Pricing and profit maximization: a study on multiple products

Jorge Eduardo Scarpin
Universidade Federal do Paraná – UFPR – Brazil
jorge.scarpin@ufpr.br

Lara Fabiana Dallabona
Universidade do Estado de Santa Catarina - UDESC/CEAVI – Brazil
lara.dallabona@udesc.br

Abstract

The present study shows a method of product-mix pricing, with multiple regression, linear and nonlinear programming, with a sample of cleaning products on a retail store. First we take operational costs of each product, then model the relationship among products. Finally optimize sale prices to achieve maximum profit.

Keywords: Pricing. Profit. Costs. Products.

Introduction

Value creation is the basis for growth. The more a product is aligned with customer preferences, the greater its value. The higher the value, therefore the greater the likelihood that it will market competition (Cross & Dixit, 2005). The advantages offered by the prices are extremely powerful. When pursued carefully, companies can achieve significant gains through price, and the impacts are easily identified. Managers should approach prices as a creative exercise in mathematics and behavioral psychology. If done correctly, profitability can be greatly enhanced through the prices (Kohli & Suri, 2011).

Consumers have different needs, preferences, purchasing power, and desire for instant gratification. This one's buying behavior, are willing to pay very different prices (Kohli & Suri, 2011). Besides the consumer behavior in relation to the product, the company must identify which type of market the same acts, since each market structure has its own dynamic and should be known. Consumer behavior in pricing is relevant, however, identify the market structure which the company operates is essential.

In order to make the management more efficient supply chain, the uncertainties that occur in the real world cannot be overlooked. These uncertainties are normally associated with the supply of products, customer demand and so forth (Zhao, Tang & Wei, 2012). To Kohli and Suri (2011), it is essential that decision makers to think strategically, to be creative, and focus on profits to create an accurate base price. This requires: get prices under its control; align prices with the marketing strategy; considering the competition and the amount to be offered; view the practice of prices as a creative art; practice prices as a science.

In the face of pricing, we need to understand the environment in which the business is inserted and observe three fundamental attributes: the costs, customers and competition (Nagle & Holden, 2005). The first attribute is related to the formation of cost-based pricing, wherein the main agent is manufactured, ie the pricing involves cost price value and consumers. Already worth based price formation, the consumer becomes the main attractiveness in price formation and ultimately engage the value, price, cost and product (Nagle & Holden, 2005). In this regard, we intend to answer the following question: how to set up a pricing method for a set of products, based on multiple regression to determine the relationship between them and linear/nonlinear programming for optimization of the sales price? Thus the study aims to propose a pricing method for a set of products, using multiple regression to determine the relationship between them and linear/nonlinear programming for optimization of the sales price.

Cross and Dixit (2005) reports that currently, prices are generally centered on the product. Product managers focus on the cost of the product, its physical attributes (size, features and functions), and the banks looking to get from it. Despite recent gains in productivity, pressures on the profitability of products persist. Because of an uncertain economy and fierce global competition, profits will continue to be inconsistent. So our study will contribute to the literature, demonstrating a proposed pricing for a set of products that, in determining the price of each product, the set is maximized.

Pricing

We consider the definition of the sale price an important condition for organizations to keep up competitive and continuous process in the market that act and that every day becomes more dynamic. According Wernke (2005, p. 147), "appropriate determination of selling prices increasingly is fundamental for the survival and growth of companies, regardless of size or area of expertise." Pricing is a subject widely discussed by economic theory, and to analyze the best way to calculate the price, it is essential to know other variables such as the type of market in which the company operates and the specific characteristics of each product (Vilela & Santos, 2000). In order to obtain a fixing appropriate prices is necessary to define the desired positioning, analyze the market share, verify billing and what profit is intended (Kotler & Keller, 2007; Nascimento, 2010).

The strategic management analysis costs broadly cost using strategic elements to make them more aware, formal and explicit, using observed data to make decisions and get strategies that have competitive advantage for the organization (Shank & Govindarajan, 1997). Pinto (2015, p. 49) reports that "it is through the price that a company guarantees the revenue to cover costs and expenses and achieves its coveted profit margins." The author also highlights that "it is the price that define customer strategies for attracting and spread positioning and cost or differentiation strategies and is based on it that are defined forces of supply and market demand."

To make the pricing effectively as a science, the company should use the survey to assess the ideal price level, create an accurate base price for maximum profitability long-term, and analyze the price of indifference zone (Kohli & Suri, 2011). Pinto (2015, p. 47) points out that "the pricing is a strategic process of interdisciplinary assigning prices to goods and services." The author mentions that the information linked to pricing, such as costs, expenses, positioning, capture, and others, receive approval from organizational leaders, making coherent strategic planning with strokes and feasible goals.

The prices charged by the companies may result in different levels of demands, which could result in a different impact on the outlined strategic objectives. Like this. "So you are able to do an adequate job of pricing, administrators should consider the level of demand for their products" (Las Casas 2001, p.197). Zhao, Tang and Wei (2012) reported more and more manufacturers increase the variety of products, differing one or more attributes, such as technical attributes of appearance, color, etc., in order to compete on the market and profit. However, for the consumer, some products can be replaced by not showing substantial differences.

From a managerial point of view, it is important to present the interactive effects of competitive prices and effects for three reasons: First, the current pricing practices seem very reactive, perhaps driven by a need to match the competition for short-term business needs, or both. Second, pricing strategies are not linked to consumer research. Third, the typical businesses do not have the data, energy or analysis to understand the complex links with regard to prices, customer reactions, costs and competition (Kopalle, Biswas, Chintagunta, Fan, Pauwels, Ratchford, & Sills, 2009).

To Kohli and Suri (2011), or the companies control their prices or the markets dictate it for them. Companies that want to control their prices have to differentiate their products; otherwise, they will be trapped in a world of commodities. The inability to differentiate restricts their ability to set the base price. If they can get out of this trap, the cost has less influence on prices, margins can be substantially increased, and the game gets interesting.

In this sense, Scarpin (2003) reports that for the pricing of a set of products with the use of mathematical models, divide the method into four sequential phases of product development, relationship between the products, target prices for the set of products, and optimization of the compound of prices and quantities, as shown in Figure 01.

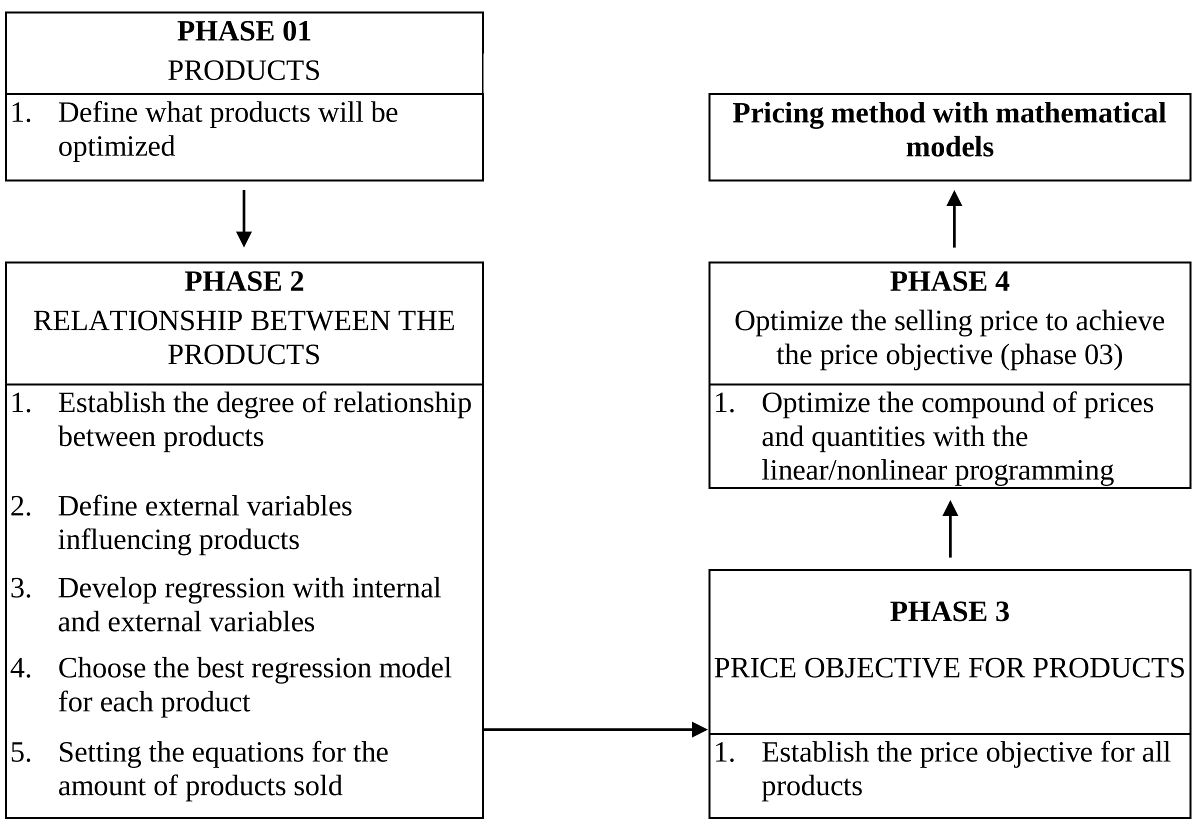

Figure1 - Pricing method with mathematical models
Scarpin (2003, p. 89).

Coupled to the first stage of the method for pricing is defined product, delimiting product with the same characteristics (operation and market) separating the products in households, and the judgment is made in a qualitative manner, usually by managers and based on individual characteristics of the product (Scarpin, 2003).

The second phase aims to verify if the products have relationship between prices and quantities, ie, "to determine the demand equation for each product based on the selling price, the prices and quantities sold of the other set of products and as external variables to set that affects" (Scarpin, 2003, p. 90). Considering the different perceptions of consumers for products, Silva and Urdan (2008, p.86) point out that "in general, a consumer buys a product if the perceived value in monetary terms, is higher than the price. Among several alternatives, he chooses one that offers the greatest perceived net value, that is, the biggest difference between perceived value and price". In the model, the dependent variable is always the quantity sold of each product, considering that the amount should be explained by the independent variables added to the model. As independent variables, we use the internal variables to the company (prices charged by the company, amount sold other products), which is directly related to the products individually. As for the external independent variables are: seasonal (yearly, monthly or weekly), the level of business, the level of income, the gross domestic product, inflation, and qualitative dummy variables to measure consumer behavior.

We need to formulate pricing strategies in the face of perceived value and sensitivity to prices observed on consumers, since both influence the buying decision (Nagle & Holden, 2005). Thus Giglio (2005, p. 145) mentions that "the degree of involvement is important that the consumer gives the consumer, that is, as he thinks that his life could change after purchase and how much he is willing to strive to realize it" For Cross and Dixit (2005), there are difficulties for prices centered on customers. A consumer, considering a purchase of a car will assign a wide range of values for each attribute of the product. Some will be economic figures for goals such as fuel efficiency, maintenance, warranty, and resale value. Others are subjective values, such as design, safety, comfort and status. In addition, the consumer may not know before making your purchasing decision, exactly how much weight can be given for each component in the value equation. Thus, companies must capture and analyze transaction data to model and predict customer behavior future.

The fourth phase comprises the objective of price for all products. According Scarpin (2003), for each objective there is an optimization process, as follows: survival, profit maximization, maximization of revenue, maximizing sales growth, maximizing the amount of goods sold, maximizing market skimming, leadership product / quality and differentiation, maximizing the value perceived by the customer, cost leadership, minimizing the number of selling prices.

Price targets are bound to vary by type of product and over time, even within a business unit and company. Although the goal of the pricing process is to determine a pricing strategy, which will be a basis for profitable decisions in the medium and long term, pricing strategies are always specific to the context and thus are bound to change (Hinterhuber 2004).

A shop can stock up on different items, and most of their prices may be irrelevant to a particular consumer. Also, different consumers may be interested in different combinations of items and prices of a company can be relatively high for a consumer, but relatively low for another (Kopalle, Biswas, Chintagunta, Fan, Pauwels, Ratchford, & Sills, 2009).

Methodology

We have done the research in a supermarket company with 28 medium size stores in small and medium cities of Santa Catarina, one of the richest states in Brazil and more than 10,000 products. Working with that huge amount of products is very hard, because it would be necessary a lot of reports and relationships among them. So, to build a theoretical model, we work with a small sample of products on a long time series. To make this study, we use a theoretical model that was used on a Brazilian airline company in the beginning of 2000 (Scarpin, 2003) presented on Figure 01.

First of all, we have to choose which store we should work with. The company has 28 stores in 16 cities and we take one of the oldest store, because it has more data and all the board works there. Its size is a little bigger than average, so it is possible to expand results for the whole company.

Second, we have to choose which products we should work with. Each store sells almost the same products and we take four cleaning products. We decide to work with cleaning products because they are sold in all of 28 stores and it does not have seasonality, problem with suppliers or tax changes.

With the store and products chosen, we finished the phase one of the model and then we collect all variables from April, 01, 2013 to January, 31, 2015 with 671 observations of all four products, called Product 202, Product 233, Product 204, Product 257 and Product 981 (DMU code on ERP) with the following variables.

Variable	Description
Quantity Sold (Q)	Quantity sold of each product, day by day. So, we have 05 variables, called Q202, Q233, Q240, Q257, and Q981
Selling Price (SP)	Selling price of each product, day by day. So, we have 05 variables, called SP202, SP233, SP240, SP257, and SP981
Payment Day	In Brazil, the employers pay their employees monthly, from the last day of the month to day 07 or 08 of the next month. For example, if I work in January, I will get my payment from January 31st to February, 8th. So, we have done a dummy variable for these days, because we think that when an employee receives his salary, he will go to supermarket more often than other days.
Days of the week	We have done dummies variables for each day of the week, because at weekends the supermarket tends to have bigger sales, because a lot of people do not work on these days. So, we did 06 dummies, from Tuesday (dummy_2) to Sunday (dummy_7).
Quantity Sold yesterday (Q n-1)	We have to build a variable to show the historical process of selling a product, because if I always sell a lot of product 01, so product 01 has some expertise that other products do not have. So, to capture this, we did a new variable called Quantity Sold yesterday that is how many products were sold the day before (n-1). Therefore, we have 05 variables, called Q n-1 202, Q n-1 233, Q n-1 240, Q n-1 257, and Q n-1 981.

After collecting all 22 variables, we need to establish the relationship among price and quantity sold of each product. As we are working with products that are, sometimes complementary and sometimes rivals. If we change the price of one product, it will have consequences of the quantity sold of the product and other products too, because the customers will change the products or it is possible that they will decide to buy the product that has the price changed and other products too, because they are complementary.

The best to make the relationship among products is with linear regression, where Quantity Sold (Q) is the dependent variable and all the others are the independent variables. We present the regression models used to make the relationship (SPSS and Gretl softwares):

$$Q\ 202 = \alpha_1 + \beta_1 SP\ 202 + \beta_2 SP\ 233 + \beta_3 SP240 + \beta_4 SP257 + \beta_5 SP981 + Payment\ Day + days + \beta_6 Qn - 1\ 202 + \varepsilon \quad 1$$

$$Q\ 233 = \alpha_1 + \beta_1 SP\ 202 + \beta_2 SP\ 233 + \beta_3 SP240 + \beta_4 SP257 + \beta_5 SP981 + Payment\ Day + days + \beta_6 Qn - 1\ 233 + \varepsilon \quad 2$$

$$Q\ 240 = \alpha_1 + \beta_1 SP\ 202 + \beta_2 SP\ 233 + \beta_3 SP240 + \beta_4 SP257 + \beta_5 SP981 + Payment\ Day + days + \beta_6 Qn - 1\ 240 + \varepsilon \quad 3$$

$$Q\ 257 = \alpha_1 + \beta_1 SP\ 202 + \beta_2 SP\ 233 + \beta_3 SP240 + \beta_4 SP257 + \beta_5 SP981 + Payment\ Day + days + \beta_6 Qn - 1\ 257 + \varepsilon \quad 4$$

$$Q\ 981 = \alpha_1 + \beta_1 SP\ 202 + \beta_2 SP\ 233 + \beta_3 SP240 + \beta_4 SP257 + \beta_5 SP981 + Payment\ Day + days + \beta_6 Qn - 1\ 981 + \varepsilon \quad 5$$

With all the regressions done, we finished the phase 02 of the model, beginning the phase 03 next. On the phase 03, we choose the objective of the model, which could be: survival, maximization of sales, or maximization of profit. To make the model bigger and more useful, we choose the maximization of profit. To maximize profit, we optimize the profit function with linear and nonlinear programming, using Microsoft Excel (Solver), with three steps:

Step 1: collect the unit cost of each product, because profit is revenue - cost;

Step 2: use regression functions to determine the quantity sold of each product;

Step 3: establish the maximum and minimum selling price of each product. We define the minimum price as 10% above the unit cost and maximum price as 50% above the actual selling price. That was the Constraints of the model. The other constraints were that quantity sold must be above zero.

Step 4: optimize the profit of the four products (sum), choosing the right selling price of each product.

Doing that, we finish the phase 04 of the model, achieving the optimal selling price that will fit the best mathematical model. To do that, we worked with descriptive statistics of all variables, except dummies, regression analysis and linear/nonlinear programming.

Analysis

The first thing we need to do is to check the descriptive statistics of all variables, but dummies, to verify if there is any outlier and to check the behavior of the variables. We show the descriptive statistics on Table 01.

Table 1 - Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
Q202	81.7836	63.4702	12.0000	225.000

Q233	66.5597	49.8836	32.0000	195.000
Q240	60.5448	46.8010	43.0000	300.000
Q257	64.8209	62.9718	22.0000	205.000
Q981	36.8060	25.0869	18.0000	115.000
SP202	2.44846	0.137055	1.59000	2.48000
SP233	3.02804	0.178893	1.97000	3.07000
SP240	4.05451	0.261127	2.64000	4.12000
SP257	3.57585	0.192930	2.32000	3.62000
SP981	4.91018	0.161543	3.97000	4.98000

We can verify that all variables of quantity sold are not so different from each other, especially items 202, 233, 240, and 257 as well as the standard deviation. One point we need to pay close attention is that the standard deviation is close to the mean and this is good to our model, because the quantity sold is sensible to other variables, as well as selling prices.

On the other hand, the selling price are close to each other, because the products are similar and the standard deviation is very low. It shows that with minimal change on selling prices, we will probably have huge changes on quantity sold. Therefore, we cannot say it precisely only looking at mean and standard deviations. We need to check it more closely, studying the relationship between selling price and quantity sold.

To check the relationship between selling price and quantity sold, we perform five linear regression (one for each product) and we find good results. All the regression assumptions were tested, with good results for lack of multicollinearity, auto-correlation and homoscedasticity/heteroscedasticity. The tests were done on gretl software and double checked with SPSS software, as well as the results found on Table 02.

Table 2 - Relationship between price and quantity

Relationship	**Product 202**	**Product 233**	**Product 240**	**Product 257**	**Product 981**
Const	186.821	189.657	49.677	184.598	70.4367
SP202	-225.813***	-135.098***	110.763	-31.7294	39.5723
SP233	26.2572*	-75.0287**	-98.5521***	9.48109*	-37.5503*
SP240	-18.754*		19.5407**	14.6754*	
SP257	102.732***	96.9001***	-44.7963**	-72.5747***	-2.38894*
SP981	8.48144*		17.3674*		-10.7369**
Payment Day					
dummy_2				29.2402***	11.8358***
dummy_3					
dummy_4		26.3897***	26.3683***	40.4795***	10.8234***
dummy_5					
dummy_6	36.3593***	24.0357***	35.4037***	51.5585***	14.0595***
dummy_7	-57.8771***	-43.1102***	-40.9735***	-32.2137***	-16.5838***
Q n-1	0.377874***	0.35608***	0.424479***	0.409725***	0.508684***
R-squared	0.253253	0.27425	0.265281	0.282392	0.298389
Adjusted R-squared	0.238455	0.25987	0.250721	0.268171	0.284485

*** Significant at .01; ** significant at .05; * significant at .01.

Before we start with our analysis we must take off all coefficients with p-value above .01, because it means that the coefficient is not different from zero. Because our model is big, we choose to not mention the poor coefficients, because they are not significant.

The first analysis we need to do is the relationship between selling price and quantity sold of products and if it is positive or negative related. We know that the higher the selling price, the lower is quantity sold and vice-versa, and our model shows it perfectly. Selling price of product 202 is negatively related with its quantity sold (-225,813), selling price of product 233 is negatively related with its quantity sold (-75.0287) and so on.

The second analysis we need on selling price is the relationship between selling price of one product on quantity sold of the other four products of the mix. The strongest selling price were the selling price of product 257 that is related with all five products, three negative relationship (product 240, product 257 itself and product 981) and two positive relationship (product 202 and product 233), the selling price of product 233 and selling price of product 202. The historical behavior of products were checked too and we found significant relationship on all five products and these variables will make the model more accurate. Finally, we checked dummies variables for payment day and week days.

The dummies variables have two different purposes. The first purpose it to check if there is difference on customer behavior when he/she gets his/her payment. Unfortunately, there is no significant coefficient for any product, showing that Brazilian customer does not buy more cleaning products at the beginning of each month more than at the rest of each month. The second purpose of dummies variables is to check if there is difference on customer behavior on week days. Our dummies variables starts on Tuesday (dummy_2) and ends on Sunday (dummy_7). The strongest variables were on weekends with dummy_6 (Saturday) positively related with all products and dummy_7 (Sunday) negatively related with all products too. In small and medium cities of Brazil, few people work on Saturdays, so supermarkets are normally crowd this day and very few supermarkets open on Sundays, so few people go out on Sunday to buy anything. We have the final equation of each product on Table 03.

Table 3 - *Quantity Sold Equation*

Product	**Quantity Sold Equation**
202	186.821 + (-225.813) x P202 + (26.2572) x P233 + (-18.754) x P240 + (102.732) x P257 + (8.48144) x P981 + (36.3593) x dummy_6 + (-57.8771) x dummy_7 + (0.377874) x Q n-1
233	189.657 + (-135.098) x P202 + (-75.0287) x P233 + (96.9001) x P257 + (26.3897) x dummy_4 + (24.0357) x dummy_6 + (-43.1102) x dummy_7 + (0.356076) x Q n-1
240	49.677 + (110.763) x P202 + (-98.5521) x P233 + (19.5407) x P240 + (-44.7963) x P257 + (17.3674) x P981 + (26.3683) x dummy_4 + (35.4037) x dummy_6 + (-40.9735) x dummy_7 + (0.424479) x Q n-1
258	184.598 + (-31.7294) x P202 + (9.48109) x P233 + (14.6754) x P240 + (-72.5747) x P257 + (29.2402) x dummy_2 + (40.4795) x dummy_4 + (51.5585) x dummy_6 + (-32.2137) x dummy_7 + (0.409725) x Q n-1
981	70.4367 + (39.5723) x P202 + (-37.5503) x P233 + (-2.38894) x P257 + (-10.7369) x P981 + (11.8358) x dummy_2 + (10.8234) x dummy_4 + (14.0595) x dummy_6 + (-16.5838) x dummy_7 + (0.508684) x Q n-1

After making all quantity sold equation, we start the last phase of the model "Optimize the selling price to achieve the price objective (phase 03) – maximization of profit". First we show the original data of last day of our sample (Jan, 31, 2015) to check the profit of all five products and then, with a linear/nonlinear programming, optimize the selling prices to achieve the maximum profit. We present the original data on Table 04.

Table 4 - Original Data

Original Data	**Product 202**	**Product 233**	**Product 240**	**Product 257**	**Product 981**	**Sum**
Selling Price	$ 2.48	$3.07	$4.12	$ 3.62	$4.98	
Unitary Cost	$ 1.04	$0.77	$2.27	$ 1.38	$2.09	
Quantity	70	35	70	35	105	
Revenue	$ 173.60	$ 107.45	$ 288.40	$ 126.70	$ 522.90	$ 1.219.05
Cost	$ 72.91	$ 26.86	$ 158.62	$ 48.15	$ 219.62	$ 526.16
Profit	$ 100.69	$ 80.59	$ 129.78	$ 78.55	$ 303.28	$ 692.89

With no optimization, the company has a profit of $692.89 (in Brazilian Reais) and have sales of all five products. However, we can optimize the profit with a model of linear/nonlinear programming with three constraints: minimum price as 10% above the unit cost, maximum price as 50% above the actual selling price and all quantity sold must be above zero. Finally we model the equations and constraints on Microsoft Excel (Solver) and run the model (GRG nonlinear model). We have tried to run the model with linear programming (Simplex) but it was not possible, because the profit function is not linear due to be five previous equations for the quantity sold. The results of optimal solutions are shown on Table 05.

Table 5 - Optimal Solution

Optimal Solution	**Product 202**	**Product 233**	**Product 240**	**Product 257**	**Product 981**	**Sum**
Selling Price	$ 2.41	$0.84	$6.18	$ 3.47	$7.47	
Unitary Cost	$ 1.04	$0.77	$2.27	$ 1.38	$2.09	
Quantity	0.00	237.65	378.81	73.33	156.62	
Revenue	$ 0.00	$ 200.63	$ 2,341.07	$ 254.19	$ 1,169.94	$ 3,965.83
Cost	$ 0.00	$ 182.39	$ 858.39	$ 100.87	$ 327.58	$ 1,469.24
Profit	$ 0.00	$ 18.24	$ 1,482.68	$ 153.32	$ 842.36	$ 2,496.59

With the results in Table 05, we can infer that there are three very profitable products (233, 240 and 981) that, with the right selling price can produce high profit. On the other hand, we have a bad product (202) that, with the right selling price, will have quantity sold equal to zero. So, do we need to withdraw the product? No, because with this selling price, the customer will not buy the product 202, but he/she will buy product 240 and/or product 981, because they are positively related with product 202 selling price. With this combination, the profit grows from $692.89 to $2,496.59 (+260.18%). Besides achieving higher profit, the model is useful to inventory and purchase management because it also makes sales forecasting.

Conclusion

Our main contribution to this research was to test and develop a theoretical model developed by Scarpin (2003) and which aims to achieve the ideal selling price for a sample involving four cleaning products in a time series, applied in a supermarket company which has 28 medium-sized stores, located in the state of Santa Catarina, Brazil. The reporting period is from April 1, 2013 to January 31 of 2015 involving 671 observations of the four products.

The theoretical model work with four phases to pricing for a set of products. The first phase is to choose the products to work with and we choose four cleaning products, some similar and other complementary. The second is to establish the relationship between products and we find relationship between price and quantity, as well as relationship between quantity and other variables, such as historical quantity and some days of the week. The third is to choose the price objective and our price objective is maximization of profit. Finally, the fourth is to optimize the set or products to achieve the objective proposed and after our optimization with nonlinear programming, we found a set of selling prices that increase our profit in more than 260%.

Lastly, we suggest more researches with other products, as well as to make the relationship between price and quantity sold with other techniques, such as nonlinear programming, arch or garch models etc.

Bibliography

Cross, R. G. & Dixit, A. 2005. Customer-centric pricing: the surprising secret for profitability. Business Horizons, 48, 483-491.

Giglio, E. 2005. O comportamento do consumidor. 3. ed. São Paulo: Thomson Pioneira.

Hinterhuber, A. 2004. Towards value-based pricing - an integrative framework for decision making. Industrial Marketing Management, 33, 765-778.

Kohli, C. & Suri, R. 2011. The price is right? Guidelines for pricing to enhance profitability. Business Horizons, 54, 563-573.

Kopalle, P., Biswas, D., Chintagunta, P. K., Fan, J., Pauwels, K., Ratchford, B. T. & Sills, J. A. 2009. Retailer pricing and competitive effects. Journal of Retailing, 85(1), 56-70.

Kotler, P. & Keller, K. 2007. Administração de marketing. 12. ed. São Paulo: Prentice Hall.

Las Casas, A. L. 2001. Marketing: conceitos, exercícios e casos. 5ª ed. São Paulo: Atlas.

Nascimento, O. M. S. 2010. Percepção dos efeitos da formação de preço aplicando algarismos terminados em 9: estudo com varejistas estabelecidos no centro de Salvador e de Cajazeiras.76 f. Dissertação apresentada ao Curso de Mestrado em Administração Estratégica, Universidade Salvador.

Nagle, T. T. & Holden, R. K. 2005. Estratégia e Táticas de preços: um guia para decisões lucrativas, 3. ed., São Paulo, Pearson Prentice Hill.

Pinto, M. P. S. F. 2015. Gestão de serviços veterinários: uma investigação sobre as práticas de custos, preços e rentabilidade sob o enfoque do conhecimento contábil, 117 p. Dissertação (Mestrado). Universidade de São Paulo.

Silva, M. A. & Urdan, A. T. 2008. O conhecimento do consumidor sobre preços: um exame de produtos de oito categorias de bens duráveis. Revista de Administração Mackenzie, 9(2), p. 82-103.

Scarpin, J. E. 2003. Método de formação de preço para um conjunto de produtos com o uso da regressão múltipla e da programação linear, 157p. Dissertação (Mestrado em Engenharia de Produção) – Programa de Pós-Graduação em Engenharia de Produção, Universidade Federal de Santa Catarina.

Shank, J. K. & Govindajaran, V. 1997. A revolução dos custos: como reinventar e redefinir sua estratégia de custos para vencer em mercados crescentemente competitivos. Tradução Luiz Orlando Coutinho Lemos. 8ª ed. Rio de Janeiro: Campus.

Vilela, D. L. & Santos, R. V. 2000. A contabilidade gerencial e o processo decomunicação: um estudo sobre a utilização de ferramentas de contabilidade gerencial pelas empresas de pequeno porte e pelos escritórios prestadores de serviços contábeis. In: Anais XVI Congresso Brasileiro de Contabilidade. Goiânia.

Wernke, R. 2005. Análise de Custos e preços de venda: ênfase em aplicações e casos nacionais. São Paulo: Saraiva.

Zhao, J., Tang, W. & Wei, J. 2012. Pricing decision for substitutable products with retail competition in a fuzzy environment. Int. J. Production Economics, 135, 144-153.