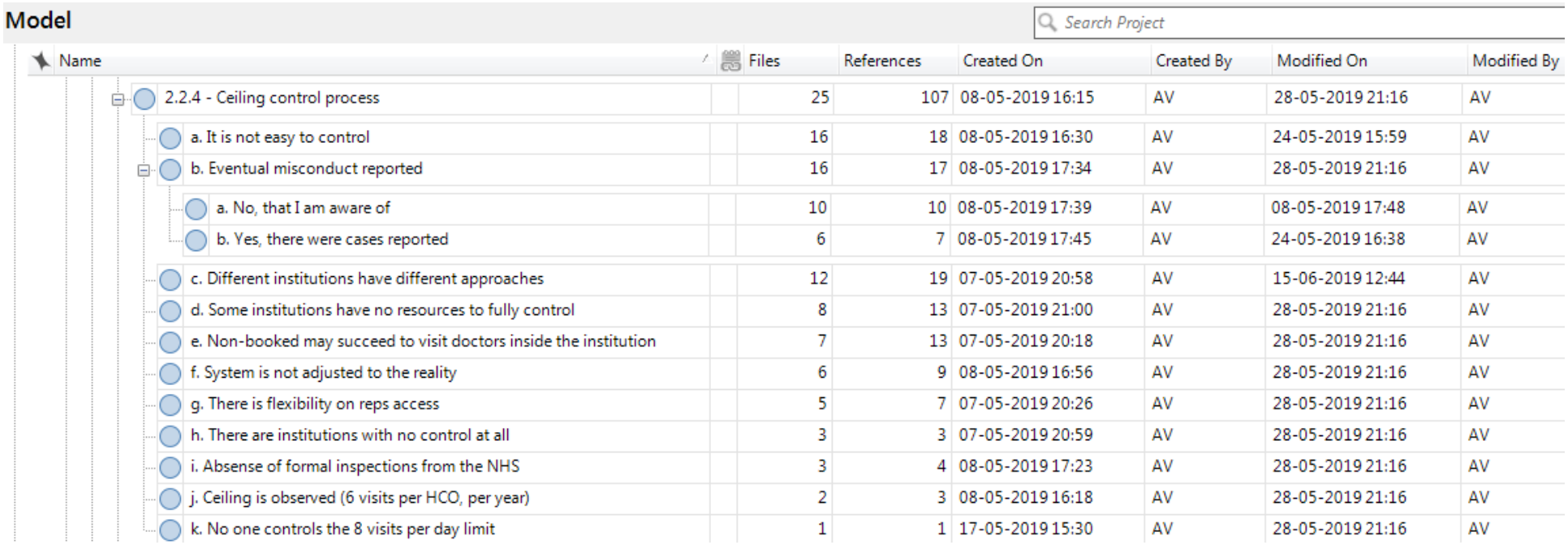
Name	Files	References	Created On	Created By	Modified On	Modified By
Model	43	1753	24-04-2019 11:03	AV	28-05-2019 21:25	AV
General Data	43	1753	24-04-2019 11:04	AV	28-05-2019 21:25	AV
1 - Pharma comm. channels & promo instrum.	37	827	24-04-2019 11:05	AV	28-05-2019 21:07	AV
2 - Implem. of the detailing ceiling in the NHS	42	550	24-04-2019 11:06	AV	28-05-2019 21:20	AV
2.1 - Motivations and goals of the detailing ceiling	33	135	25-04-2019 12:10	AV	28-05-2019 21:07	AV
Main goal	33	135	03-05-2019 14:49	AV	28-05-2019 21:07	AV
a. Reduce disturbance on HCOs	21	30	03-05-2019 14:50	AV	27-05-2019 20:19	AV
b. Reduce Rx and consumption	19	27	03-05-2019 14:50	AV	24-05-2019 15:31	AV
c. Reduce commercial pressure	15	16	03-05-2019 14:50	AV	24-05-2019 15:31	AV
d. Safeguard HCPs care-related activity	14	21	03-05-2019 14:55	AV	29-05-2019 20:26	AV
e. Discipline and dignify access to HCPs and HCOs	14	25	03-05-2019 14:56	AV	29-05-2019 20:26	AV
f. Calm public opinion	6	6	03-05-2019 15:56	AV	24-05-2019 15:33	AV
g. Stimulate the Rx of Gxs	4	7	03-05-2019 15:30	AV	28-05-2019 20:08	AV
h. Stimulate the usage of digital channels	2	3	03-05-2019 15:00	AV	24-05-2019 15:31	AV

Figure 5.12 – Coding statistics – First and second level nodes – 2.1 – Motivations and goals of the detailing ceiling



Name	Files	References	Created On	Created By	Modified On	Modified By
2.2 - Implementation of the detailing ceiling	37	277	25-04-2019 12:11	AV	28-05-2019 21:18	AV
2.2.1 - Booking process - NEW	16	23	07-05-2019 20:11	AV	28-05-2019 21:10	AV
a. Reps book with security or admin. staff	13	15	07-05-2019 20:22	AV	29-05-2019 20:20	AV
b. Registry as a rep at Infarmed	7	8	08-05-2019 17:35	AV	29-05-2019 20:18	AV
2.2.2 - Access process inside NHS institution - NEW	11	16	07-05-2019 20:14	AV	28-05-2019 21:11	AV
a. Access cards are given to booked reps	7	7	07-05-2019 20:15	AV	28-05-2019 21:10	AV
b. Security guard or administrative check	6	7	07-05-2019 20:15	AV	28-05-2019 21:11	AV
c. Not all HCOs hava a dedicated room for reps	2	2	07-05-2019 20:33	AV	24-05-2019 16:29	AV
2.2.3 - Ceiling implementation process	21	27	07-05-2019 19:55	AV	28-05-2019 21:13	AV
a. Was partially implemented only	13	15	07-05-2019 20:02	AV	24-05-2019 15:55	AV
b. Was fullly implemented at that time	5	5	07-05-2019 20:01	AV	24-05-2019 15:55	AV
c. Has not been implemented at all	3	4	07-05-2019 19:57	AV	24-05-2019 15:54	AV
d. The ceiling Order was not taken seriously	3	3	07-05-2019 21:15	AV	08-05-2019 19:10	AV
2.2.4 - Ceiling control process	25	107	08-05-2019 16:15	AV	28-05-2019 21:16	AV
2.2.5 - Control patterns - NEW	19	70	07-05-2019 21:36	AV	28-05-2019 21:18	AV
2.2.6 - Detailing ceiling before 2013 - NEW	17	28	07-05-2019 20:29	AV	03-06-2019 21:12	AV
2.2.7 - Perception of implem. on other NHS institutions - NEW	5	6	07-05-2019 19:59	AV	03-06-2019 21:12	AV

Figure 5.13 – Coding statistics – First and second level nodes – 2.2 – Implementation of the detailing ceiling (1/4)



Name	Files	References	Created On	Created By	Modified On	Modified By
2.2.4 - Ceiling control process	25	107	08-05-2019 16:15	AV	28-05-2019 21:16	AV
a. It is not easy to control	16	18	08-05-2019 16:30	AV	24-05-2019 15:59	AV
b. Eventual misconduct reported	16	17	08-05-2019 17:34	AV	28-05-2019 21:16	AV
a. No, that I am aware of	10	10	08-05-2019 17:39	AV	08-05-2019 17:48	AV
b. Yes, there were cases reported	6	7	08-05-2019 17:45	AV	24-05-2019 16:38	AV
c. Different institutions have different approaches	12	19	07-05-2019 20:58	AV	15-06-2019 12:44	AV
d. Some institutions have no resources to fully control	8	13	07-05-2019 21:00	AV	28-05-2019 21:16	AV
e. Non-booked may succeed to visit doctors inside the institution	7	13	07-05-2019 20:18	AV	28-05-2019 21:16	AV
f. System is not adjusted to the reality	6	9	08-05-2019 16:56	AV	28-05-2019 21:16	AV
g. There is flexibility on reps access	5	7	07-05-2019 20:26	AV	28-05-2019 21:16	AV
h. There are institutions with no control at all	3	3	07-05-2019 20:59	AV	28-05-2019 21:16	AV
i. Absense of formal inspections from the NHS	3	4	08-05-2019 17:23	AV	28-05-2019 21:16	AV
j. Ceiling is observed (6 visits per HCO, per year)	2	3	08-05-2019 16:18	AV	28-05-2019 21:16	AV
k. No one controls the 8 visits per day limit	1	1	17-05-2019 15:30	AV	28-05-2019 21:16	AV

Figure 5.14 – Coding statistics – First and second level nodes – 2.2 – Implementation of the detailing ceiling (2/4)

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
2.2.5 - Control patterns - NEW	19	70	07-05-2019 22:36	AV	28-05-2019 22:18	AV
a. By temporal evolution	13	24	24-05-2019 17:21	AV	28-05-2019 22:17	AV
Losened control after six to 12 months	13	24	07-05-2019 21:46	AV	24-05-2019 17:18	AV
b. By region	9	21	24-05-2019 17:14	AV	28-05-2019 22:18	AV
Higher control in bigger population centers	3	6	08-05-2019 18:03	AV	24-05-2019 17:15	AV
Higher control in the North and Center regions	5	6	08-05-2019 18:24	AV	24-05-2019 17:15	AV
Lower control in the South and the Interior	7	9	07-05-2019 22:05	AV	24-05-2019 17:16	AV
c. By type of institution	9	14	24-05-2019 17:16	AV	28-05-2019 22:18	AV
Higher control in USFs	3	4	07-05-2019 22:24	AV	24-05-2019 17:16	AV
Lower control in Hospitals	4	4	07-05-2019 21:54	AV	24-05-2019 17:17	AV
Private practice raised limitations too	5	6	07-05-2019 22:23	AV	24-05-2019 17:17	AV
d. By type of HCO leadership	5	11	24-05-2019 17:19	AV	28-05-2019 22:18	AV
Control attitude is related to ACES directives	3	5	07-05-2019 22:06	AV	24-05-2019 17:19	AV
Control dependent on Political quadrant of directors	4	6	07-05-2019 22:12	AV	24-05-2019 17:19	AV

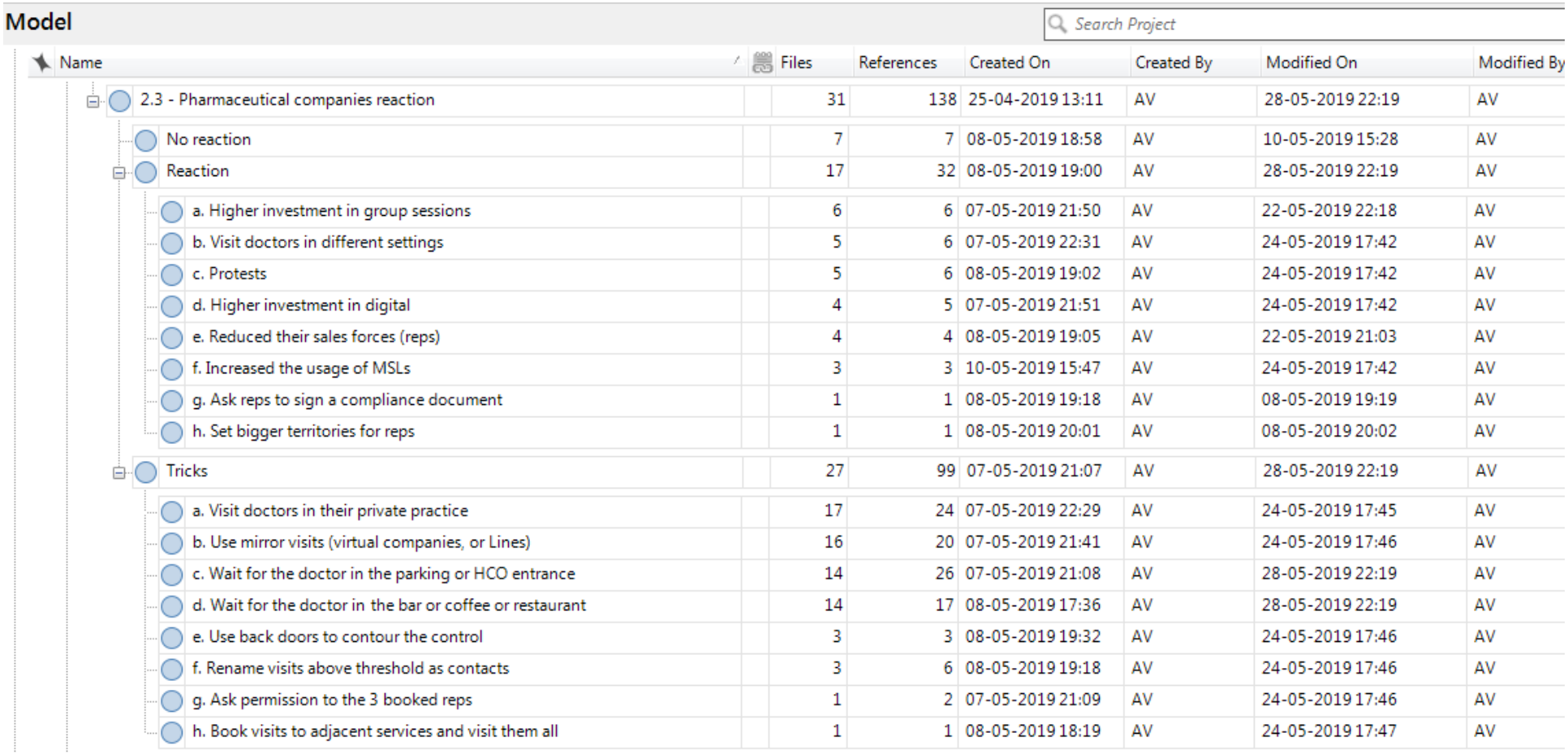
Figure 5.15 – Coding statistics – First and second level nodes – 2.2 – Implementation of the detailing ceiling (3/4)

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
2.2.6 - Detailing ceiling before 2013 - NEW	17	28	07-05-2019 21:29	AV	03-06-2019 22:12	AV
a. Existence of ceiling	14	20	24-05-2019 17:34	AV	28-05-2019 22:14	AV
Each ARS set their limits (not generalized & national)	1	1	29-05-2019 21:03	AV	29-05-2019 21:05	AV
Order 2837-2004 declared unconstitutional	3	3	29-05-2019 21:12	AV	29-05-2019 21:31	AV
Order 9630-2001 was in force	2	2	29-05-2019 21:05	AV	29-05-2019 21:32	AV
There was already a ceiling in some institutions	8	10	07-05-2019 21:30	AV	24-05-2019 17:37	AV
There was no detailing ceiling	3	4	07-05-2019 21:45	AV	24-05-2019 17:37	AV
b. Control of ceiling	7	8	24-05-2019 17:32	AV	28-05-2019 22:14	AV
Control was not generalized	6	6	07-05-2019 21:31	AV	24-05-2019 17:36	AV
There was no control at all	2	2	10-05-2019 15:15	AV	24-05-2019 17:36	AV
2.2.7 - Perception of implem. on other NHS institutions - NEW	5	6	07-05-2019 20:59	AV	03-06-2019 22:12	AV
The majority of institutions has implemented	1	1	07-05-2019 22:26	AV	24-05-2019 17:40	AV
The majority of institutions has not implemented	4	5	07-05-2019 21:00	AV	24-05-2019 17:40	AV

Figure 5.16 – Coding statistics – First and second level nodes – 2.2 – Implementation of the detailing ceiling (4/4)



Name	Files	References	Created On	Created By	Modified On	Modified By
2.3 - Pharmaceutical companies reaction	31	138	25-04-2019 13:11	AV	28-05-2019 22:19	AV
No reaction	7	7	08-05-2019 18:58	AV	10-05-2019 15:28	AV
Reaction	17	32	08-05-2019 19:00	AV	28-05-2019 22:19	AV
a. Higher investment in group sessions	6	6	07-05-2019 21:50	AV	22-05-2019 22:18	AV
b. Visit doctors in different settings	5	6	07-05-2019 22:31	AV	24-05-2019 17:42	AV
c. Protests	5	6	08-05-2019 19:02	AV	24-05-2019 17:42	AV
d. Higher investment in digital	4	5	07-05-2019 21:51	AV	24-05-2019 17:42	AV
e. Reduced their sales forces (reps)	4	4	08-05-2019 19:05	AV	22-05-2019 21:03	AV
f. Increased the usage of MSLs	3	3	10-05-2019 15:47	AV	24-05-2019 17:42	AV
g. Ask reps to sign a compliance document	1	1	08-05-2019 19:18	AV	08-05-2019 19:19	AV
h. Set bigger territories for reps	1	1	08-05-2019 20:01	AV	08-05-2019 20:02	AV
Tricks	27	99	07-05-2019 21:07	AV	28-05-2019 22:19	AV
a. Visit doctors in their private practice	17	24	07-05-2019 22:29	AV	24-05-2019 17:45	AV
b. Use mirror visits (virtual companies, or Lines)	16	20	07-05-2019 21:41	AV	24-05-2019 17:46	AV
c. Wait for the doctor in the parking or HCO entrance	14	26	07-05-2019 21:08	AV	28-05-2019 22:19	AV
d. Wait for the doctor in the bar or coffee or restaurant	14	17	08-05-2019 17:36	AV	28-05-2019 22:19	AV
e. Use back doors to contour the control	3	3	08-05-2019 19:32	AV	24-05-2019 17:46	AV
f. Rename visits above threshold as contacts	3	6	08-05-2019 19:18	AV	24-05-2019 17:46	AV
g. Ask permission to the 3 booked reps	1	2	07-05-2019 21:09	AV	24-05-2019 17:46	AV
h. Book visits to adjacent services and visit them all	1	1	08-05-2019 18:19	AV	24-05-2019 17:47	AV

Figure 5.17– Coding statistics – First and second level nodes – 2.3 – Pharmaceutical companies' reaction

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
3 - Effect of the detailing ceiling in the NHS	31	241	25-04-2019 13:06	AV	28-05-2019 22:25	AV
3.1 - Effect on PSRs	19	34	25-04-2019 13:12	AV	28-05-2019 22:21	AV
a. Reps and visits became more effective	8	12	10-05-2019 14:28	AV	27-05-2019 21:05	AV
b. It had no major impact	7	9	10-05-2019 14:28	AV	27-05-2019 21:08	AV
c. Many reps were fired	4	5	10-05-2019 14:43	AV	27-05-2019 21:09	AV
d. Had to find doctors in other settings	3	3	10-05-2019 14:54	AV	27-05-2019 21:09	AV
e. Territories to cover got bigger	3	3	10-05-2019 14:43	AV	27-05-2019 21:26	AV
f. Reps and visits became more compliant	2	2	10-05-2019 14:28	AV	27-05-2019 21:27	AV
3.2 - Effect on pharmaceutical companies	20	53	25-04-2019 13:13	AV	28-05-2019 22:21	AV
a. Increased usage of other channels and tools to complement detailing	13	16	10-05-2019 15:21	AV	27-05-2019 21:32	AV
b. Reduction in the frequency of visits inside NHS institutions	10	10	10-05-2019 14:29	AV	22-05-2019 22:09	AV
c. Were able to keep the same accessibility as before (inside and outside NH	3	5	10-05-2019 15:08	AV	27-05-2019 21:28	AV
d. Adapted to the new reality	2	3	10-05-2019 14:29	AV	27-05-2019 21:28	AV
e. Broadened the visits to other stakeholders	1	1	10-05-2019 15:17	AV	27-05-2019 21:28	AV
Impact of ceiling vs pharmaco size	17	18	17-05-2019 15:21	AV	28-05-2019 22:21	AV
3.3 - Effect on NHS institutions	19	25	25-04-2019 13:13	AV	28-05-2019 22:22	AV
a. Higher regulation and discipline of the reps activity	8	9	10-05-2019 16:22	AV	28-05-2019 22:22	AV
b. No major impact or no impact at all	6	6	10-05-2019 16:24	AV	28-05-2019 22:22	AV
c. A significant reduction in the number of reps and visits in 2013	4	4	10-05-2019 14:30	AV	28-05-2019 22:22	AV
d. But an increase in number of reps in recent years	3	5	10-05-2019 14:30	AV	28-05-2019 22:22	AV
e. Adapted to the new reality	1	1	10-05-2019 14:30	AV	28-05-2019 22:22	AV

Figure 5.18 – Coding statistics – First and second level nodes – 3.1 – Effect on PSRs / 3.2 – Effect on pharmaceutical companies / 3.3 – Effect on NHS institutions

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
3.4 - Effect on NHS physicians	25	52	25-04-2019 13:14	AV	28-05-2019 22:23	AV
a. More time to assistencial tasks with patients	8	9	10-05-2019 14:30	AV	22-05-2019 20:41	AV
b. Less information & less updates on novelties	5	6	10-05-2019 14:30	AV	27-05-2019 21:40	AV
c. No major impact or no impact at all	5	6	10-05-2019 16:39	AV	27-05-2019 21:41	AV
d. Higher objectivity & concentration	3	4	10-05-2019 14:30	AV	27-05-2019 21:47	AV
e. Complained as wanted to keep full access to reps	3	3	17-05-2019 11:47	AV	27-05-2019 21:45	AV
Structural impact on physician Rx behavior	22	24	17-05-2019 12:33	AV	28-05-2019 22:23	AV
3.5 - Goals attained	19	47	25-04-2019 13:14	AV	28-05-2019 22:24	AV
Impact on the field	19	22	17-05-2019 15:56	AV	28-05-2019 22:23	AV
a. Less visits inside the NHS institutions	11	12	17-05-2019 15:58	AV	17-05-2019 16:39	AV
b. No impact in my territory (reps)	4	4	17-05-2019 16:29	AV	28-05-2019 22:23	AV
c. If the Order was observed, then there was an impact	2	3	17-05-2019 15:59	AV	27-05-2019 21:48	AV
d. Only during a certain period	2	2	17-05-2019 16:06	AV	17-05-2019 16:35	AV
e. There is a room now to receive the reps	1	1	17-05-2019 16:04	AV	27-05-2019 21:48	AV
Tutelage goals attained	18	25	17-05-2019 16:45	AV	28-05-2019 22:24	AV
a. Regulation & limitation of reps access in the NHS	11	12	17-05-2019 16:47	AV	17-05-2019 17:40	AV
b. Goals were not attained	4	4	17-05-2019 17:23	AV	27-05-2019 21:51	AV
c. Tutelage may be convinced it reached its goals	4	6	17-05-2019 16:58	AV	17-05-2019 17:34	AV
d. Raise ethical standards in the relation	2	2	17-05-2019 16:51	AV	27-05-2019 21:51	AV
e. Lower Rx of expensive medicines	1	1	17-05-2019 17:27	AV	17-05-2019 17:28	AV

Figure 5.19 – Coding statistics – First and second level nodes – 3.4 – Effect on NHS physicians / 3.5 – Goals attained

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
3.6 - Adjustments to the detailing ceiling	24	30	25-04-2019 13:16	AV	28-05-2019 22:25	AV
a. Set a less restrictive limit	9	10	18-05-2019 13:37	AV	27-05-2019 21:57	AV
b. Involve stakeholders & communicate the rationale	5	5	18-05-2019 13:37	AV	27-05-2019 21:57	AV
c. Set the same limits	3	3	18-05-2019 13:37	AV	27-05-2019 22:01	AV
d. Set different limits depending to certain factors	3	3	18-05-2019 13:47	AV	27-05-2019 21:58	AV
e. Flexibility when it is not possible to visit booked doctors	2	2	18-05-2019 14:16	AV	27-05-2019 21:58	AV
f. Only set a daily limit of reps, and not year limit	2	2	18-05-2019 13:47	AV	27-05-2019 21:58	AV
g. Prohibition of lines (mirror teams)	2	2	18-05-2019 14:31	AV	27-05-2019 21:58	AV
h. Set a higher limit to collective meetings	2	2	18-05-2019 13:58	AV	27-05-2019 21:58	AV
i. Would have launched the Order sooner	1	1	18-05-2019 14:30	AV	27-05-2019 21:58	AV

Figure 5.20 – Coding statistics – First and second level nodes – 3.6 – Adjustments to the detailing ceiling

Model

Search Project

Name	Files	References	Created On	Created By	Modified On	Modified By
4 - Paradigm shift - NEW	28	135	01-05-2019 13:40	AV	28-05-2019 22:20	AV
4.1 - Reduction in the number of visits and reps not linked to the Order alone	13	27	10-05-2019 15:19	AV	28-05-2019 21:39	AV
4.2 - Legislative initiatives	21	63	28-05-2019 21:21	AV	28-05-2019 21:40	AV
a. INN Rx (DCI)	12	23	01-05-2019 13:40	AV	28-05-2019 21:09	AV
b. Electronic Rx & Rx softwares	12	17	28-05-2019 21:00	AV	28-05-2019 21:28	AV
c. Increased regulation on promotional activities & compliance	6	8	01-05-2019 14:34	AV	28-05-2019 21:28	AV
d. Prohibition of the Lines	6	7	03-05-2019 16:48	AV	29-05-2019 21:24	AV
e. Successive price cuts & Reduction in margins	4	4	03-05-2019 16:49	AV	28-05-2019 21:28	AV
f. Expenditures Cap	3	4	28-05-2019 20:46	AV	28-05-2019 21:28	AV
4.3 - Market dynamics	14	25	28-05-2019 21:27	AV	28-05-2019 21:40	AV
a. Gxs promotion shift from physicians to pharmacists	12	14	01-05-2019 13:45	AV	28-05-2019 21:29	AV
b. Power shift from physicians to pharmacists (off-patent)	6	8	01-05-2019 13:41	AV	28-05-2019 21:29	AV
c. Portfolios getting older & less pipeline in ambulatory	2	3	17-05-2019 16:16	AV	28-05-2019 21:29	AV
4.4 - Economic & financial conjuncture	9	15	28-05-2019 21:22	AV	28-05-2019 21:40	AV
a. Troika & Economic & Financial crisis	9	15	01-05-2019 13:46	AV	28-05-2019 21:29	AV
4.5 - NHS Administrative ecosystem	5	5	28-05-2019 21:27	AV	28-05-2019 21:40	AV
a. Administrative changes (USFs) and expense ceilings	5	5	01-05-2019 17:26	AV	28-05-2019 21:29	AV

Figure 5.21 – Coding statistics – First and second level nodes – 4 – Paradigm shift

5.2 Additional tables and figures

We then produced a series of additional figures using NVivo, to help us generate insights on the data we collected (figures 5.22 to 5.39).

Case Classifications

Search Project

Name	Created On	Created By	Modified On	Modified By
Interviewed people	17-04-2019 21:08	AV	03-06-2019 21:	AV

Name	Type	Created On	Created By	Modified On	Modified By
Gender	Text	17-04-2019 21:09	AV	17-04-2019 21:51	AV
Position	Text	17-04-2019 21:12	AV	17-04-2019 21:52	AV
Institution	Text	17-04-2019 21:47	AV	17-04-2019 21:53	AV
Region	Text	17-04-2019 21:13	AV	26-04-2019 16:05	AV
Scope	Text	17-04-2019 21:16	AV	17-04-2019 21:55	AV
Age group	Text	17-04-2019 21:26	AV	17-04-2019 21:55	AV
Academic qualifications	Text	17-04-2019 21:27	AV	26-04-2019 16:05	AV
Years of experience	Text	17-04-2019 21:28	AV	26-04-2019 16:04	AV

Figure 5.22 – Case classification

Interviewed people

	A : Gender	B : Position	C : Institution	D : Region	E : Scope	F : Age group	G : Academic qualificati...	H : Years of experie...
1 : Case 01 - Inte...	Male	High Officer	NHS only	Greater Lisbon	Government / Tutelage	55 to 64	PhD	>20
2 : Case 02 - Inte...	Female	ACES Director	NHS only	Greater Lisbon	Health Care Organizations	45 to 54	Degree	>20
3 : Case 03 - Inte...	Female	Hospital Clinical Director	NHS only	Greater Lisbon	Health Care Organizations	55 to 64	MSc / MBA	>20
4 : Case 04 - Inte...	Male	Physician	NHS + Private	Greater Lisbon	Health Care Providers	55 to 64	Degree	>20
5 : Case 05 - Inte...	Male	Physician	NHS + Private	Center	Health Care Providers	>64	Degree	>20
6 : Case 06 - Inte...	Female	Physician	NHS + Private	Greater Oporto	Health Care Providers	55 to 64	Degree	>20
7 : Case 07 - Inte...	Male	Physician	NHS + Private	Algarve / Alentejo	Health Care Providers	45 to 54	Degree	>20
8 : Case 08 - Inte...	Female	Physician	NHS + Private	Greater Oporto	Health Care Providers	55 to 64	Degree	>20
9 : Case 09 - Inte...	Female	High Officer	Top Pharmaco	Greater Lisbon	Pharmaceutical Industry offi	45 to 54	Degree	>20
10 : Case 10 - Int...	Male	High Officer	Top Pharmaco	Greater Lisbon	Pharmaceutical Industry offi	45 to 54	Degree	>20
11 : Case 11 - Int...	Male	High Officer	Apifarma	Greater Lisbon	Pharmaceutical Industry offi	55 to 64	Degree	>20
12 : Case 12 - Int...	Male	High Officer	Apifarma	Greater Lisbon	Pharmaceutical Industry offi	45 to 54	PhD	>20
13 : Case 13 - Int...	Male	Rep	Top Pharmaco	Algarve / Alentejo	Sales Representatives	45 to 54	Degree	>20
14 : Case 14 - Int...	Male	Rep	Top Pharmaco	Greater Lisbon	Sales Representatives	45 to 54	Degree	>20
15 : Case 15 - Int...	Male	Rep	Top Pharmaco	Algarve / Alentejo	Sales Representatives	45 to 54	Degree	>20
16 : Case 16 - Int...	Female	Rep	Top Pharmaco	Greater Lisbon	Sales Representatives	45 to 54	Degree	>20
17 : Case 17 - Int...	Female	Rep	Top Pharmaco	Greater Oporto	Sales Representatives	55 to 64	Degree	>20
18 : Case 18 - Int...	Male	High Officer	IQVIA	Greater Lisbon	Consultants	45 to 54	MSc / MBA	>20
19 : Case 19 - Int...	Male	High Officer	Lean Health	Greater Lisbon	Consultants	45 to 54	MSc / MBA	>20
20 : Case 20 - Int...	Male	High Officer	hmR	Greater Lisbon	Consultants	45 to 54	MSc / MBA	>20

Figure 5.23 – Interviewed people characterization

Figure 5.24 – Global map

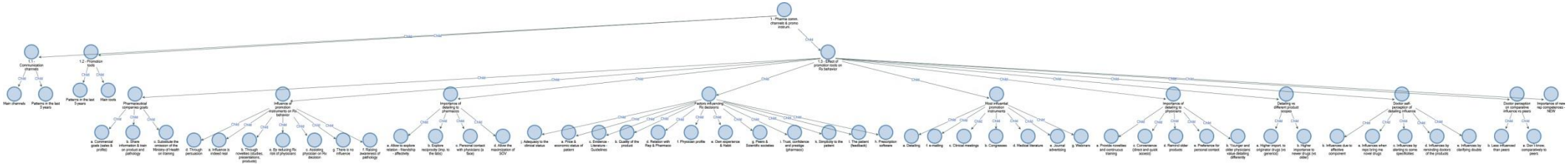


Figure 5.25 – Dimension 1 map - Pharmaceutical communication channels and promotion tools

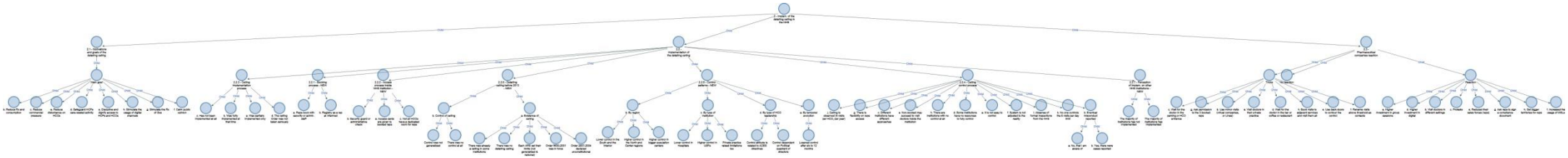


Figure 5.26 – Dimension 2 map – Implementation of the detailing ceiling in the NHS

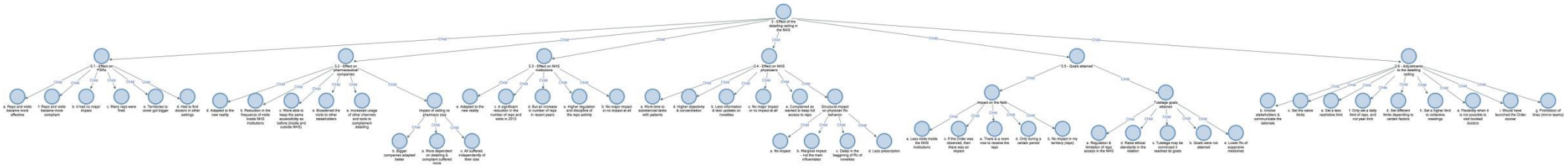


Figure 5.27 - Dimension 3 map – Effect of the detailing ceiling to the NHS

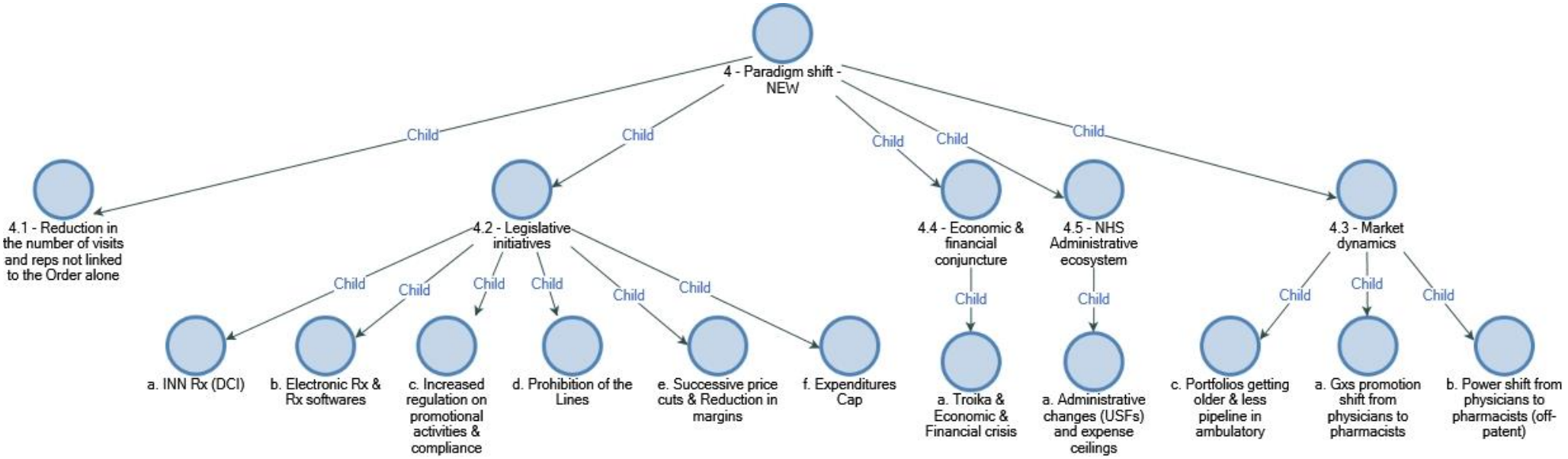


Figure 5.28 - Dimension 4 map – Paradigm shift

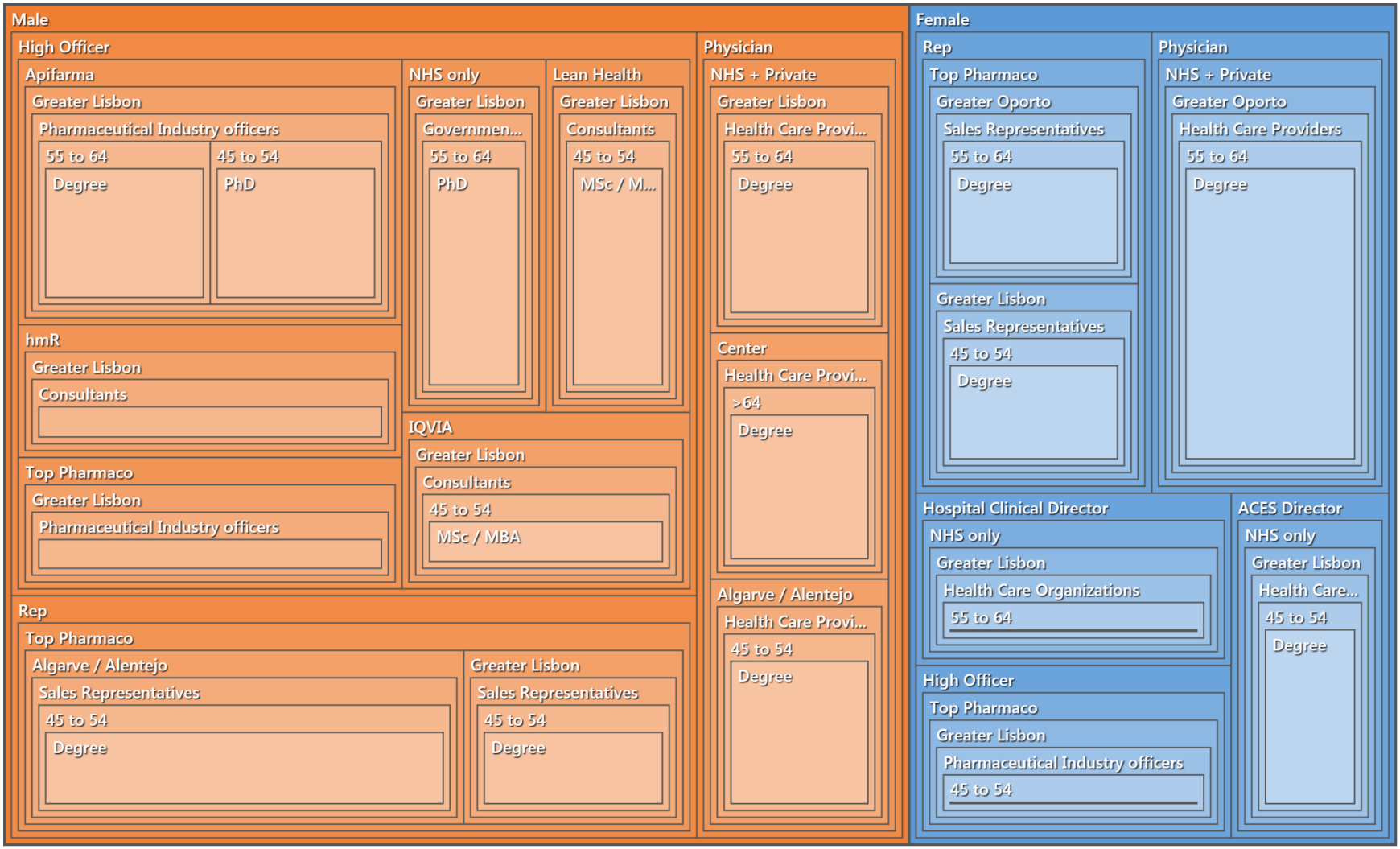


Figure 5.29 - Interviewed people attributes

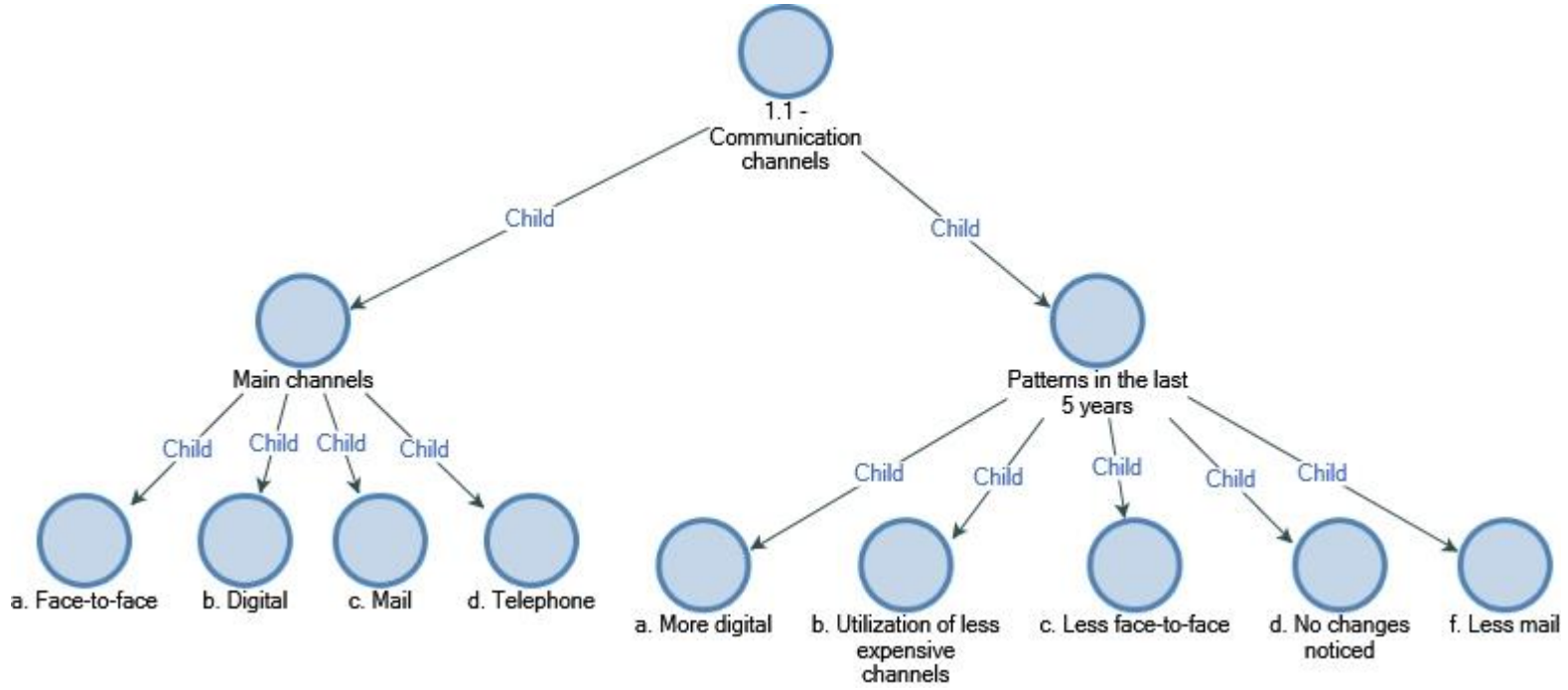


Figure 5.30 – Communication channels map (1.1)

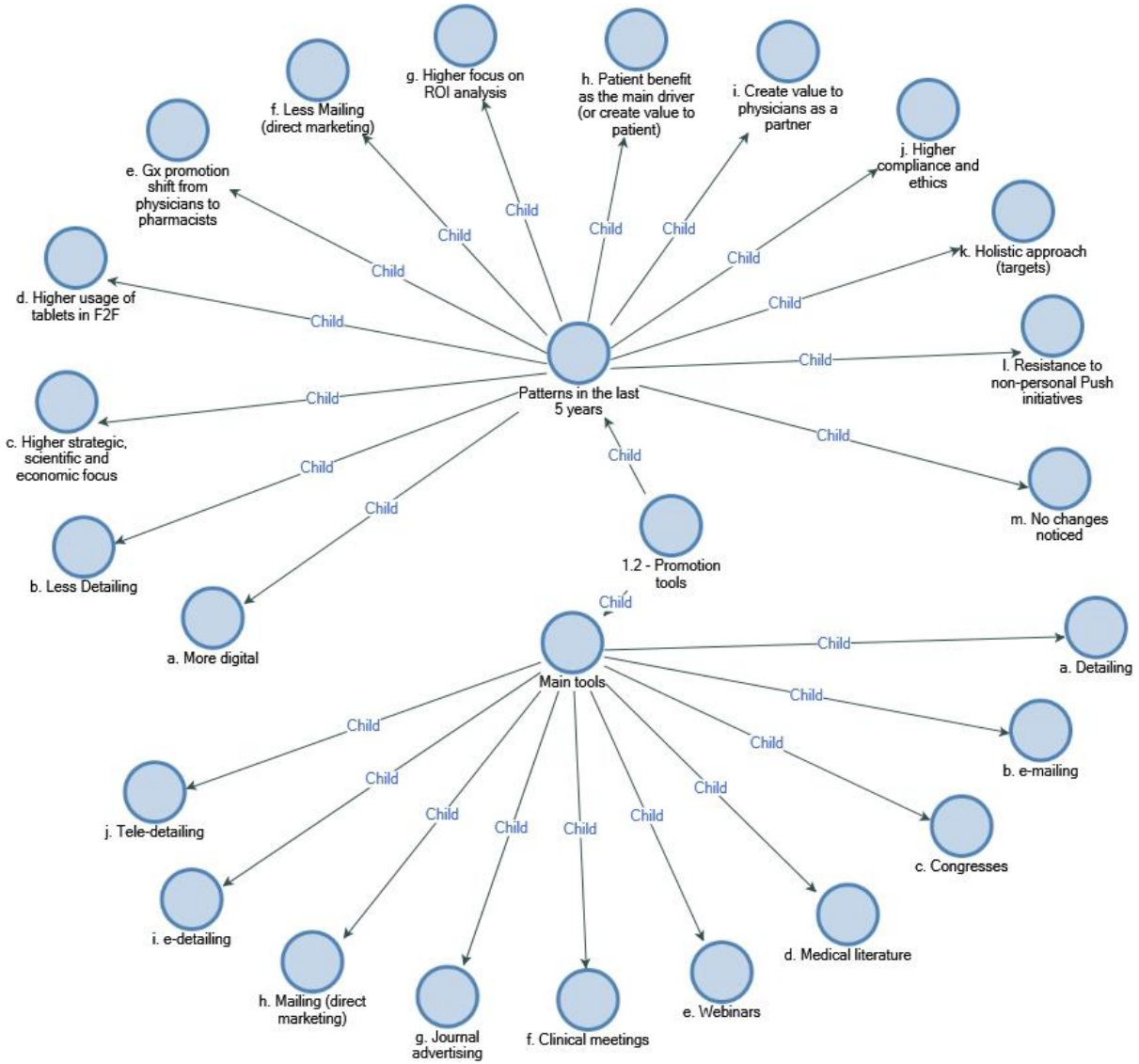


Figure 5.31 - Promotion tools map (1.2)

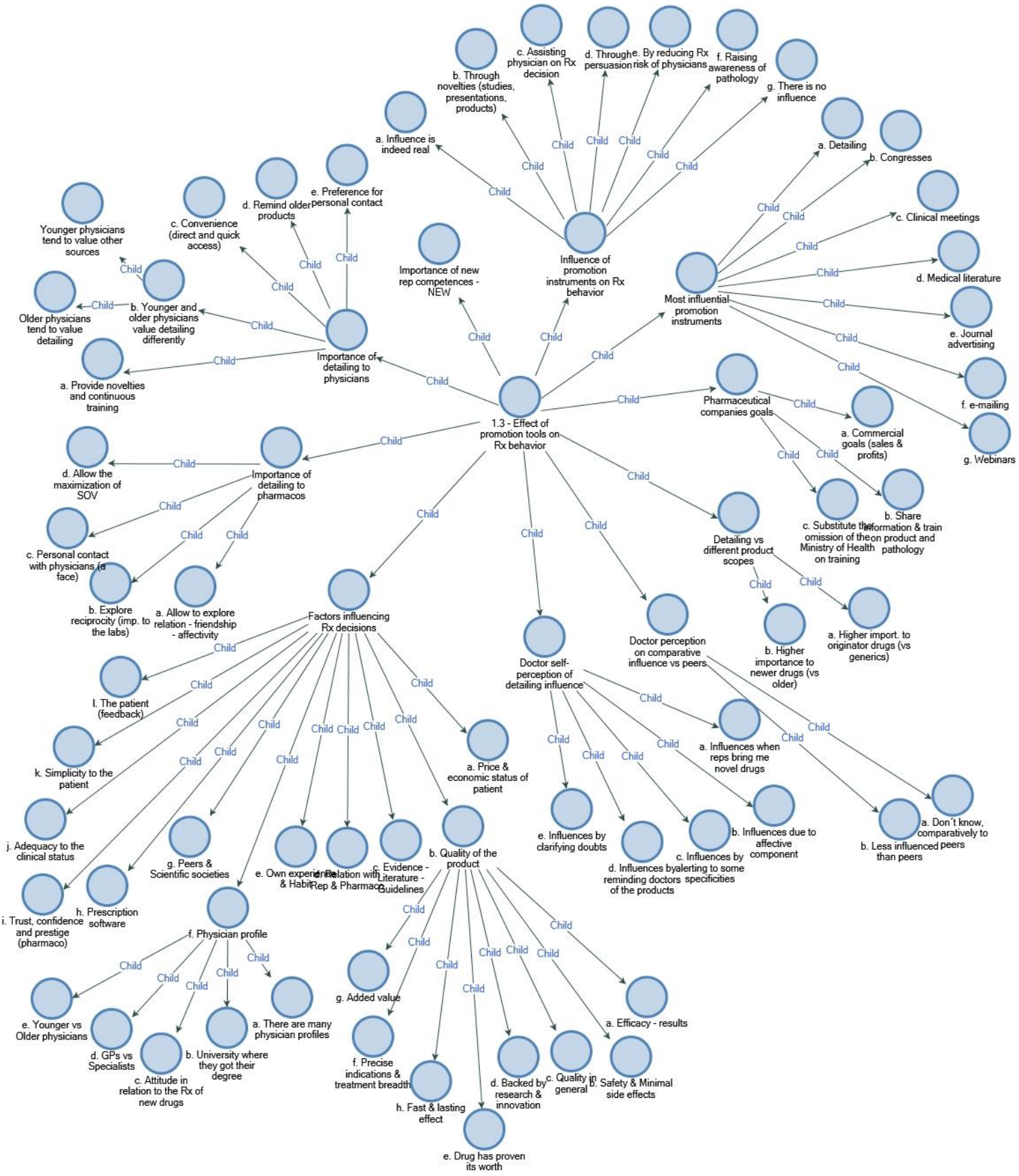


Figure 5.32 - Effect of promotion tools on prescription behavior map (1.3)

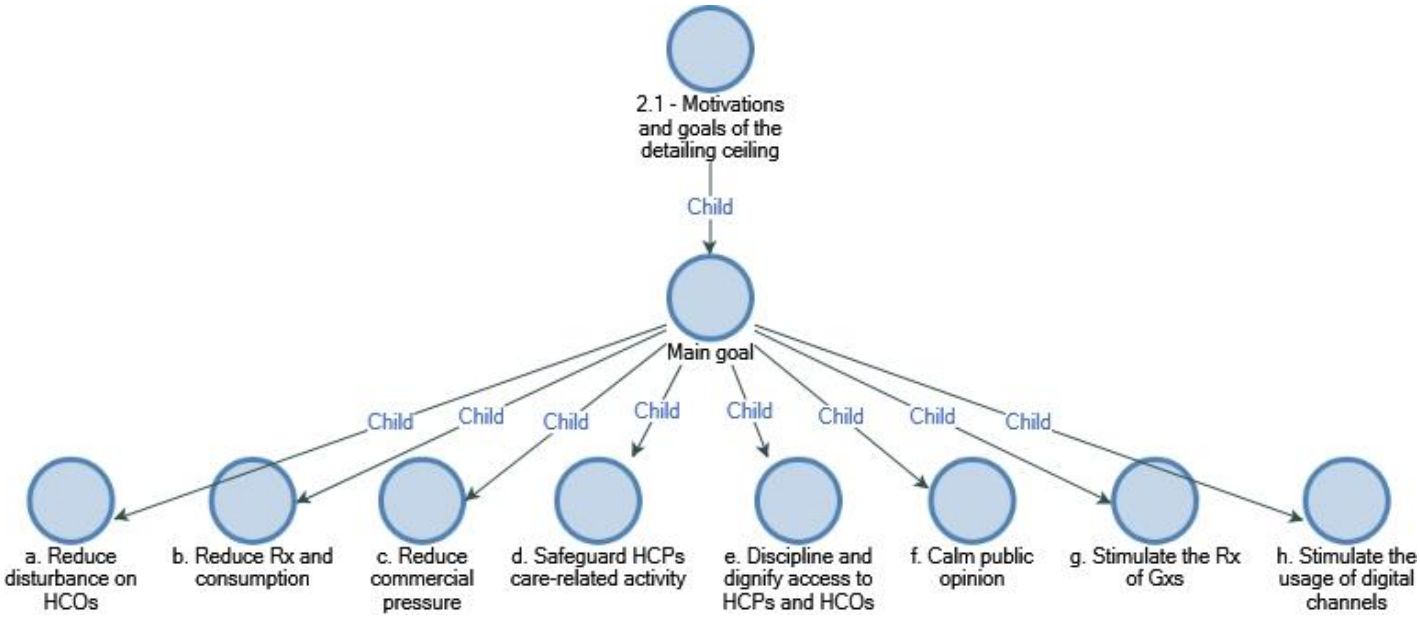


Figure 5.33 - Motivations and goals of the detailing ceiling map (2.1)

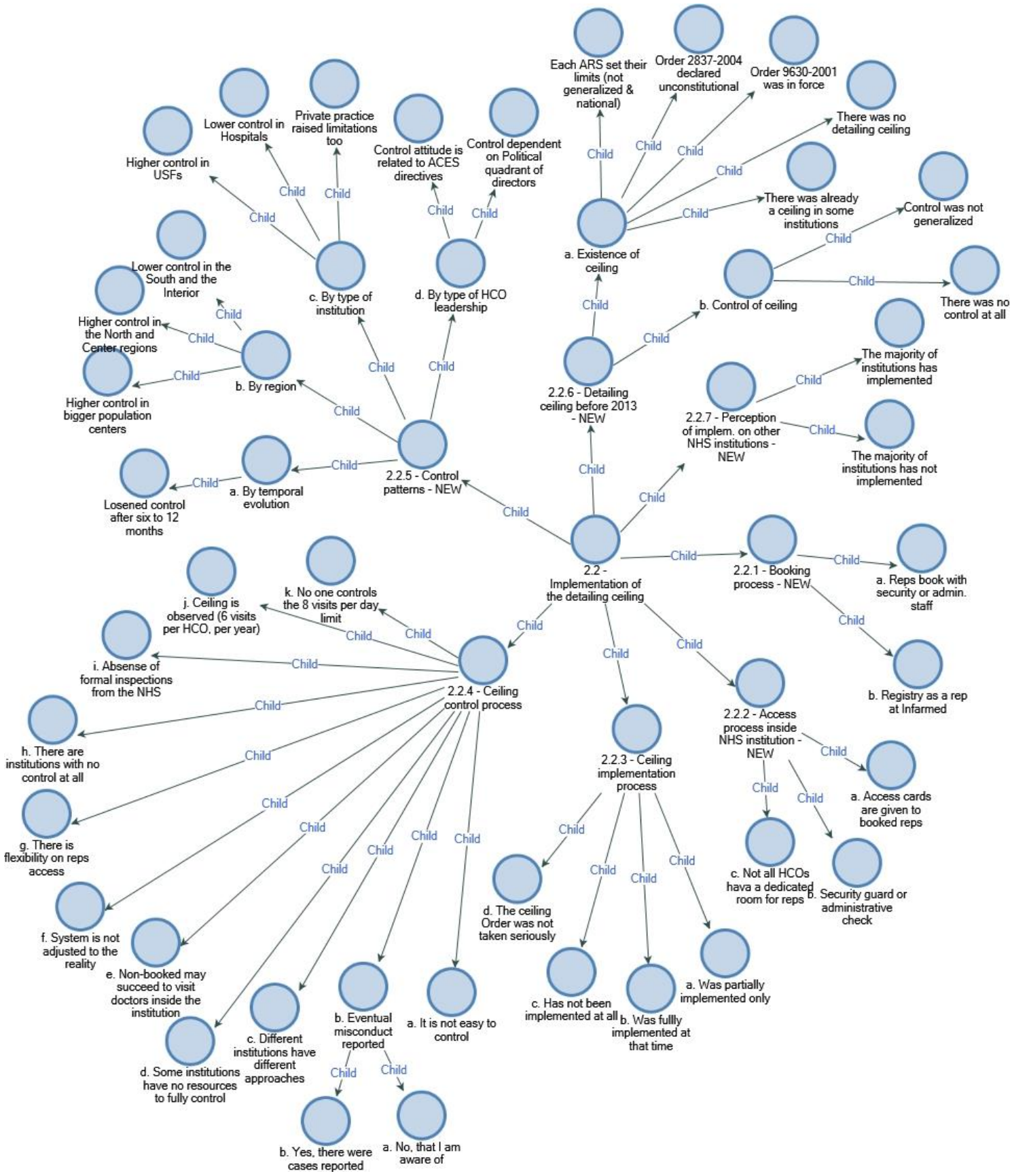


Figure 5.34 - Implementation of the detailing ceiling map (2.2)

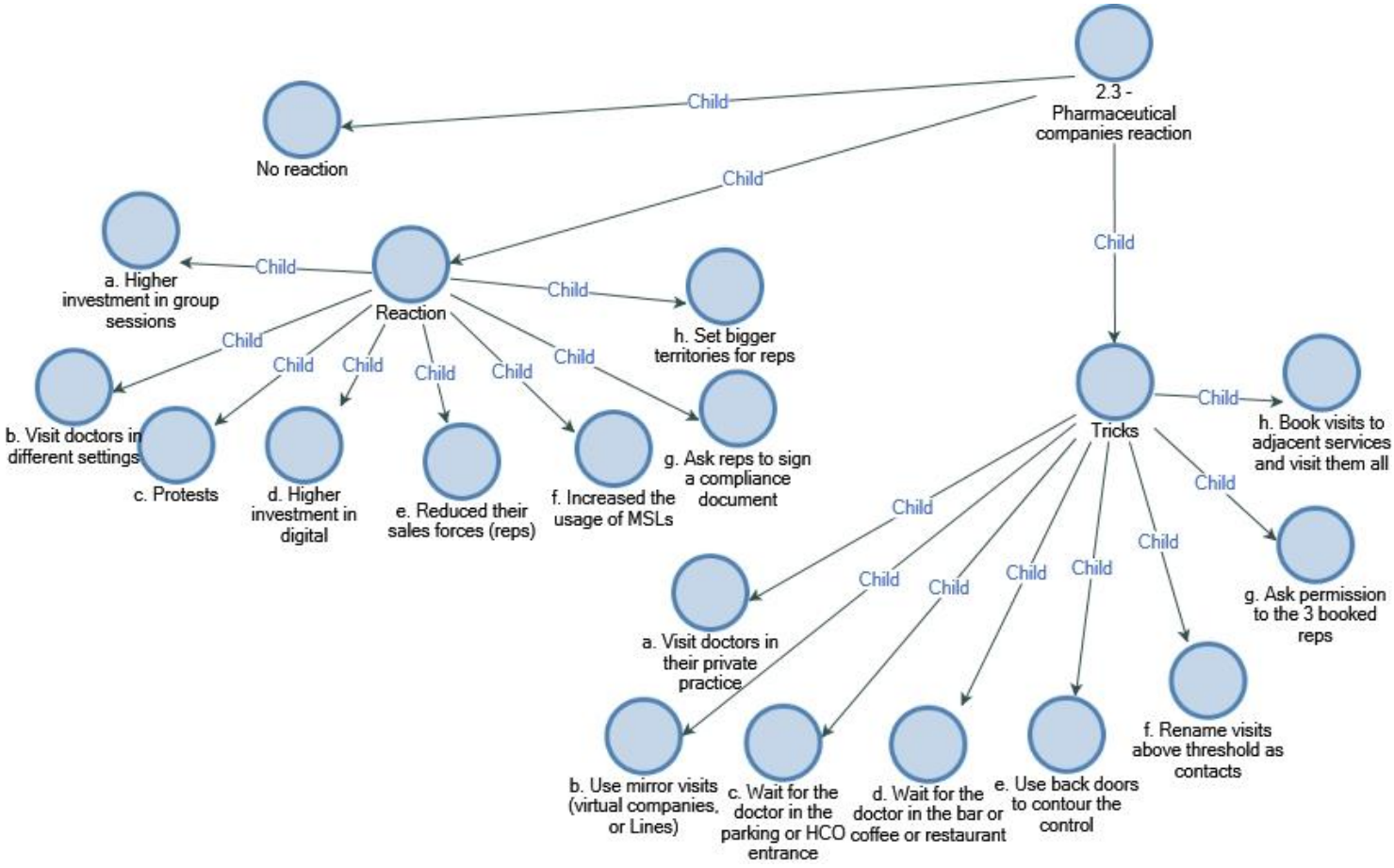


Figure 5.35 - Implementation of the detailing ceiling map (2.3)

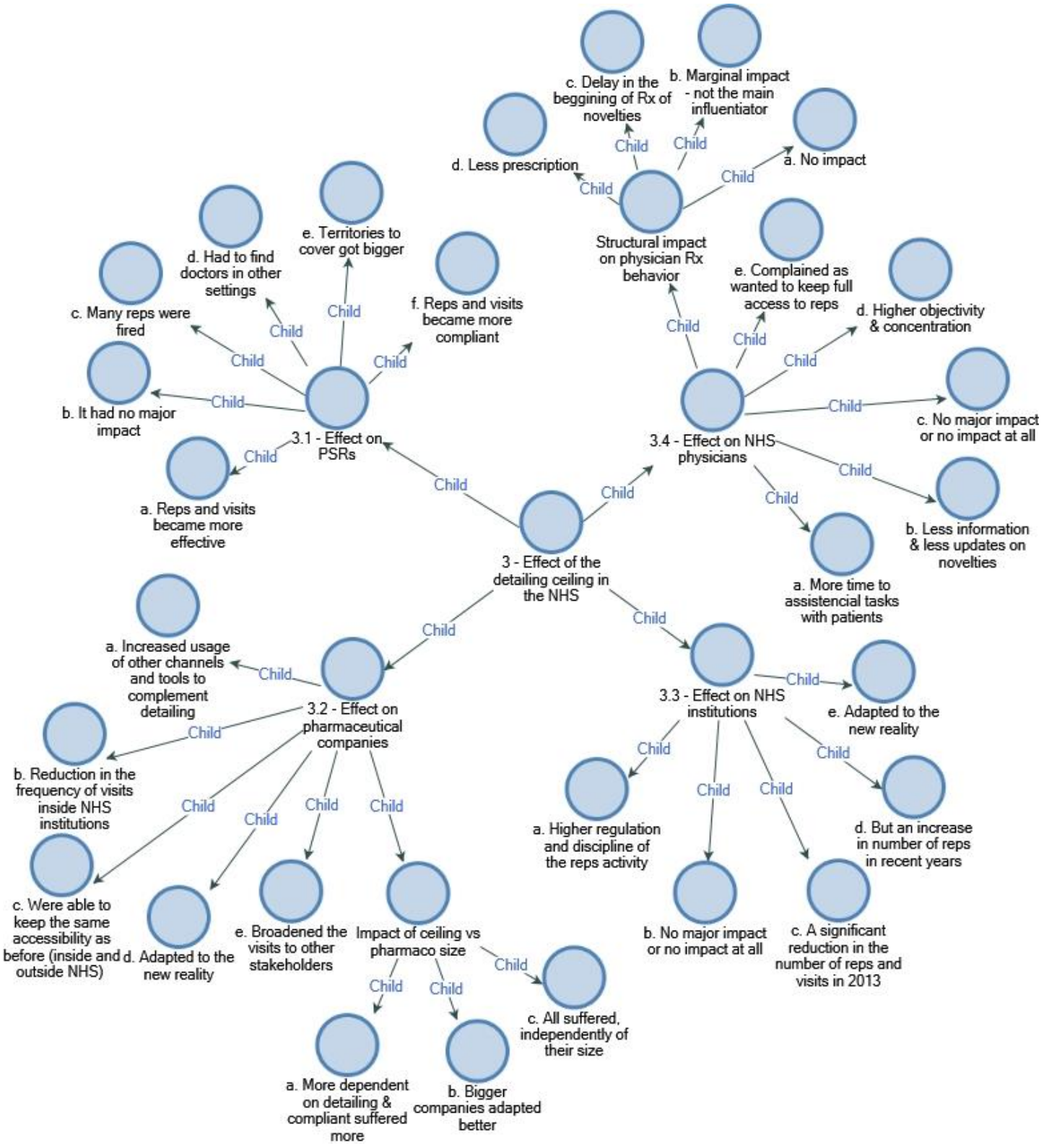


Figure 5.36 - Effect of the detailing ceiling on PSRs, pharmaceutical companies, NHS institutions, and NHS physicians map (3.1 to 3.4)

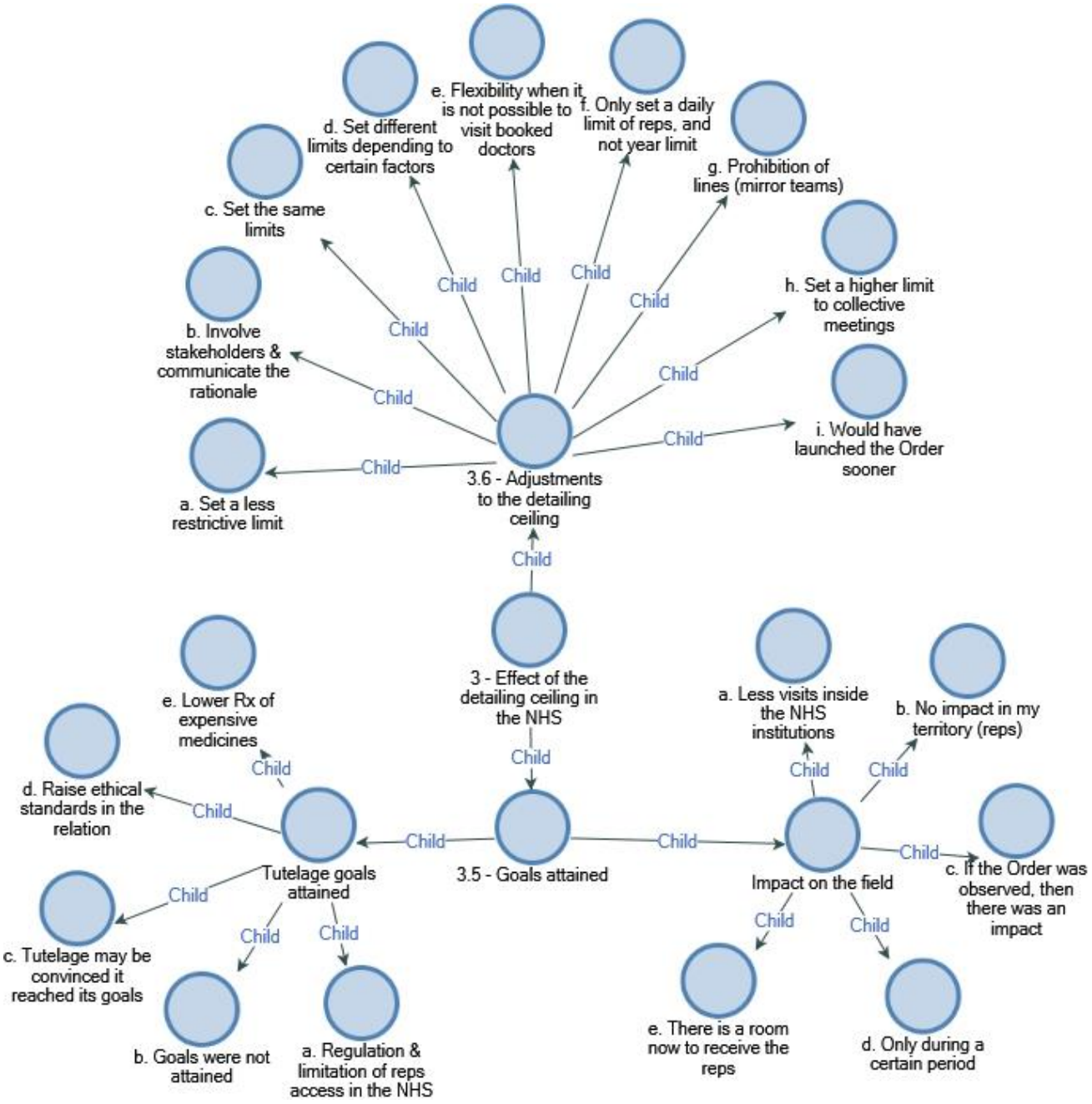


Figure 5.37 - Goals attained and Adjustments to the detailing ceiling map (3.5 and 3.6)

Figure 5.38 - Word cloud – Interviews + Researcher observations

For the purpose of this word cloud, we removed all words with less than four letters, and manually removed other words such as mode adverbs.

A hierarchical map (figure 5.39) was obtained with the importance, in number of references, of each of the four macro dimensions and their sub-dimensions. As previously explicated, the first dimension – Pharma communication channels and Promotion Instruments was, by far, the dimension with the higher number of references. This can be explained, by the one hand, by the number of questions (11), and by the other hand by the natural interest and enthusiasm this dimension generated in the majority of the interviewees.

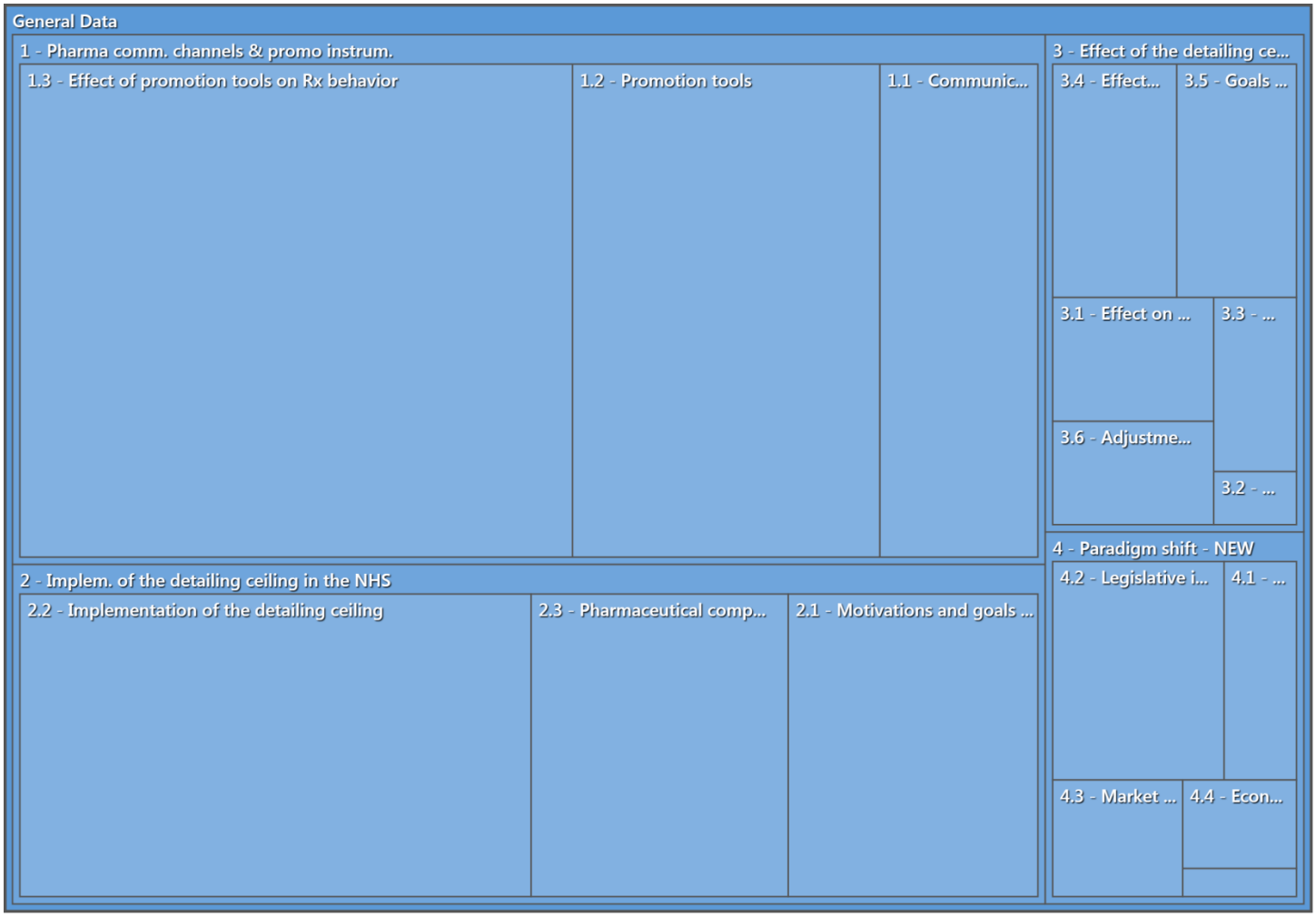


Figure 5.39 - Hierarchy chart - Analysis model map - Compared by number of coding references