Influence of Economic Situation in The Sales of a Commercial Enterprise

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Abstract: In today's economy, companies need to become more efficient and competitive. However, the economic crises experienced by our country and the world bring to light the question of the degree of impact of turbulence in firms' performance, especially with regard to the behavior of sales during this period. The aim of this study is to evaluate the relationship between economic and financial crisis and the change of sales of a company in the field of refrigeration. An analysis of economic and financial crisis and its consequences for business performance is presented. The study is characterized as exploratory, using quantitative techniques. Taking as reference the company's sales from January 2001 to January 2007, and comparing them with the evolution of the economy during the same period of time, established a dependence on these variables. To obtain and confirm this relationship, we used model SARMA (p,q)x(P,Q) with intervention. The results confirmed the existence of the Influence of Economic Situation in The Sales of a Commercial Enterprise

Key words: Economic situation, Sales, Intervention model, Financial crisis.

INTRODUCTION

In the last decade, globalization has become the keyword in the global market. Companies wishing to keep at it, or even their local markets, they need first of all, analyze the situation around them and pay attention to the direction taken in the context of globalization. In this context, the sales forecast is one of the cornerstones of marketing planning.

Many important decisions are based on estimates of sales, production planning, purchase of raw materials, costs of advertising and sales promotion expenses with sales teams, and even investments in productive assets such as machinery and equipment. Thus, all planning activity requires predictions about a future fact. The better the prediction, the better the assumptions used for planning (Fogliatto and Pellegrin, 2000).

Within the planning cycle, the information of future sales stands out as a basic datum for the entire planning process, whether at the strategic or operational level. Sales are always considered as the limiting factor for any basic planning. It is the definition of future sales data that the company begins its budget plan for next year and gives grants for new operational plans for the needs of new investments and development projects of new businesses, products and branches of action. Thus, the projected demand is not restricted to a need for short term, but is required for any company's strategic planning (Penteado Filho, 1984).

However the forecast demand for our products always depend on the company's current and future economic conditions. Even for companies that, for some particular characteristic, can sell everything they produce and do not have inventory problems (therefore, the production would be the limiting factor in planning), the economic factor is uncertainty, since even selling everything what it produces, the demand may be limited by a possible slowdown in the economy (Buescu, 1985).

Thus a key variable for predicting the demand for the products of an organization is the behavior of the economy. However, the behavior of a country's economy depends on the economy of other countries. The intensity dependence of the economy of a country has in relation to other countries is varied, but it is undeniable that there is an interrelationship between the national economic situation and international economic situation (Pereira, 1996).

The relationship between instability and economic forecasting sales of companies has been identified in economic studies and strategic management. (Calvo and Mendoza, 1997) point to global economic integration, the uncertainty of investors and the volatility of capital as the main causes of business failure. (Terence, 2002) relates the drop in sales of small and medium enterprises to their difficulties of strategic planning. Combined these contributions, the sales decline and even extinction of enterprises, especially small and medium-sized, can be associated with the uncertainties arising from external shocks.

Therefore the aim of this work was to study the prediction of sales of products from a company that operates in the field of trade in parts and equipment for cooling, considering as the main variable of the
Economic analysis. The aim is to develop a study to investigate the relationship between facts and situational demands of the company's products.

**Economy, Financial Crisis and Uncertainties:**

Increased flows of people, capital and goods and services associated with the formation of economic blocs and trade, resulted in the progressive opening of the borders of national economies, culminating in the formation of a global society increasingly integrated and at the same time, more susceptible to the spread of instability in the international financial and economic system (Greenwald and Stiglitz, 2004).

For (Ahmed and Corsi, 2002) the fall of trade barriers, free movement of capital, the new wave of technological innovations and the rapid movement of information marked the beginning of a capitalist world without borders, self-regulated by markets and national states with limited economic role and turned into mere conductors of arbitration issues and local interests.

According to (Tonelli, 2001) these are the characteristics of globalization, a phenomenon socio-economic and cultural changes associated with deep. In the view of (Umeda and Hildebrand, 2004) globalization can not be regarded only as the subversion of national barriers in a more integrated society, for both the fall of trade barriers and the international movement of capital and technology are both causes and effects of this process wider, which reaches from the everyday to the macroeconomic policies of the inhabitants of large cities.

According (Fusfeld, 2001) after the second world war, the stability of the international financial system was linked to the Bretton Woods Agreements of 1945, thus providing a stable basis for international trade and investment. The author cites the freedom that the banking system was in this period for its development, through their free agency in several countries, regardless of the interference of local monetary authorities.

From the second half of the 70's, economic instability and the financial system led to the collapse of the hitherto existing patterns of intense trade and mobility of capital, ending the system of fixed exchange rates and the Bretton Woods Agreement (Stiglitz and Greenwald, 2004). In Brazil, the behavior of the economy ranged as follows (from 2001):

a) Year 2001: Terrorists throw airplanes full of passengers into the Pentagon and both towers of the World Trade Center. The buildings collapse and more than 3,000 people die;
b) Year 2002: currency crisis due to nervousness with the presidential elections. Before the elections, the climate was of concern and the economy stagnated, reflecting the exchange rate;
c) Year 2003: the first year in office, President Lula won the confidence of investors, but maintained a policy of economic austerity and high interest rates. Result: GDP shrank and unemployment rose;
d) Year 2004: the Brazilian economy grew vigorously. From January to September, GDP increased by 5.3%. To meet the domestic and foreign demand, the country opened up jobs. Unemployment fell to 10.5% of the economically active population;
e) Year 2005: the balance of the Brazilian economy was good, even with the small GDP growth of 2.3%. In the period we can highlight the economic stability and less vulnerability foreign government's concern with the whole economy. The reduction in inflation was essential for the poorest population, reducing the imbalance with a better distribution of national income;
f) Year 2006: the economy was characterized by presenting a context of low economic growth. Although the basic interest rate has fallen, the decline of the dollar inhibited export performance, penalizing some industries, especially the branches of textiles, footwear, electrical and telecommunications equipment.

The variation of the Brazilian GDP growth is primarily attributed to reflections of international crises since the country is heavily dependent on foreign capital and products from abroad.

**Methodology:**

This research is characterized as exploratory, using quantitative techniques. This condition of the exploratory research was enhanced by (Trivino, 1987; Minayo, 2001) as research from a broad investigation, from at understanding the phenomenon studied and the identification of factors that compose it.

(Gil, 1991) highlights that exploratory research is developed to provide an overview on a particular subject, theme unexplored, difficult to formulate hypotheses operationalized (Beuren; Raupp, 2003).

In this study the question to be investigated during the research is whether the economic and financial crises affect the behavior of the company's sales analysis.

**General Multiplicative Seasonal Model (SARIMA):**

The model SARIMA(p,d,q)x(P,D,Q)s process Yt verifies the equation:

\[ \phi(B) \Phi_s(B)(1 - B)^d (1 - B^p)^D Y_t = \theta(B) \Theta_s(B) v_t \]  

(1)
Where:

\[
\phi(B) = 1 - \phi_B B^2 - \phi_{2B} B^4 - \cdots - \phi_{pB} B^{2p}
\]
\[
\theta(B) = 1 - \theta_B B^2 - \theta_{2B} B^4 - \cdots - \theta_{qB} B^{2q}
\]
\[
\phi(B) = 1 - \phi_{1B} B^2 - \phi_{2B} B^4 - \cdots - \phi_{PB} B^{2p}
\]
\[
\theta(B) = 1 - \theta_{1B} B^2 - \theta_{2B} B^4 - \cdots - \theta_{QB} B^{2q}
\]

where \(e_t\) is a white noise sequence. Here, \(\Phi\), \(\Theta\), \(\phi\) and \(\theta\) are polynomial functions of degrees \(p\), \(P\), \(q\) and \(Q\) respectively. The term \((1-B)^d\) is used to eliminate polynomial trends and \((1-B)^D\) is used to eliminate seasonal patterns with the period \(s\).

Model orders are fixed by analyzing the autocorrelation and partial autocorrelation functions of time series.

**Intervention Model:**

Suppose we have a time series \(Y_1, Y_2, \ldots, Y_{n-1}, Y_n\) of \(n\) observations measured at equal time intervals. The SARMA \((p, q)(P, Q)\) interventions can be represented by equation (2), (Box and Tiao, 1975).

\[
\hat{Y}_t = \frac{\varpi(B)B^b}{\delta(B)}I_{it} + \frac{\theta(B)\Theta_s(B)}{\phi(B)\Phi_s(B)}a_t
\]  

where:

\(Y_t\) - quality characteristic under study;
\(\hat{Y}_t\) - quality characteristic estimated by the model for period \(t\);
\(\varpi(B) = \left(1 - \varpi_1B - \cdots - \varpi_p B^p\right)\), is the autoregressive polynomial of order \(p\);
\(\theta(B) = \left(1 - \theta_1B - \cdots - \theta_q B^q\right)\), is the moving average polynomial of order \(q\);
\(a_t\) - is a sequence of white noise that follows a normal distribution \(N(0, \sigma_a^2)\);
\(I_{it}\) - represents the intervention variables for \(j = 1, \ldots, k\);
\(\delta(B) = \left(\delta_0 - \delta_1B - \cdots - \delta_s B^s\right)\);
\(\varpi_i, \delta_i\) represent the effects of the intervention and represent the \(\delta_i\) permanent effects of the intervention.

**Variable Types of Intervention:**

In this work we considered the following types of intervention, based on (Box and Tiao, 1975).

i. Sept function

\[
S_i^T = \begin{cases} 
0, & t < T \\
1, & t \geq T 
\end{cases}
\]  

ii. Pulse input function

\[
P_i^T = \begin{cases} 
0, & t \neq T \\
1, & t = T 
\end{cases}
\]  

ii) Seasonal pulse function

\[
SI_{i,t}^{ST} = \begin{cases} 
0, & t \neq ST \\
1, & t = ST 
\end{cases}
\]
Criteria for selection of models:

There are several criteria for selection of templates that provide a "tradeoff" between a reduction in the sum of squared residuals and estimated a more parsimonious model. The most commonly used criteria are the AIC and BIC, whose formulas are given by:

AIC = \( T \ln (\text{sum of squared residuals}) + 2n \)

BIC = \( T \ln (\text{sum of squared residuals}) + n \ln(T) \)

where,

\( n \) = number of estimated parameters;
\( T \) = number of estimated parameters.

The ideal situation is: the smaller the AIC and BIC, the better the fit of the model. However, it is necessary to compare the AIC and BIC's model's alternative, to know which model best explains the dynamics of the series under study. Thus, the best model is one that has the smallest AIC and BIC.

Company identification:

The analyzed company is focused on the distribution of parts and refrigeration and air conditioning, founded in 1999 in the city of Caxias of Sul, Rio Grande of Sul, Brazil. With the growth of its activities in 2004 expanded its product line by importing directly with the manufacturers in the industry, presenting the market a new concept of presence in the distribution of products and components for refrigeration and air conditioning.

Arranged in an area of approximately one thousand five hundred square meters, the company has a flexible design and bold, amended so as to contribute to the ease of customers in locating merchandise and understand the operation of products, and a work climate favorable to employees.

Working in partnership with companies recognized worldwide for quality and reliability of its products, the company offers a complete line of parts and components for cooling, in various models and capacities, providing its users with the latest technology and a commitment to a relationship based on professionalism and credibility.

The main product lines serviced by the company are: compressors, copper pipes, motors, refrigerant gas, tools, measuring instruments, digital controllers and accessories that contribute to the overall efficiency of business activities in maintenance, repair and recovery equipment act with cooling.

The change in the company's revenue is primarily attributed to reflections of the country's economy, since there is no sales through exports. To verify the behavior of its sales in relation to the situation, raise the sales data monthly period January 2001 to January 2007. Figure 1 shows the seasonal pattern of sales in the period of January/2001- January/2007.

![Fig. 1: The evolution of sales from January 2001 to January 2007. Source: Company data](image-url)

Empirical Results:

To investigate whether the economic and financial crises affect the behavior of sales of the company analyzed data were used in the selling behavior of the studied during the time January 2001 to January 2007,
based on information provided by the company's commercial department. Regarding the data of Gross Domestic Product of Brazil, we performed a query from the Brazilian Institute of Geography.

**The estimated intervention model:**

A visual inspection of the Figure 1 indicates that the sales serie is stationary. So the series was differentiated and set a model SARMA \((1,1)(0,1)_{12}\), with and five without interventions.

![Graph showing annual sales](image)

**Fig. 2:** Evolution annual sales. Source: Company data.

The following is a comparison of sales performance in relation to economic events occurring during the period of analysis.

a) Year 2001: first year analysis of the company, where there is a global financial collapse due to terrorist attacks against the United States of America;

b) Year 2002: the company has developments in sales in the order of 4.50% compared to 2001. In Brazil, presidential elections cause nervousness in the market. The Brazilian GDP growth was 1.90%;

c) Year 2003: the company has developments in sales in the order of 2.70% compared to 2002. In Brazil, the economic policy adopted provides austerity in spending and high interest rates. The Brazilian GDP growth was only 0.30%;

d) Year 2004: the company has developments in sales in the order of 5.90% compared to 2003. In Brazil, the economy grew vigorously. Brazil's GDP expanded 4.90%;

e) Year 2005: the company has developments in sales in the order of 2.50% compared to 2004. In Brazil, the scenario is economic stability, less external vulnerability and control inflation. The Brazilian GDP growth was 2.30%;

f) Year 2006: the company has developments in sales in the order of 3.00% compared to 2004. In Brazil, the economy was characterized by presenting a context of low economic growth. Even with the basic interest rate falling, the decline of the dollar inhibit export performance. The Brazilian GDP growth was 2.73%.

Furthermore a comparative study was conducted to assess whether intervention analysis produces better forecasts compared with forecasts without intervention analysis.

The variation of the Brazilian GDP growth is primarily attributed to reflections of international crises since the country is heavily dependent on foreign capital and products from abroad. Figure 1 shows the variation of GDP during the years 2000 to 2007.

<table>
<thead>
<tr>
<th>Forecasting model</th>
<th>AIC</th>
<th>BIC</th>
<th>MSE</th>
<th>MAPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARMA ((1,1)(0,1)_{12})</td>
<td>0.7543</td>
<td>0.8732</td>
<td>0.7214</td>
<td>0.7214</td>
</tr>
<tr>
<td>SARMA ((1,1)(0,1)_{12}), with intervention</td>
<td>0.6432</td>
<td>0.7948</td>
<td>0.5842</td>
<td>0.5842</td>
</tr>
</tbody>
</table>

The results show that the intervention model adjust well to the sales data, and provide acceptable forecast for the period analysed with basis in the MSE and MAPE, respectively. Hence, the SARMA\((1,1)(0,1)_{12}\) with intervention model is more adequate in study the sales data.
Final Considerations:

The results of this study suggest that there is a positive correlation between crises, periods of great uncertainty and instability, and the sales performance of the company under study. These results lead to the need for further studies with respect to three lines of research: i) assess the real impact of which companies are subject in these times of crisis, ii) investigate the vision of the business enterprises of the need to produce strategic responses to events previously thought to be distant from their day-to-day, and iii) to verify the existence of a correlation between the monetary policies implemented in Brazil to boost the economy and company performance.

The results, under the management approach, also indicate that changes as the formation of strategic thinking of business should be focused on development policies, since issues such as asymmetry of information to which the market is subject, may be probable causes identified as strong impacts associated with periods of crisis and uncertainty. Thus it is possible that the benefits of a monetary policy of maintaining the traditional fundamentals of an economy are not sufficient to prevent the crisis and its impact, since these new crises and periods of uncertainty no longer rely on weaknesses of economic fundamentals.

REFERENCES