SALES PROCESS IN STATE CONTROLLED PRESCRIPTION-PHARMACEUTICALS MARKETS

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Abstract

The present study aims to provide a better understanding of the pharmaceuticals market and the sales process that occurs within it, in order to deliver both a basis for future scholarly research and practical guidelines for marketers, thus leading to a better allocation of marketing activities and therefore to an improvement of marketing efficacy. In order to do so, we utilize a unique data set that combines secondary data for 108 drugs in 37 categories over 10 years in the Swiss pharmaceutical sector, combined with primary data on medical practitioners' views of pharmaceutical efficacy. In doing so, novel insights into the key drivers of pharmaceutical success over time are provided.

Key words: Sales Process, Pharmaceuticals market, Marketing, Efficacy

JEL Code: M16, M31, C30

Introduction

Pharmaceutical companies are increasingly facing pressure to compete. As a result, for many pharmaceutical companies, the revenues have been reduced resulting in smaller profit margins (Bush *et al.*, 2002; Gonzalez *et al.*, 2008). Because the efficacy of marketing spending is being questioned (Morgan *et al.*, 2002; Sheth and Sisodia, 2002), "pharmaceutical marketing managers are under increasing pressure to assess, justify and communicate the impact of marketing expenditures on financial outcomes" (Lehmann, 2004, p. 75), and therefore need to improve the efficacy of their marketing activities in order to reduce their marketing spend.

In pharmaceuticals marketing, marketers are generally considered to work within McCarthy´s (1960) conceptual framework. This refers to the four marketing instrument areas: product (includes product design, packaging), place (distribution channels), promotion (personal selling, advertising, sales promotion) and price (e.q. Frey, 1956). In the pharmaceutical business, it is clear that the sale (prescription decision) is to a greater or lesser extent influenced by the doctor's personal medical-drug preference (prescription habit). Prior work has found that the prescription habit is guided by the order of market entry (OE) (Coscelli, 2000). Therefore, an early market entry leads to that product gaining a market advantage, as found in a large number of prior studies (Berndt *et al.*, 1997; Coscelli, 2000; Bond and Lean, 1977; Urban *et al.*, 1986). Most of the current literature on pharmaceutical marketing

presupposes the order of market entry model (OE) as a starting point in the conception of a marketing strategy (e.q. Castro and Chrisman, 1995; Rodriquez-Pinto *et al.*, 2008). It can therefore be formally stated that *ceteris paribus*:

H1: The earlier (in regard to other competitors) a market entrant enters the market, the higher the sales will be.

Of course, the product features of a medical drug play a central role in the physician's prescription decision (sales) (Cooper and Kleinschmidt, 1993; Dogramatzis, 2002). For Cooper and Kleinschmidt (1993), product differentiation can be reached by the product innovativeness, efficacy and qualities such as safety (medical-drug interactions (IA), side effects (SE)) (Smith, 1983; Dogramatzis, 2002). Consequently, if the approved product has an advantage relative to other products, its market share increases (Berndt *et al.*, 1997). Taking these product-related factors together, a number of specific hypotheses can be generated:

H2: Medical drugs with fewer IAs are more likely to be prescribed by practitioners.

H3: Medical drugs with fewer SEs are more likely to be prescribed by practitioners.

H4: The better the medical drug's expected efficacy and effectiveness, the more likely it is that the medical drug will be prescribed.

Furthermore, packaging is a part of product design that enables the manufacturers to distinguish themselves from the competition. Evidence suggests that doctors tend to prescribe the product with the most convenient package size, e.g. by choosing the most economical option for their patients. In addition to this it is suggested that producers with a wider range of different packaging have a benefit on market (e.q. Elliot, 1993; Wansink, 1996). It is therefore hypothesed:

H5: Medical drugs supplied in a packaging more convenient for the user are more likely to be sold.

The influence of pricing in the pharmaceutical sector has been investigated by several researchers. Lexchin (2009, p145) highlighted that "doctors are generally ignorant both about the relative and absolute prices of medications". Despite the contradicting evidence provided by the literature, it seems likely that in some manner, the price of a medical drug will be an important variable in any medical pricing policy. As a baseline then, a negative relation between the price level and the prescription decision is suggested:

H6: Medical drugs with a lower price (price of medication) are more likely to be sold.

In order to ensure that a product is known by physicians and prescriptions are made, product marketing plays a central role (Brassington and Pettit, 2007). The relevance of promotion in pharmaceutical marketing has been described by Bond and Lean (1977), who found a linear function

between sales (revenue) and promotion. Schwartz *et al.* (1989, p281) revealed that "physicians also sometimes prescribed drugs at a rate far greater than that warranted by scientific evidence of their effectiveness". These findings are supported by Kremer *et al.* (2008, p244), who showed that 'promotional expenditure have a significant and positive effect on sales in pharmaceutical markets'. As a result, the following hypothesis is proposed:

H7: More (DTP) promoted medical drugs are more likely to be sold.

Research Methodology and Data Preparation

This study uses a unique set of data from the Swiss pharmaceutical sector. The data set covered a total of five prescription-drug classes, containing sales information on 37 substances from 108 products (brands) in Switzerland for the period of 1995 to 2005. The Swiss market is an appropriate one, because its characteristics of governmentally fixed pricing, the lack of price awareness of the prescribers and the patients when a drug choice is made, restrictions to certain promotional measures, and the almost non-existent competition from other markets, replicate many other large pharmaceutical markets (e.g. Dogramatzis, 2002).

In terms of a descriptive investigation, a sales-time diagram was produced. Different slopes between the sales (revenue) curves were observed. Drawing from this, the variable beta sales (BS), as an indicator for the slope of sales (i.e. beta value), was introduced as a dependent variable to represent the growth (decline) of sales over time. In Table 1, a short description of the variables is given:

Variable	**Description**	**Hypotheses**
Order of Market Entry (OE)	This variable indicates the order of market entry of a specific product within a specific medical drug class.	H_1
Drug Interaction (IA)	This variable indicates the „interaction between a drug and another substance that prevents the drug from performing as expected" (Day, 2007, p53).	H_2
Drug Side Effects (SE)	This variable indicates the „adverse effect that can be termed as a side-effect when judged to be secondary to a therapeutic effect. Adverse effects may cause complications of a disease or procedure and negatively affect its prognosis (Day, 2007, p196).	H_3
Expected efficacy and effectiveness	This variable indicates the efficacy of a specific medical drug as perceived by prescribers in relation to other medical drugs within a	H_4

(EEE)	specific drug class.	
Packaging Alternatives (PA)	This variable indicates the number of available package sizes.	H_5
Average Price (AP)	A price standardisation procedure was conducted to perform a price comparison between the different substances in terms of their efficacy, different dosages and packaging units within a medical drug class was conducted. The standardised price, for one day's therapy is based on the defined daily drug dose (DDD), described as the „assumed average maintenance dose per day for a drug used for its main indication in adults' (www.whocc.no).	H_6
Marketing Expenditures (MA)	Total monthly marketing expenditures, derived by the addition of detailing expenditures (DE), mailing expenditures (ME) and advertising expenditures (AE).	H_7
Average Sales (AS) (Revenue)	This variable indicates the stated real average sales (revenue) of a specific medical drug per month.	-
Beta Sales (BS)	This variable indicates the slope (beta value) of sales.	-

Table 1: Description and Statistics of Individual Scales

Furthermore, taking into consideration that some of the brands use the same substance (multiple brands can use the same substance, e.g. Paracetamol), a hierarchical two-level data structure is suggested, indicating a brand (first) and a substance (second) level. The substance level includes EEE, IA, and SE variables. The brand level, on the other hand, contains OE, packaging alternatives (PA), average price (AP) - Sales price of medication and MA as independent variables, whereas average sales (AS) results in a dependent variable (see Figure 1).

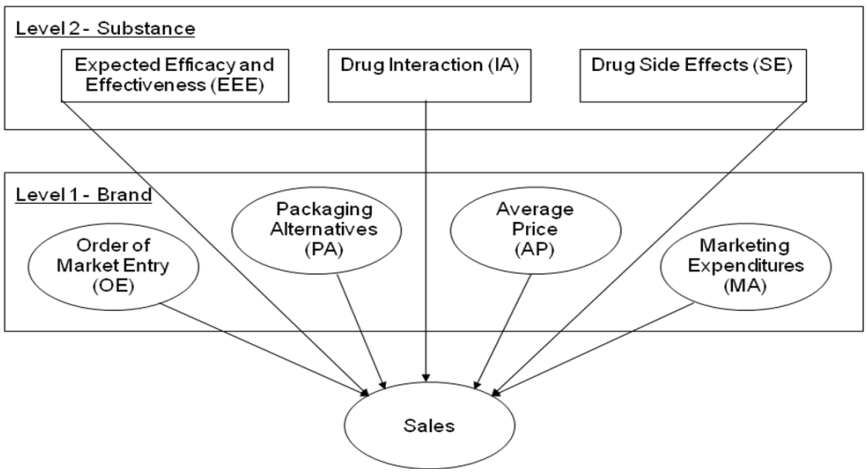

Figure 1: Multi-Level Data Structure

Regression Analysis

Because of the multi-level data structure, each level was separately analysed by a multiple-regression. The application of regression analysis is viewed as the best strategy for testing the given conceptual model. The conducted regressions were based on the sample of 37 substances from 108 brands. Since it is necessary for a separate multiple-regression analysis to be conducted for both levels, the data needed to be aggregated for the second level (Hox, 2010). For this purpose, first level (brand) data were taken and their average value for every single substance was calculated.

For the analysis of the first-level model, the following independent variables were introduced: OE, AP, PA, MA, using AS as a dependent variable. For AP, support could be found (beta = 0.11; sig. = 0.08). For MA, strong support can be afforded by the results (beta = 0.42; sig. = 0.00). This means that an increase in AP and MA will lead to higher sales (revenue). Furthermore, it can be seen that hypotheses H1 and H5 do not find support. In other words, OE and PA do not influence the prescribing decision (see Table 2).

For the second level (substance) multiple-regression model, aggregated data were used. The analysis has shown that SE (beta = 0.42; sig. = 0.03) and EEE (beta = 0.37; sig. = 0.04) are significantly positively related to sales. On the other hand, no significant relationships were found for drug IA (see Table 2).

Dependent Variable: Average Sales (AS)			
First Level (Brand) Regression Analysis - $R^2 = 0.330$; F = 4.854; Sig. = 0.000			
Independent Variable	Beta	Sig.	Hypotheses
Order of Market Entry (OE)	-0.08	0.44	H_1
Packaging Alternatives (PA)	0.11	0.25	H_5
Average Price (AP)	**0.11**	**0.08**	**H_6**
Marketing Expenditures (MA)	**0.42**	**0.00**	**H_7**
Second Level (Substance) Regression Analysis - $R^2 = 0.341$; F = 3.962; Sig. = 0.021			
Independent Variable	Beta	Sig.	Hypotheses
Drug Interaction (IA)	-0.06	0.76	H_2
Drug Side Effects (SE)	**0.42**	**0.03**	**H_3**

Expected Efficacy and Effectiveness (EEE)	**0.37**	**0.04**	**H_4**

Table 2: Results of the Multiple Regression Model of Average Sales

The third model analysed the relationship between marketing factors and BS on the first level (brand). The analysis shows that OE (beta = 0.19; sig. = 0.07), EEE (beta = 0.46; sig. = 0.00) and average MA (beta = 0.22; sig. = 0.03) are significantly positively related to sales (H1, H4, H6). On the other hand, no significant relationships were found for AP and PA (see Table 3).

The fourth model analysed the relationship between marketing factors and the BS on the second level (substance), using aggregated data. The analysis indicates that IA (beta = -0.28; sig. = -2.06), SE (beta = 0.32; sig. = 2.34) and EEE (beta = 0.67; sig. = 0.00) are significant related to the sales slope (see Table 3).

Dependent Variable: Beta Sales (BS)			
First Level (Brand) Regression Analysis - R^2 = 0.335; F = 5.608; Sig. = 0.000			
Independent Variable	Beta	Sig.	Hypotheses
Order of Market Entry (OE)	**0.19**	**0.07**	**H_1**
Packaging Alternatives (PA)	0.08	0.40	H_5
Average Price (AP)	0.05	0.65	H_6
Marketing Expenditures (MA)	**0.22**	**0.03**	**H_7**
Second Level (Substance) Regression Analysis - R^2 = 0.625; F = 12.771; Sig. = 0.000			
Independent Variable	Beta	Sig.	Hypotheses
Drug Interaction (IA)	**-0.28**	**0.05**	**H_2**
Drug Side Effects (SE)	**0.32**	**0.03**	**H_3**
Expected Efficacy and Effectiveness (EEE)	**0.67**	**0.00**	**H_4**

Table 3: Results of the Multiple Regression Model of Beta Sales

The outcome of the multiple-regression analysis, leading to the hypothesised antecedents to AS and their expected direction of influence is shown in Table 4.

Hypotheses	**Independent Variable**	**Expected Direction of Relationship (Sales)**	**Support of Hypotheses**
H_1	Order of Market Entry (OE)	-	N
H_2	Drug Interaction (IA)	-	N
H_3	Drug Side Effects (SE)	-	N
H_4	Expected Efficacy and Effectiveness (EEE)	+	Y
H_5	Packaging Alternatives (PA)	+	N
H_6	Average Price (AP)	-	N
H_7	Marketing Expenditures (MA)	+	Y

Table 4: Hypothesised Independent Variables of Average Sales

Discussion

The outcome of the analysis suggests a number of novel contributions to literature on pharmaceutical marketing. First, we uncover a multi-level structure, containing a brand (first) level and a substance (second) level. In practical terms, this distinction is highly relevant as companies are only able to actively influence non-substance level-related variables through their marketing activities. This means that marketers can only influence brand-related factors, whereas substance-related factors are mainly attributed when the outcomes of companies' research and development are presented.

Furthermore, our descriptive analysis suggested that during the early stage of market entry, sales appeared to increase immediately, but once a product is established on the market, no effect can be observed. Therefore, an additional variable [BS] was introduced, indicating the slope and capturing the overall sales trend, whereas the mean AS over the whole sales period is indicated by the AS variable. As a result, it can be concluded that promotional efforts in general are of importance during the medical drug introduction phase as an extraordinary sales increase takes place.

The investigation of the OE has not revealed a significant relationship to AS, but a positive significant relation to BS. This means that a later market entrant is more likely to have a higher increase in sales during the market introduction than an earlier entrant. Even more interesting is the fact that AS is not related to OE. At first glance, it appears that OE is not necessarily a decisive factor for long-term

market success (sales). This finding is also in contrast to the findings presented in the scientific literature (e.q. Urban *et al.*, 1986; Berndt *et al.*, 1997; Kalyanaram and Urban, 1992; Bond and Lean, 1977; Golder and Tellis, 1993). However, in the present context, additional factors such as governmental bodies are involved in the medicines-launching process. Consequently, an early entry does not necessarily lead to higher sales.

The analysis of the product-related drug IA variable has revealed a negative relation to BS. This means that a higher number of drug IAs result in a lower increase of sales. These findings are in support of the scientific literature, as sales will increase if the approved product has an advantage relative to other products (Berndt *et al.*, 1997).

Based on the results of the regression analysis, the following conceptual model can be presented (Figure 2):

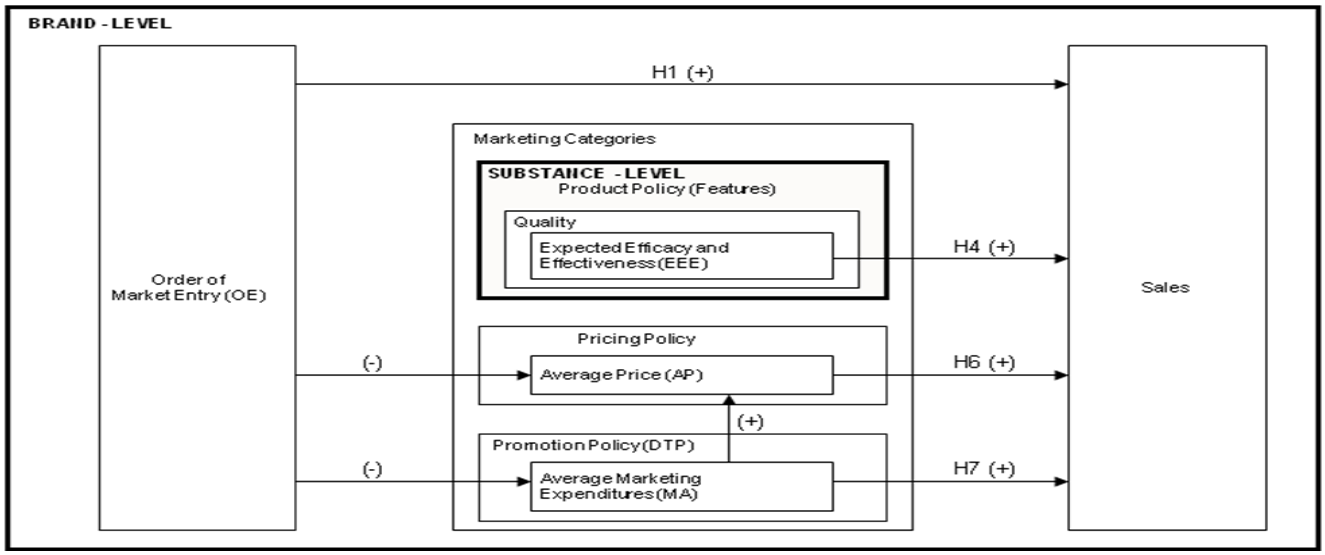

Figure 2: Two-Level Conceptual Model of Prescription-Pharmaceuticals Marketing in a State-Controlled Market

Limitations and Directions for Future Research

Like any study, the present research has some limitations. This study was designed so that individual medications could be compared effectively with each other (same product class and same indication), leading to a limited number of medications available and a resulting small data set. Furthermore, the assumption is made that the presented results could be generalised for prescription-pharmaceuticals markets that are similar to the Swiss market. Of course, this might not necessarily be true (Kremer *et al.*, 2008), especially because only five medical drug classes have been investigated.

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