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THE EFFECTS OF THE COVID-19 PANDEMIC ON EXPLOITATIVE AND EXPLORATIVE STRATEGIES OF PHARMACEUTICAL INDUSTRIES IN BRAZIL

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ABSTRACT

The survey assesses whether changes in highly competitive market environments have led pharmaceutical companies in Brazil to adjust their corporate strategies in order to maintain or expand their performance. The study is of a theoretical-empirical type, and supported by a regression model and content analysis. Data collection applied questionnaires and interviews with managers of the pharmaceutical industries in two moments. The questionnaire referred to previous information (year 2019) and during the Covid-19 pandemic (June and December 2020). The interviews sought answers about future perspectives. As main results, the correlations between Market Turbulence, Exploitation, Exploration, Ambidexterity and Performance were positively validated, with the exception between Market Turbulence and Exploitation in 2019 and between Market Turbulence and Exploitation and also Exploration in 2019 and 2020. It is clear that companies in the pharmaceutical industry in Brazil changed their strategies to maintain or expand their performance in the face of this uncertain scenario, keeping exploration at levels similar to the previous year, but seeking balance in terms of exploitation, in the pursuit of ambidexterity, optimizing advantages of both strategies, with the mitigation of risks inherent to a turbulent scenario.

Contribution/Originality: This study contributes to the organizational ambidexterity literature in highly turbulent environments, as is the case of the Covid-19 Pandemic, as well as identifies and analyzes how the pharmaceutical industries in Brazil had to carry out their incremental and or radical innovations in the global health crisis in 2020.

1. INTRODUCTION

For many managers, when making decisions, strategic doubts arise. Among them, the main one may be to invest in new products and services or to improve existing products, services and processes (He & Wong, 2004). Thus, some authors claim that exploring (refining) and exploring (creating) products and services in a balanced way ensures organizational survival (Gibson & Birkinshaw, 2004; He & Wong, 2004). On the other hand, other researchers argue that balance, on the contrary, is very difficult to achieve, since both strategies present considerably different perspectives and approaches and compete for resources (March, 1991).

Environmental turbulence or environmental uncertainty, as Milliken (1987) and Miles, Snow, Meyer, and Coleman (1978) prefer, refer to the impossibility of foreseeing the future given a sudden event in the environment,

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either by an environmental disaster or catastrophe, or when it becomes difficult to obtain the predictability of the environment, or part of it (Milliken, 1987). A turbulent environment brings about changes in the current status quo, forcing organizations to adapt to maintain their business. Wars, financial crises, pandemics etc are examples of some environmental uncertainties. The Covid-19 pandemic that began in China at the end of 2019 placed the whole world in a sudden and unexpected way in this environment of uncertainty, forcing companies to make decisions to face the economic crisis underlying the effects of the pandemic due to restrictive measures of circulation of people and commercial activities (Nicola et al., 2020).

Pazini, Cunha, and Gimenez (2011) found that during the 2008 global economic crisis, small companies mostly choose defensive strategies, which refers to the search for security for a better assessment of the situation, to the detriment of prospective strategies, even though there was an absence of success in the perceived performance. In the opposite direction, Miles et al. (1978) state that in turbulent environments companies tend to prosper when they opt for innovations.

Despite the various studies on the subjects covered, in different situational contexts, there is still no research that addresses both exploitative and exploratory strategies in a turbulent environment caused by a worldwide pandemic. As in other countries of the world, in Brazil, the implementation of restrictive measures has generated a great impact on the economy. According to data from Brazilian Micro and Small Business Support Service (2020) most companies, from different sectors, had to interrupt their activities or change the way they work. The pharmaceutical industry started to use remote interactions, through digital platforms and promoted changes in the area of development research, the changes can be seen from the point of view of the short term, in the long term new measures will come according to the progress of the pandemic (Ayati, Saiyarsarai, & Nikfar, 2020).

In this sense and in view of the market turmoil caused by the Covid-19 pandemic, the research question arises: did the companies in the pharmaceutical industry change their strategy to maintain or expand their performance due to the Covid-19 pandemic? To answer the problem, the objective of this study is to verify whether the changes in highly competitive market environments have led the pharmaceutical industries in Brazil to adjust their corporate strategies, in order to maintain or expand their performance.

The research is theoretical-empirical, supported by a regression model and interview script. Data collection took place through the application of questionnaires and interviews with managers of the pharmaceutical industries in two moments. The questionnaire referred to previous information (year 2019) and during the Covid-19 pandemic (May and June 2020). The interviews sought answers about future perspectives.

This work demonstrates its academic importance by offering mechanisms to foster the discussion regarding relationships between constructs and variables that involve strategies in times of turbulence caused by a pandemic. In practical terms, it is known that the pharmaceutical industry showed an impressive growth in 2018 and 2019, years that moved around R$ 215.6 billion (ICTQ - Institute of Science & Technology and Quality, 2020). It is estimated that, by 2024, Brazil will assume the fifth position in the world ranking in this segment. From the figures of the ICTQ - Institute of Science and Technology and Quality (2020) the importance of the sector in the Brazilian economy is perceived, therefore, understanding how the effects of the turbulence affected the sector and understanding which strategies are being adopted to overcome the bad weather of the pandemic, can provide subsidies to public managers and private for better targeting and decision making in times of turbulence.

2. LITERATURE REVISIONS

2.1. Market Turbulence (MT)

The market turmoil affects a company in relation to the strategic deployment of resources (Wang & Ke, 2016). Being characterized by continuous changes in customers' preferences and demands, in price and cost structures and in the composition of competitors (Calantone, Garcia, & Dröge, 2003), in this sense, the concept of market turbulence applied attempts to assess the change that companies face in their sets of customers and competitors

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(market dynamism) and the difficulty of preparing the organization to deal with the new competitive scenarios (market uncertainty) (Santos-Vijande & Álvarez-González, 2007).

In this study, it is understood that the Covid-19 pandemic, an environmental turbulence, brings an underlying turbulence in the market, when due to the restrictions imposed (movement of people and commercial activities), most companies had to interrupt their activities or change how it works. Innovating was for few, except sales and online contacts (Brazilian Micro and Small Business Support Service, 2020). The surviving companies had to adapt to a reality that was not foreseen. Covid-19 is a disease caused by the Severe Acute Respiratory Syndrome coronavirus, which has had a detrimental effect on global health systems, with a ripple effect on all aspects of human life as we know (Nicola et al., 2020).

Thus, regardless of the level of market turbulence that the company faces, management must seek to maintain a continuous state of innovation in order to sustain a greater capacity to develop technical innovations and assume that the organizational management system is the main precursor of administrative innovation (Santos-Vijande & Álvarez-González, 2007). Thus, the exploitation of these opportunities becomes even more important in turbulent markets, on the other hand, the uncertainty of demand requires the adoption of more radical innovations that meet the changing needs of customers and that strengthen the company's competitive position in the market (Theodosiou, Kehagias, & Katsikea, 2012).

2.2. Exploitation, Exploration and Ambidexterity (ET, ER and AM)

The seminal article by March (1991) reports that exploitation and exploration are different learning mechanisms that compete for the company's resources, however, they need balance to guarantee the long-term sustainable maintenance of an organization. In the author's understanding, exploitation activities are focused on the refinement and efficiency of current products and services. Exploration activities are linked to the discovery and creation of new products and services. For He and Wong (2004); Goel and Jones III (2016) and Luger, Raisch, and Schimmer (2018), exploitation is related to continuous paths, routines, markets and stable technologies in order to improve existing products and services. Exploration is directed at new paths, improvisation and emerging technologies in the search for new products and services (Chen, 2017; Luger et al., 2018).

When a company seeks a way of innovation that involves both strategies, of exploitation and exploration at the same time, they are called ambidextrous (He & Wong, 2004), and some studies indicate an improvement in its organizational performance (Dhir & Dhir, 2018; Silveira-Martins, Rossetto, & Silva Añaña, 2014; Zhang, Edgar, Geare, & O'Kane, 2016). Another current reports that, when opting for a type of strategy, the company is able to act in a more specific way, which also results in improvements in performance (Cao, Gedajlovic, & Zhang, 2009; Gupta, Smith, & Shalley, 2006). In the literature on the subject, it is clear that there is a trade-off between exploring current knowledge and skills and exploring new knowledge and skills (March, 1991).

According to March (1991) when compared to the exploitation returns, the exploration returns are less certain, more distant in time and more distant from the place of action and adaptation. Therefore, what is good in the end is not always good in the short run. However, the exploitative innovation strategy presents considerably greater risks than the exploitative innovation strategy (Morgan & Berthon, 2008).

In the same sense, for an exploitative strategy, efforts can serve to reinvigorate the lifespan of a declining product or, in the same way; an exploitative innovation strategy can create a unique position and allow taking advantage of innovative products. Either way, a balance between the two is desirable that forms the basis for sustained improvements in business performance (Morgan & Berthon, 2008). Due to the proximity of the nature of exploitation and exploration, researchers began to use ambidexterity as an integral part of the concept to denote the dual orientation of a company with respect to exploitation and exploration (Cao et al., 2009).

Ambidexterity can be calculated in several was Huang, Pickernell, Battisti, Soetanto, and Huang (2020) by the product or sum of the variables of the exploitation and exploration constructs, when there is a combined perspective

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between the two strategies (Gibson & Birkinshaw, 2004; He & Wong, 2004; Junni, Sarala, Taras, & Tarba, 2013; Lubatkin, Simsek, Ling, & Veiga, 2006) or by subtracting the exploration variables by the exploiting variables, when there is a panorama of equilibrium or continuum (Cao et al., 2009; Severgnini, Galdamez, & Vieira, 2018). In this research, ambidexterity assumes a balance between the two types of activities, which allows a company to avoid or better manage the inherent risks of each activity, when one is prioritized, to the detriment of the other (Cao et al., 2009).

Choi and McNamara (2018) studied the effect of technology acquisition on ambidexterity and performance. Theodosiou et al. (2012) in a study that counted with the participation of 316 Greek bankers, proved that the market turbulence precedes the innovation orientation and the internal cost orientation. In another research, Molina-Castillo, Jimenez-Jimenez, and Munuera-Aleman (2011) confirmed the hypothesis in a survey of 197 manufacturing organizations, that the high level of market turbulence increases the positive effects of the exploration of skills in the objective quality of new products. products. Despite some studies, little is known about how companies respond when facing market turbulence and the need to fight for organizational survival (Dahlmann & Grosvold, 2017).

Therefore, the following hypotheses are presented:

H1a - The market turbulence is positively related to a company's exploitative innovation.

H1b - The market turbulence is positively related to a company's exploratory innovation.

In this sense, empirical evidence demonstrates the potential benefits of ambidexterity, but it needs a balance in exploitation and exploration, not allowing them to reach extreme limits, as well as very low levels of exploitation and exploration may not be positively related to their performance (He & Wong, 2004).

2.3. Organizational Performance (OP)

Organizational performance is a complex set, with multiple causes and dependent on internal factors and strategy (Deshpandé, Farley, & Webster, 1993). For Abubakar, Elrehail, Alatailat, and Elçi (2019), organizational performance, in its simplistic state, is the achievement of organizational objectives. To evaluate this performance, some ways are the financial benefits, profitability and organizational learning.

Likewise, organizational performance refers to a general assessment of the company's achievements in relation to the effectiveness and efficiency of its business processes (Ghasemaghaei, 2018). For a better understanding, an organization represents a group of people allocated based on responsibilities and hierarchical levels in order to achieve objectives, goals, adapting, and dealing with turbulent environments, while performance refers to the level of goal achieved by an organization or the effectiveness of individuals, groups and organizations. Performance at the individual level refers to job satisfaction, goals achieved and personal adjustment; at the group level, it refers to morale, cohesion, efficiency and productivity; at the organizational level, it refers to efficiency, productivity, absenteeism rate, turnover rate and adaptability (Masa'deh, Al-Henzab, Tarhini, & Obeidat, 2018).

Results of the work of Battaglia, Neirotti, and Paolucci (2018); Jacobs and Maritz (2020); Koriak, Lockett, Hayton, Nicolaou, and Mole (2018); Liao, Liu, and Zhang (2018); Morgan and Berthon (2008); Severgnini, Takahashi, and Abib (2019) the hypotheses related to the effect of the exploitative and exploratory innovation strategy on performance were specified as positive and significant and the exploitative-exploratory ambidextrous function was shown to be positive, despite research not validating these relationships (Cao et al., 2009; Severgnini et al., 2018).

In this context, we have the following hypotheses:

H2a - The exploitative innovation strategy is positively associated with organizational performance.

H2b - The exploratory innovation strategy is positively associated with business performance.

H3 - The ambidextrous innovation strategy is positively associated with business performance.

The proposed theoretical model is represented by Figure 1.

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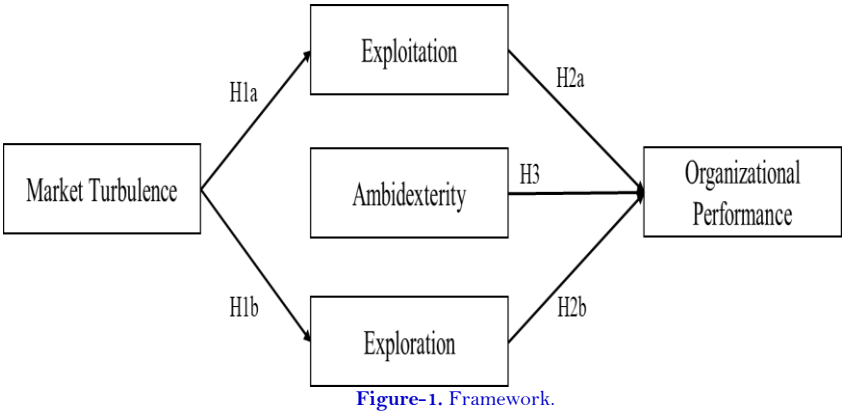

Figure-1. Framework.

The companies that achieve a better performance are those strongly oriented to the market, innovative and that have a culture of marketing, simultaneously (Deshpandé et al., 1993). On the other hand, according to Hudecheck, Sirén, Grichnik, and Wincent (2020) organizations around the world are currently facing double anxiety about how severe the coronavirus outbreak (Covid-19) will be for the economy and what companies should do to prepare.

3. METHODS

This research uses two methods. The first is a quantitative, correlational and descriptive research, which aims to answer questions related to the participants' perceptions, through field research, with data collection, through questionnaires sent by e-mail (Cooper & Schindler, 2016). The second, using a qualitative method, using the technique of interviews with representatives of the companies that are part of this study, of the semi-structured type, with pre-defined questions (Bardin, 2011).

The collection phase took place between the months of May of June 2020. For the quantitative research, the sample of 66 respondents was extracted from a universe formed by 203 companies in the pharmaceutical industry, CNAE 21.21-01-1, active in Brazil, excluding micro and small companies. The sample has a 95% confidence level, with a 10% margin of error. The sampling has non-probabilistic characteristics, as it was not surveyed at random, but because of the availability of responses (Hair, Black, Babin, Anderson, & Tatham, 2009).

3.1. Research Instrument

For data collection, we used a questionnaire containing questions about market turbulence, exploitation, exploration and organizational performance in the form of a seven-point Likert scale, with response options ranging from totally disagree to totally agree, as shown in Table 1.

With regard to issues in the current context, a nominal scale with three options was used (decreased, stable or increased). For questions related to government measures, a five-point Likert scale was also used, which varied from little to very important.

The responses to the questions on the constructs of market turbulence, exploitation, exploitation and financial performance were captured under the respondents' perception at two moments: before the effects of the Covid-19 pandemic (Dec / 2019) and present during the effects of the pandemic (May-June / 2020).

The qualitative research included a sample of ten managers, from different companies who participated in the previous stages and who made themselves available to participate in the interview. As a way of identifying them, they were called Manager 1 to Manager 10.

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Table-1. Research variables.

Construct	Variable	Question	Source
Market Turbulence (MT)	MT01	Customer preferences are constantly changing.	Jaworski and Kohli (1993)
	MT02	The company's set of customers is changed regularly.	
	MT03	The company experiences a high variation from its competitors.	
	MT04	New competitors enter the market regularly.	
Exploitation (ET)	ET01	Analyzes products and processes in search of improvements.	Morgan and Berthon (2008)
	ET02	Seeks to improve processes to reduce costs.	
	ET03	Improves processes to reduce production time.	
	ET04	Enhances the benefits of products / services through process improvements.	
Exploration (ER)	ER01	It seeks pioneering strategies for the market.	Morgan and Berthon (2008)
	ER02	Innovates in product in an aggressive and non-conservative way.	
	ER03	The company's products offer unique features that are not available in competitors' offerings.	
	ER04	The company's products are highly innovative.	
Organizational performance (OP)	OP01	The company is more successful than its competitors are.	(Kava & Didonet, 2019)
	OP02	It has better market share than competitors do.	
	OP03	The company grows faster than its competitors do.	
	OP04	The company is more profitable than its competitors are.	
	OP05	The company is more valued by the market than its competitors are.	
Current context (CC)	CC01	Considering the current moment of its production.	The authors
	CC02	Considering the current moment in the number of employees. Considering the current moment of the amount of competitors.	
	CC03		
	CC04	Considering the current moment of sales revenue.	
	CA05	Considering the current moment of offering its products.	
Government measures (GM)	GM01	Reduction of taxes and fees.	Brazilian Micro and Small Business Support Service (2020)
	GM02	Renegotiation of payment terms of taxes and fees.	
	GM03	Reduction in interest on loans.	
	GM04	Renegotiation of loan repayment terms.	
	GM05	Reduction of import rates.	

3.2. Data Analysis

For the first stage of the research, a descriptive analysis was carried out to present the profile of the respondents and to analyze the variables present in the model independently. In a second step, inferential statistics were used to verify the association between the dependent and independent variable of each relationship through simple linear regression. Linear regression analysis is a bivariate statistical technique used to predict changes in the criterion variable, based on changes in the predictor variable. The sample size meets the minimum of 50 cases and the proportionality of five cases by variables between constructs (Hair et al., 2009). The objective of simple regression is to establish a prediction between a dependent variable and an independent variable given the existence of a linear relationship between them, and in this study the relationships between the directly correlated constructs were verified, so that the analysis using simple regression satisfied the objective (Corrar, Paulo, & Dias, 2017).

The variables used in the regressions are the results of the average responses per case, for each variable of each construct. Finally, a multiple regression analysis was performed including all independent variables with the dependent variable per period (2019 and 2020) to give an idea of the weights and variables that would make up the regression equations (Hair et al., 2009).

For the third stage, the interviews had four open questions. The first two to answer gaps in the research itself and the next two on future innovation strategies, which also included a closed question, containing six options (three of exploitation and three of exploration), in which respondents were asked to indicate two strategies that,

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from their point of view, should be adopted by companies after the pandemic period, at this point, following the rule of homogeneity by Bardin (2011) considering that individuals were interviewed using e- mail and with standardized questions.

After the interviews, analyzes of the responses were made and those that were closest to the theme of the question were separated, with the excerpts of responses used at work as a way to answer the initial questions. For this, a categorization was made by responses that led to the themes of exploitation, exploration and ambidexterity. Then, the answers were analyzed and the ones closest to the proposed categories were adopted as answers to the interview questions and presented in the work (Bardin, 2011).

Thus, the triangulation between the primary data collected in two moments and the interviews was used as a strategy, which allows a more complete analysis, as it involves more than one source of information (Basso et al., 2016). Content analysis, using summaries and transcripts of the interviews, was used to link the two steps.

In the sample of the quantitative survey, three respondents were regional managers and the remainder, sixty-three, were district managers. All women who answered the questionnaire were part of the group of district managers, out of a total of 14. That is, the sample was composed of 21% women and 79% men. Regarding the nationality of the industry, 62% of the companies were multinational and 38% were national.

3.3. Pandemic Impacts on the Pharmaceutical Industry

Profound changes in health dynamics are likely to occur, leading to massive investment in disease prevention infrastructure and the accelerated digital transformation of health delivery (Nicola et al., 2020).

In this sense, changing demand, scarcity of supply, panic of purchase and stock, changes in legislation and transformation of communication and business to remote interactions through technological platforms, in addition to changes in the research and development (R&D) process can be seen as short-term impacts of COVID-19 on the health market (Ayati et al., 2020).

The situation is worrying considering that the Brazilian pharmaceutical market reached sales of R $ 215.6 billion in 2019, being the largest drug market in Latin America. The numbers are part of the Institutional Market Study of IQVIA, a global company associated with audit, technology and consultancy solutions for the healthcare market, present in Brazil since 1974 (Leonardi & Matos, 2020).

However, the pharmaceutical industry segment suggests that it is less susceptible to fluctuations in the economy, given that its products are used to restore health. This is a worldwide characteristic, which is also reflected in Brazil (Leonardi & Matos, 2020). Furthermore, COVID-19 can be seen as a great opportunity for the pharmaceutical industry, as it is expected to increase the demand for prescription drugs, vaccines and medical devices (Ayati et al., 2020).

In Nigeria, a study by Akande-Sholabi and Adebisi (2020) indicates that the investment should focus a little more to fight the fake drugs that are widely sold in the country, as well as to convince the local pharmaceutical industry in the research of herbal medicines, seen as essential for improving public health in a country rich in medicinal plants.

COVID-19 has had detrimental effects on almost all industries and business sectors in Bahrain and the pharmaceutical industry is no exception, according to Darwish, Ahmed, and Pahi (2020), one of the biggest concerns is to get the commercial representative from pharmaceutical industry with healthcare providers and other stakeholders.

4. RESULTS AND DISCUSSION

4.1. Analysis of the Current Context and Government Measures - First Stage

Considering the Covid-19 pandemic, participants were asked about the current situation of companies. According to Table 2, with respect to production, number of employees, number of competitors and product

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offerings, on average, companies remained stable. Regarding sales revenue, there is a reduction of 39.4%. It is interesting to observe a 19.7% increase in production and product offerings, to the detriment of the decrease in the number of employees and the number of competitors, by 13.6% and 15.2%, respectively. It is worth mentioning that the increase in production and the supply of products are moving in the same direction and in percentages close to sales revenue.

Table-2. Current context (Pandemic Covid-19).

Variable	Decreased	Stable	Increased
Production	18,2%	62,1%	19,7%
Regarding the number of employees	13,6%	77,3%	9,1%
Regarding the number of competitors	15,2%	83,3%	1,5%
As for sales revenue	39,4%	39,4%	21,2%
The product offer	15,2%	65,2%	19,7%

Table 3 shows what companies predominantly expected from the government before the pandemic, than they currently expect. It is observed that the reduction of import tariffs was the most important government measure in terms of expectations, before the pandemic (81.8%), followed by the reduction of taxes and fees (77.3%) and the renegotiation of the term loan payments (63.6%). In general, there was a decrease in the expectations of the industries in relation to the measures that the government could take to alleviate the companies in this difficult moment of the economy, highlighting the indifference in relation to the reduction of the interest of the loans (71.2%) and the renegotiation of the term for payment of taxes (63.6%).

Table-3. Government measures.

Variable	Expectation	2019	Expectation	2020
Reduction of taxes and fees.	Very important	77,3%	Indifferent	51,5%
Renegotiation of payment terms of taxes and fees.	Very important	60,6%	Indifferent	63,6%
Reduction in interest on loans.	Very important	56,1%	Indifferent	71,2%
Renegotiation of loan repayment terms.	Very important	63,6%	Indifferent	57,6%
Reduction of import rates.	Very important	81,8%	Indifferent	53,0%

Although there was a reduction in expectations on the part of the industries, the federal government provided a series of measures that meets expectations before the pandemic in an attempt to mitigate the effects of the pandemic. According to data from the Ministry of Economy (2020) import tariffs were reduced to zero for a series of products for medical-hospital and pharmaceutical use, mainly those used in the treatment of Covid-19, there was a temporary suspension of payments of installments of direct and indirect financing for companies, a line of low interest financing was offered to small and medium-sized companies; the Selic was reduced to a rate of 3% per year, in addition to other measures in several areas, in an attempt to safeguard the survival of companies and people.

4.2. Hypothesis Verification - Second Stage

First, the reliability analysis was performed by Cronbach's alpha, which resulted in $\alpha = 0.829$ (2019) and $\alpha = 0.893$ (2020). In both cases the values exceed the expected minimum of 0.70 (Hair et al., 2009).

In Table 4, linear regressions are presented as a way of verifying the hypotheses predicted in this research and finding the regression coefficients, with which the regression equation for the dependent variable can be estimated. The hypotheses were tested using independent regression models, which are not rivals. The Durbin-Watson values, being close to 2, meet the assumption of absence of autocorrelation. The normality test was performed with the standardized residual values, which resulted in p values > 0.05, confirming the normality of the data. As for homoscedasticity, the null hypothesis that the residues are homoscedastic was not rejected. The same verification process occurred with the multiple regressions used in this study (Corrar et al., 2017).

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Table 4 shows that the results of the first analyze refer to the first period (2019). The H1a hypothesis suggests a direct effect of market turbulence with exploitative innovation. The regression was performed and the result showed that there was no significance in the result (β = 0.064, p> 0.05), therefore, hypothesis H1a was not supported. The second hypothesis H1b proposes a direct effect of the market turbulence with exploratory innovation, which was also not confirmed (β = 0.142, p> 0.05). The results are in line with the work of Theodosiou et al. (2012) who demonstrated the significance of turbulence as an antecedent of the orientation towards innovation.

Table-4. Linear regressions – 2019.

Relationship	Hypotheses	R^2	Durbin Watson	Constant	β non-standard	P value
MT –>ET	H1a	0,091	2,136	5,523	0,064	0,467
MT –> ER	H1b	0,006	1,868	4,912	0,073	0,532
ET –> OP	H2a	0,272	1,648	2,474	0,399	0,027
ER –> OP	H2b	0,574	1,927	2,185	0,508	0,000
AM –> OP (-)	H3	0,402	1,721	5,014	0,347	0,001
AM –> OP (*)	H3	0,577	1,932	2,729	0,069	0,000
AM –> OP (+)	H3	0,570	1,946	0,543	0,778	0,000

Note: MT = Market turbulence; ET = exploitation; ER = exploration; OP = organizational performance: AM = ambidexterity.

According to Table 4, hypothesis H2a predicted that the exploitative innovation strategy is positively associated with business performance, being confirmed (β = 0.399, p <0.05) after linear regression. The H2b hypothesis, which suggested the positive relationship between exploratory innovation strategy and performance was also supported (β = 0.508, p <0.05). These results are in line with research by Battaglia et al. (2018); Jacobs and Maritz (2020); Koriak et al. (2018); Morgan and Berthon (2008); Liao et al. (2018); Severgnini et al. (2019) and Silveira-Martins et al. (2014).

Finally, hypothesis H3, which suggested the relationship between ambidexterity and performance, in this case, ambidexterity calculated by the difference between the exploration and exploitation constructs (equilibrium perspective), a direct and positive correlation with performance was supported (β = 0.347 , p <0.05), a divergent result by Cao et al. (2009) and Severgnini et al. (2018) and yet, going in the same direction as Battaglia et al. (2018); Jacobs and Maritz (2020); Koriak et al. (2018); Morgan and Berthon (2008); Liao et al. (2018); Severgnini et al. (2019) and Silveira-Martins et al. (2014).

When the product of the exploitation and exploration constructs (combined perspective) was used to form ambidexterity, the hypothesis was also confirmed (β = 0.069, p <0.05), meeting Gibson and Birkinshaw (2004), He and Wong (2004) and Junni et al. (2013) the ambidexterity model was also tested by adding the variables of the exploitation and exploration constructs (Popadiuk, 2012) also confirmed (β = 0.778, p <0.05).

The values of the regression coefficient also indicate the weight that each independent variable exerts on the dependent variable(Hair et al., 2009). Thus, it can be seen that performance is better associated with the equation model that calculates ambidexterity by the sum, followed by the model that directly relates it to exploration.

As shown in Table 5, the same analysis was performed with data for the second period (2020). The H1a hypothesis, which estimated the direct relationship of the market turbulence in the exploration innovation, was confirmed (β = 0.196 p <0.05). Regarding H1b, the hypothesis was not supported (β = 0.083, p> 0.05). The hypotheses H2a and H2b were tested (β = 0.685, p <0.05) and (β = 0.665, p <0.05) and were supported. With respect to hypothesis H3, ambidexterity, as a difference between the constructs of the explore and explore variables, was primarily supported (β = 0.635, p <0.05), as well as by the product of the explore and explore construct variables (β = 0.076, p <0.05) and by the sum of the variables of these same constructs (β = 0.858, p <0.05).

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Table-5. Linear regressions – 2020.

Relationship	Hypotheses	R^2	Durbin-Watson	Constant	β non-standard	P value
MT –> ET	H1a	0,064	1,937	4,850	0,177	0,041
MT –> ER	H1b	0,006	1,868	4,912	0,073	0,532
ET –> DE	H2a	0,261	2,218	0,632	0,722	0,000
ER –> DE	H2b	0,381	2,103	1,252	0,657	0,000
AM –> OP (-)	H3	0,104	1,861	4,873	0,481	0,008
AM –> OP (*)	H3	0,393	2,170	2,420	0,076	0,000
AM –> OP (+)	H3	0,404	2,207	0,277	0,407	0,000

Note: TM = Market turbulence; ET = exploitation; ER = exploration; OP = organizational performance: AM = ambidexterity.

The hypotheses supported in 2020 confirm the results of the works developed by Battaglia et al. (2018); Jacobs and Maritz (2020); Koriak et al. (2018); Morgan and Berthon (2008); (Liao et al., 2018); Severgnini et al. (2019) and Silveira-Martins et al. (2014) which corroborates exploration, exploitation and ambidexterity as predictors of performance.

As previously reported, the values of the regression coefficient also indicate strength, as they are associated with the independent variable and the dependent variable. Thus, it can be seen that performance is better associated with ambidexterity calculated by the sum of the variables of the exploitation and exploration constructs, followed by the model that relates it to exploitation and exploration, respectively, in very close values. Table 6 presents a comparison between the hypotheses and their results, for each period studied. When comparing the 2019 and 2020 periods, it is clear that the market turbulence did not influence the pharmaceutical segment in 2019 and, during the pandemic, it had a moderate influence on the strategy of exploitative innovation.

Tabel-6. Summary of hypotheses.

Relationship	2019			2020			Percent Change (R^2)
	R^2	β	Supported	R^2	β	Supported	
MT –> ET	0,091	0,064	NOT	0,291	0,196	YES	219,78%
MT –> ER	0,123	0,142	NOT	0,086	0,083	NOT	(30,08) %
ET –> OP	0,272	0,399	YES	0,466	0,685	YES	71,32%
ER –> OP	0,574	0,508	YES	0,652	0,665	YES	13,59%
AM –> OP (-)	0,402	0,347	YES	0,553	0,635	YES	37,56%
AM –> OP (*)	0,577	0,069	YES	0,599	0,076	YES	3,81%
AM –> OP (+)	0,570	0,570	YES	0,640	0,858	YES	12,28%

In 2020, it can be seen, in percentage terms, that the relationship between market turbulence and exploitation more than doubled in terms of explanation (219.78%) and association. Kohli and Jaworski (1990) explain that companies that operate in turbulent circumstances need to adapt to meet the rapid changes and preferences of customers in this environment of restlessness, which reflects in greater customer orientation in search of sustainable competitive advantage, as supported by Calantone et al. (2003).

Still in relation to Table 6, in the same way, Santos-Vijande and Álvarez-González (2007) and Theodosiou et al. (2012) report that the exploitative strategy in turbulent environments is important, because it awakens the company's ability to seek innovative solutions to meet customer expectations, also meeting the results of this research. Regarding performance, all the hypotheses confirmed that the strategies contributed to the performance during the pandemic, however, it is noted that the greatest percentage variation in the explanatory power involved the relationship between exploitative strategy and performance (71.32%), the which suggests some kind of relationship (not identified in this study) with the only confirmed hypothesis that involved the market turbulence, as explained above. It is interesting to note that the percentage variations in terms of explanation and association of the exploratory strategy in relation to performance were small; however, its absolute values remained among the highest levels.

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In fact, what is perceived is an elevation of the exploitative strategy towards the exploratory strategy in the search for a balance. This perspective of balancing exploitation and exploration, in times of pandemic, is represented by ambidexterity calculated by the difference between the variables of the exploitation and exploration constructs, which was really configured in this research, by presenting the second largest percentage variation in terms of explanation in terms of regarding performance (37.56%). Cao et al. (2009) state that the balance between these two concepts allows a company to avoid or better manage circumstances that hinder performance, as seen in the Covid-19 pandemic. Thus, it is perceived that it is necessary to balance new initiatives with the existing ones for the survival and prosperity of the company, as concluded by Junni et al. (2013) and March (1991).

Table 7 presents the model's multiple regression equation. The variables turbulence, exploration, exploitation and ambidexterity (sum, difference and product) were used as independent and the performance variable as dependent. There is no multicollinearity because the equations have only one predictor variable.

Table-7. Multiple linear regressions of the model.

Period	β non-standard	Independent variables	Constant	Durbin-Watson	R^2	β standardized	P Value
2019 (+)	0,508	Exploration	2,185	1,927	0,330	0,574	0,000
2019 (-)	0,508	Exploration	2,185	1,927	0,330	0,574	0,000
2019 (*)	0,069	Ambidexterity	2,729	1,932	0,333	0,577	0,000
2020 (+)	0,665	Exploration	1,227	1,965	0,425	0,652	0,000
2020 (-)	0,665	Exploration	1,227	1,965	0,425	0,652	0,000
2020 (*)	0,665	Exploration	1,227	1,965	0,425	0,652	0,000

Note: The signs next to the period represent the type of ambidexterity - sum, difference and product.

As shown in Table 7, in all equations only one independent variable remained in the model, with the exploration variable being the best predictor of organizational performance.

4.3. Interview Analysis - Third Stage

The first question of the interview referred to the results of the current context of the first stage of the survey, in which, for 65%, on average, of the respondents, related that Covid-19 did not impact the pharmaceutical industry's industrial performance in terms of production, recipes, employees, supply and competition. In view of this, respondents were asked about the reason for the stability of the pharmaceutical market during the turbulent period of the pandemic.

According to the interviewees, business continuity occurred for several reasons, mainly due to the use of continuous medication, as in the words of Manager 3: "The population continued to buy the drugs, mainly for medications for continuous use. The population was more vigilant to health in general" and Manager 8: "Need for continuity, above all, for chronic treatments. Another point is the flexibility of the call center and digital payment of receipts or their issuance". These responses were fundamental to understand the results of stability in the pharmaceutical segment found in the first stage, even in adverse times.

The second question of the research was related to the results of the expectations of the governmental measures related to the first stage. According to respondents, compared to 2019, on average, 69% of respondents considered government measures important or very important, however, with the advent of the pandemic, 60% of respondents indicated that the expectations of government measures were indifferent or not important. Given the above, respondents were asked why this change in expectation.

Manager 10 reported that the cause of the change was "Credibility in government actions (at the federal and governmental levels)" or, according to Manager 3: "I believe that the level of uncertainty is very high, due to the uncertain future of the economy. However, I consider governmental actions to be important for strengthening the sector". Managers 6 and 7 disagreed with the survey data. The conflicting answers illustrate the complexity of the subject's perception. Perhaps, the reduction in expectation is due to the fact that, however beneficial a governmental

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measure may be, it will not be able to restore normality in terms of the market, while the pandemic lasts, but only mitigate some effects, as the Covid-19 affected two major pillars of modern society, the health of individuals and the economy as a whole, decreasing people's income and purchasing power.

The third question of the interview asked whether, after the end of the pandemic, when the market starts to return to normality, the pharmaceutical industries will act in a way that they start to seek improvements in the dissemination of existing products, cost reduction, improvement in processes and or will seek new market segments, new indications and uses for existing products, new alternatives for dissemination and greater aggressiveness to conquer the market.

For Manager 1, the answer was: "Today what we have to learn and which should be incorporated into the dissemination routines is the so-called 'remote visit' of representatives of the pharmaceutical industry to OPctors". In the same vein, for Manager 10: "Constant improvements in disclosure as it understands that it is the fastest way to minimize impacts on sales".

From Manager 2, the following answer was obtained: "Cost reduction is always an objective. With the pandemic, we are closer and more agile in the exchange of information. I believe that we will OP many courses and trainings in a virtual way". Cost reduction is also part of Manager 5's response. As for Manager 3, "I believe there will be a mix: New alternatives are already a reality and there is no turning back. Ex.: expansion of virtual contacts to minimize costs". A combination of the two was also Manager 9's response.

In general, there are among the answers about the strategies: 50% exploitation, 30% ambidexterity and 20% exploitation. These responses are based on what was observed in the first stage of the research, which showed the escalation of the exploitative strategy in times of pandemic.

The fourth question asked whether, at the end of this turbulent period, in the experience as a manager, the pharmaceutical industries would seek managers who act to meet short-term goals, with the service to customers with existing products and or managers who learn new skills and knowledge that are adaptable to the renewal of products or services.

Manager 7 replied: "I totally agree, adaptability, unlearning, relearning, technological skills". In the same sense were the responses of Managers 2, 5, 6 and 8. For Manager 1: "I believe that the focus of management will increasingly be focused on people and the incorporation of technological improvements in the dissemination of medicines. I believe that none will work in isolation". In the words of Manager 10: "They will look for managers who act in the fulfillment of short-term goals, through a scenario that is the same for all companies".

The last question asked the respondent to indicate two actions that, in his perception, will be the focus for the future of the pharmaceutical industry. These actions were based on the work of Auh and Menguc (2005) and were used to measure exploitation and exploration strategies. Table 8 shows the results obtained.

Table-8. Third stage data.

Question	Strategy	N	%
Modernization and automation of production processes.	Exploitation	0	0,0
Efforts to achieve economies of scale.	Exploitation	1	5,0
Increase the capacity to use existing resources.	Exploitation	5	25,0
Development of new manufacturing, distribution and or sales processes.	Exploration	3	15,0
Investment in research for the development of new products.	Exploration	6	30,0
Innovation of 4 Ps marketing techniques.	Exploration	5	25,0

It is noticed that the highest percentage in terms of action to be implemented was with an action that reflects exploratory strategy (30%), followed by two actions, in equal values (25%) (exploitative and exploratory), which each represent , a type of strategy. In terms of percentages accumulated by each type of strategy, it can be seen that the highest percentage values are distributed in exploration strategies (70%). The results show that they are on the same path as the first stage of the research, that is, panoramas focused on the exploratory and ambidextrous

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strategy. The percentage of exploitative strategy in moderate percentages reflects the tendency towards ambidexterity in times of turbulence.

As shown, it is clear that the content analyzes of the second stage, confirmed almost entirely and explained, as far as possible, the results and gaps found in the first stage of the study, respectively.

Among the limitations of this research, it is highlighted the impossibility of evaluating the structural model, due to the small number of respondents, so the study focused only on the theoretical model and its relationships between variables.

5. CONCLUSION

The pharmaceutical industry, according to the ICTQ - Institute of Science and Technology and Quality (2020) is a segment that invests more in research and development in the world, surpassing the sectors of automobiles, hardware and software, in addition to being less susceptible to fluctuations in the economy, because its products are used for the restoration of health. The high investments are justified by constant innovation and the need for new therapies, due to the chronic and complex diseases, inherent to the aging of the population.

From the results presented, one can empirically verify each of the hypotheses of the theoretical model presented at two different times. The interviews that involved the qualitative part of the work were essential to better understand the results of the quantitative part.

This triangulation of methods was essential to answer the research question and conclude that the companies of the pharmaceutical industry in Brazil changed their strategies to maintain or expand their performance in the face of this uncertain scenario, keeping the exploration at levels similar to the previous year, but seeking balance in terms of exploitation, in the pursuit of ambidexterity, optimizing the advantages of both strategies and joining forces to improve products and services with the mitigation of risks inherent to a turbulent scenario.

It is suggested that further studies be carried out applying the same theoretical model to a probabilistic sample more representative of the population, in order to verify the structural model, as well as to analyze the mediating impact of the exploitative strategy between market turbulence and performance. Although the pandemic is still ongoing and its consequences remains to be seen, studies involving future scenarios, with more long-term goals could offer subsidies for a better understanding and adequacy of strategies that involve exploitation, exploration and ambidexterity in tortuous environments.

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