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REGIONAL SUPPLY CHAINS FOR THE PRODUCTION OF PROTECTIVE MASKS FOR COPING IN THE POST-COVID WORLD

CADEIAS DE SUPRIMENTOS REGIONAIS PARA A PRODUÇÃO DE MÁSCARAS PROTETORAS PARA ENFRENTAMENTO NO MUNDO PÓS-COVID

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Abstract

This paper aims to develop a short supply chain for the local production of protective masks for the population in different regions of Brazil, in view of the scarcity of resources on the market in pandemic contexts. Regarding the methodological procedures, the research was classified as applied in nature, with a qualitative approach and as for the exploratory objective because it plans at this time of the pandemic, of COVID-19 to present an emergency supply chain that has not yet been properly mapped. Regarding the data, secondary data related to suppliers in the supply chain and potential manufacturers of masks were used in the Central Business Register of the Brazilian Institute of Geography and Statistics (IBGE). The information on the productive arrangements in the clothing sector was obtained through a search on the Google search site. As a result, this paper identified the existence of potential complete supply chains in the Southeast and South regions, as well as pointed out the need to develop some links in the chain in other regions of the country, in order to guarantee supply in pandemic periods. In the post pandemic period, it is necessary to use policies to stimulate the development of suppliers of the masks supply chain, especially in the North, Northeast and Midwest regions of Brazil in order to enable the prompt production of articles by the installed capacity of the region.

Keywords: Supply chain. Pandemic. COVID-19. Masks.

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Resumo

Este artigo possui como objetivo uma proposta de desenvolvimento de uma cadeia de suprimentos curta para a produção local de máscaras de proteção para a população nas diferentes regiões do Brasil, tendo em vista a escassez do recurso no mercado em contextos pandêmicos. Com relação aos procedimentos metodológicos, a pesquisa foi classificada como de natureza aplicada, de abordagem qualitativa e quanto ao objetivo exploratória pois planeja neste momento de pandemia, do COVID-19, apresentar uma cadeia de suprimentos emergencial que ainda não foi devidamente mapeada. Com relação aos dados, foram utilizados dados secundários relacionados aos fornecedores da cadeia de suprimentos e os potenciais fabricantes das máscaras no Cadastro Central de Empresas do Instituto Brasileiro de Geografia e Estatística (IBGE). As informações dos arranjos produtivos do setor de confecção foram obtidas através de pesquisa no site de buscas Google. Como resultado, este artigo identificou a existência de potenciais cadeias de suprimentos completas nas regiões Sudeste e Sul, bem como apontou a necessidade de desenvolvimento de alguns elos da cadeia nas demais regiões do país, de forma a garantir o suprimento em períodos pandêmicos. No período posterior a pandemia faz-se necessária a utilização de políticas de estímulo ao desenvolvimento de fornecedores da cadeia de suprimentos de máscaras sobretudo nas regiões Norte, Nordeste e Centro Oeste do Brasil de forma a possibilitar a pronta produção de artigos pela capacidade instalada da região.

Palavras-chave: Cadeia de suprimentos. Pandemia. COVID-19. Máscaras.

Introduction

The outbreak of the new Coronavirus (COVID-19), was declared by the World Health Organization (WHO) as a pandemic in March 2020, being instituted as a Public Health Emergency of International Importance, considered thus, because it is an event that can generate public health risk, due to the high level of spread of the disease internationally. COVID-19 is a new respiratory disease caused by Severe Acute Respiratory Syndrome of Coronavirus 2 (SARS-COV-2).

Due to the high level of spread of COVID-19, some health measures are recommended in order to reduce the spread of the virus. According to the Pan American Health Organization (2020), some of the recommendations were provided by the World Health Organization, which are: wash hands regularly, avoid approaching and shaking hands, cover your mouth and nose when coughing or sneezing, keep your distance of at least one meter of people, avoid touching eyes, nose and mouth.

With widespread fear of what was being seen in China, people unbridledly sought surgical masks as a means of protecting against infection. Masks really have this purpose, they block the particles and droplets expelled by coughing or sneezing. However, the recommendations for the use of surgical and respiratory masks (N95) emphasized that they should be used only by people with symptoms of COVID-19 and by health professionals (WHO, 2020).

However, many individuals stocked masks at home, contributing to the lack of this item for hospital use. It is worth mentioning that the masks, whether surgical or N95, are part of the use of the group of Personal Protective Equipment (PPE) used by health professionals, forming part of the "COVID-19 Package", which is composed of masks, caps, glasses, apron and gloves. Of this package only the glasses and the respirator (Mask N95 or PFF2) can be reused after being sanitized. The rest must be discarded at the end of each care given to an infected patient. Unrestrained purchase contributed to the scarcity of masks in the market, compromising the use by health professionals (SECAD, 2020).

In this sense, Lister et al. (2020) described that the Coronavirus pandemic triggered a global dispute for health PPE in the world. The drastic reduction in stocks of PPE in several countries that were affected by the pandemic and the expansion of domestic demand led some countries to retain this type of cargo, while this carried out some logistical process and in their territory. According to the aforementioned authors, the acquisition of masks and other equipment has been a real war so that the supply chain is not broken.

The Brazilian scenario is not very different from that found in other countries. Brazil is also in the struggle to acquire essential supplies to combat COVID-19. The heated demand and delayed deliveries have caused stocks to be sold to the highest bidder, reports the Brazilian Minister of Health, who points out that this scarcity in the market only shows how many countries are dependent on externally produced PPE (LINDNER, 2020).

According to Alderman (2020), China produces about half of the facial health masks in the world, which are approximately 20 million a day, or more than 7 billion a year. As global dissemination grows, this dependence compromises the supply chain, mainly due to the fact that many countries are restricting exports of protective equipment, which only exacerbates the situation of the pandemic in the world.

For Mandel (2020), the impact of the pandemic on the economy has been very strong, it is as if a puzzle was shuffled and its attempt at assembly was made in a new form. However, the author believes that the US economy needs shorter supply chains, in order to allow for quicker reactions in crisis situations. And that this inability to generate PPE, months after the pandemic started, is unacceptable.

This scenario mentioned by the author is experienced by countless countries. Brazil can also be framed in this situation of the need to develop shorter supply chains, as a means of avoiding such a sudden break in the PPE supply chain, as has been happening in this calamity scenario that the country has been facing at the moment. Given the context presented, the present study aims to map short supply chains for the local production of masks for general use of the population as an answer to the problem in the post-COVID-19 world.

With the study, it is expected to identify possible regional market niches for policy actions to stimulate the development of suppliers of the masks supply chain in the post-crisis. In this way, this work was structured in five sections. This section sought to present the introduction of the paper, highlighting the context of the problem and the objective of the research. The second section presented the literature review with the important concepts for the elaboration of the research. The third section brought the methodology, with the technical characteristics for the elaboration of the research. The fourth section presented the results of the research. Finally, the fifth section reported the conclusion of the research.

Literature review

This section presents the main concepts that guide the development of this research, namely, global supply chain X local supply chain and medical hospital supply chains.

Global supply chain X Local supply chain

The supply chain is responsible for all activities that are linked to the flow (of materials and information) and the transformation of finished products from the raw material stage to the end user (BALLOU, 2006). In this way, supply chain management is conceptualized as the integrated coordination of all strategic and tactical areas of the organization and throughout the business within the scope of the supply chain. Thus, the supply chain aims to deliver the right product, to the right place, at the right time, in the desired conditions and giving the best contribution to the company (BOWERSOX et al., 2014).

In this sense, two characteristics that stand out in supply chain management are being of a local nature and of a global nature (SCHMIDT; WILHELM, 2000; VIDAL; GOETSCHALCKX, 2001). Although both characteristics deal with economic, social and productive factors, it is clear that managing a global supply chain is much more complex than managing a local chain, since the global supply chain involves specific rules of foreign trade, in addition to wide international competition (VISENTINI; BORENSTEIN, 2014). The local supply chain aims to supply the domestic market in a single country (VIDAL; GOETSCHALCKX, 1997).

Cappelli and Cini (2020) analyze the relevance of global and local supply chains for food production in the European Union. In most industrialized countries, trade and logistical management of food products have a global character, local supply chains are unable to be part of global markets, due to lower productivity and higher costs, with local production being focused only on specific customer niches. However, in a pandemic situation they become very relevant.

Ivanov (2020) states that epidemic outbreaks are a special case of risk for the supply chain, which is characterized by the existence of a supply interruption and propagation of the interruption (cascade effect) and high uncertainty in the global supply chains. Taherian (2020) comments that due to COVID-19 companies are rethinking their supply chain, and as an alternative are rapidly changing global supply chains to local and lean and efficient to flexible and risk-proof. For the author, this change may mean making supply chains less efficient, but more resilient.

Medical hospital supply chains

When it comes to health services provided by hospitals, the supply chain is even more complex, since hospitals need to provide human resources, equipment, beds, materials, devices, medicines, food, cleaning, information technology, physical headquarters, vehicles among others for diagnosing and treating their patients (VECINA NETO; MALIK, 2007).

In this way, the main challenge of managing the hospital supply chain is to provide sufficient resources to supply demand, in partnership with its buyers, producers and service providers (SOUZA et al., 2006). The literature presents some initiatives for the optimization of results in supply chains around the world, as shown in Table 1.

Table 1: Improvements in the supply chain of medical and hospital supplies

Reference	Research objective	Results
Lin et al. (2020)	Packaging of vaccines in the supply chain	The participation of the Hospital influenced the choice of distributor for cold transport
Guerriero et al. (2020)	Defining hospital inventory strategies	The use of mathematical models for control increases the efficiency of the supply chain
Hamdan and Diabat (2020)	Blood supply management in hospitals	Model for mobilizing and distributing blood quickly in times of disaster

Source: The authors (2020)

According to Kapadia (2020), COVID-19 has been pressuring companies to reevaluate distant supply chains. Even the United States must accelerate this change, as a means of increasing the country's self-sufficiency, mainly in technological products. According to the author, the US Congress has evaluated a series of proposals, among them, the local production of critical goods, such as ingredients for medicines and medical supplies. The same author states that Brazil could be an alternative for other countries, and that even with the 30% drop in the Real (R$), the country has a strong attraction for the production of materials for other countries. Despite this statement, the author says that Brazil would not be the main supplier of American companies but would be an alternative.

Methodology

As for its nature, this research can be characterized as applied research as it generates knowledge for practical applications aimed at solving problems related to short supply chains for the local production of masks for general use of the population as an answer to the problem in the world post-COVID-19 (GIL, 2002). As for the approach to research, according to Merriam (1998), research is qualitative when it tries to assimilate what people produce throughout their existence, through personal moments and also about what they perceive about the world.

The research can be characterized as exploratory, as it plans in this pandemic moment for COVID-19 to present an emergency supply chain that has not yet been properly mapped (CASARIN; CASARIN, 2012). Marconi and Lakatos (2017) claim that exploratory research is of relevance when one has a very vague notion of the research problem.

The specifications of the masks to be used by health professionals in the pandemic have technical specifications, Note Guideline 03/2020 of the Paraná State Department of Health (2020), states that a surgical mask must be made of non-woven material, with an internal and external layer of a filter element according to the Brazilian Association of Technical Standards (ABNT), the standards NBR 15052: 2004 and NBR 14873: 2002.

Given the unavailability of supplies on the international market for such items, the Brazilian Ministry of Health in information note No. 3/2020-CGGAP/DESF/SAPS/MS has recommended that the population manufacture and use homemade masks for their individual protection, and reduce pressure on the demand for surgical masks that are currently restricted to use by health and public safety professionals (MINISTÉRIO DA SAÚDE, 2020).

In several regions of Brazil, state authorities have presented reference standards for the emergency manufacture of masks for general use by the population. In the State of Pernambuco, the

Center for the Management of the Textile and Clothing Chain of Pernambuco (NTCPE), in partnership with the state government, developed a Technical Sheet for making a three-layer fabric mask made on a sewing machine, aimed at protecting the general population, these masks were not indicated for the use of health professionals (NTCPE, 2020).

Among the indications provided in the Technical Sheet for the pattern of facial masks, the type of fabric used stands out (16 cm of cotton mesh in white 30 mercerized - 100% cotton and 16 cm of cotton cloth in white color without fluff - 100% cotton), trims (54 cm elastic from 0.5 to 0.7 cm - 100% polyester), packaging and composition label. The technical sheet also presented aspects related to the size grid in relation to the cut that varies from P to XG, to the mask template for each type of fabric, the type of sewing machine (Overlock needle n. 10, manual and straight needle n. 11) and the step by step process of making the mask (NTCPE, 2020). This paper uses this pattern as a reference for building a supply network of masks for use by the general population.

The research makes use of secondary data, the information of the suppliers of the supply chain, as well as, of the potential manufacturers of the masks (companies of confection of garments and accessories) were obtained in the Central Register of Companies of the Brazilian Institute of Geography and Statistics (IBGE). The information on the productive arrangements in the clothing sector was obtained through a search on the Google search site using the following descriptors: clothing APL, textile APL, clothing cluster, textile cluster, fashion industry, clothing sector and textile industry. The population contingent information was obtained from IBGE.

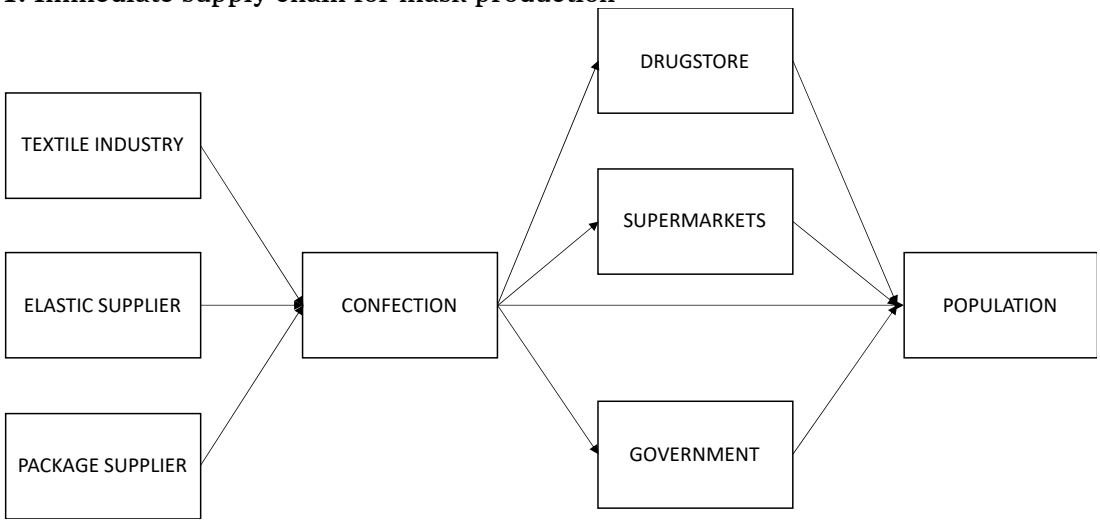
Results

Given the proliferation of Coronavirus contagion around the world, a race has started to obtain the materials needed to provide health services. Given the concentration of world production in some Asian countries, challenges related to economic and logistical power have hindered the access of poorer countries to an adequate supply of such materials.

Thus, this research outlines the components of an internal supply chain for the local production of masks for the population, based on the specifications of the Technical Sheet prepared by NTCPE and the government of the State of Pernambuco. Such a chain is shown in Figure 1.

The company that focuses on this chain is the clothing company. On the supply side, the suppliers of the following components are considered: knitwear (100% cotton), tricoline (100% cotton), cotton cloth or flannel (50% cotton and 50% polyester), elastic (100% polyester), sewing thread and packaging. On the distribution side, the supply chain uses first-tier suppliers: drugstore, supermarkets and the government (government action is taken in purchasing masks for use during the provision of public services except for health and distribution to segments of the population with vulnerable situation). The chain also considers the possibility of direct sales to the final consumer through e-commerce.

Figure 1: Immediate supply chain for mask production



Source: The authors (2020)

Production and demand in 2019

According to the Brazilian Association of the Medical and Dental Articles and Equipment Industry, Brazilian exports of medical, dental and hospital articles and equipment in 2018 represented R$ 679.19 million, while imports in the same period totaled R$ 4.36 billion, which corresponded to a deficit of R$ 3.68 billion (ABIMO, 2020). Especially the consumables segment, in which surgical masks are inserted, the focus of this research, in 2018 exports represented R $ 338.71 million and imports R $ 1186.01 billion, resulting in a deficit of R$ 847.3 million, which represents 23% of the sector's total deficit.

In 2019, according to the IBGE Annual Industrial Survey, 148.1 million non-woven artifacts for safety and protection (caps, protective masks, etc.) were produced in Brazil, which represented revenue of R$ 115.7 million. In the beginning of 2020 with the worsening of the pandemic and arrival in the country, the demand for such resources grew in a proportion greater than the production and import capacity, causing a rush to the establishments that generated a shortage of items (IBGE, 2019).

Such supply limit associated with new recommendations for the use of cloth masks has given rise to a potential demand for the products. However, official statistics on the production of fabric protection masks, according to the various models indicated by the Ministry of Health to be used in the context of COVID-19, were scarce at the beginning of the pandemic, considering that the use of such items until few months ago it was not common.

Given the need for general and unrestricted use of fabric protection masks, it is considered that the entire population of the country corresponds the potential demand for the items. According to IBGE (2020), the population of Brazil is about 209 million people. When considering that cloth masks can be washed and reused, the average consumption of two masks per inhabitant is considered, which totals a potential demand of 418 million masks.

Supply chain for mask production

From the group of material requirements necessary to make the masks for general use of the population, the number of potential suppliers in the country was raised, according to the Central Register of Companies of IBGE (2020), such information refers to the year 2018 and are organized by type of material and region of the company are shown in Table 2.

Table 2: Supplier mapping

Material/Industry	Midwest		North		Northeast		Southeast		South		Brazil
	n	%	n	%	n	%	n	%	n	%	n
Cotton, tricoline, moletim or flannel	19	2.0%	7	0.7%	101	10.8%	507	54.2%	302	32.3%	936
Elastic or textile artifact	366	6.3%	64	1.1%	939	16.0%	2914	49.8%	1571	26.8%	5854
Textile fiber preparation / spinning (spinning)	120	4.3%	21	0.8%	344	12.4%	1078	39.0%	1204	43.5%	2767
Packaging / manufacture of paper packaging (cardboard)	76	3.5%	33	1.5%	224	10.3%	1216	55.8%	631	28.9%	2180

Source: The authors (2020)

In relation to the producer's direct suppliers (first layer), the supply originating from the textile industry, refers to the supply of flat fabrics (cotton, tricoline, moletim and flannel) through weaving. According to Table 2, there is a greater concentration of these companies in the Southeast and South regions, 86.5% of the total companies. A similar pattern can be observed in the other items, the Southeast and South regions concentrate elastic 76.6%, lines 82.5% and packaging 84.7%.

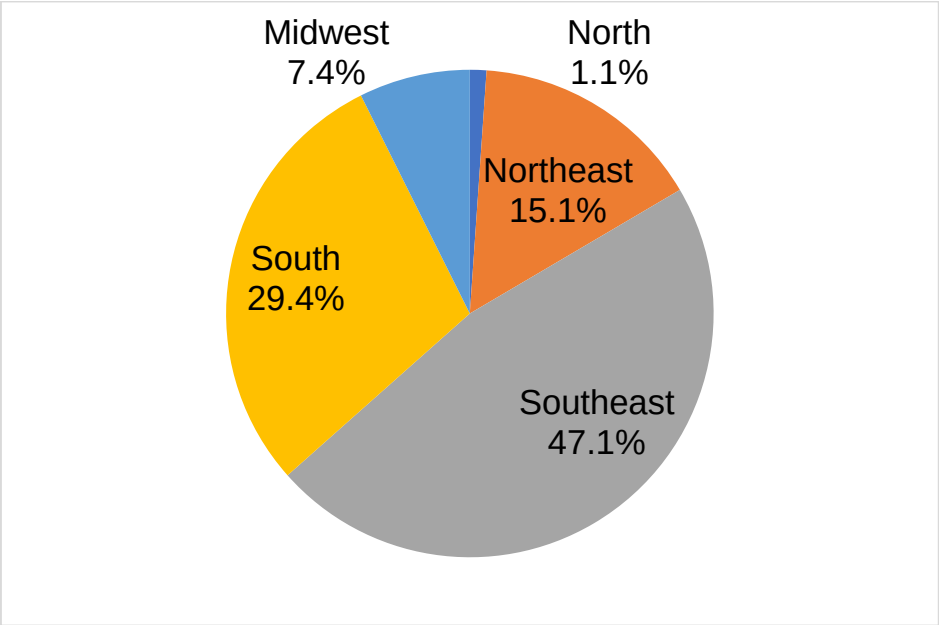
In relation to second-tier suppliers in the supply chain of the textile industry considered for the production of masks, cotton is the main raw material, at this level of supply there is sufficient supply in the country, as Brazil is the fifth largest producer of cotton, with a crop of 2.7 million tons

in 2019. Cotton is the fourth most important agricultural commodity in the Brazilian economy (EMBRAPA, 2019).

Regional distribution of producers and productive arrangements

According to the Central Register of Companies of IBGE (2018), Brazil has 54,448 companies that manufacture clothing and accessories. The Southeast regions stand out with 47.1%, and the South 29.3% of the total companies. The Northeast regions followed by 15.1% and the Midwest 7.5% of the total of companies. Finally, there is the North region with approximately 1.1% of companies in the country that operate in the segment.

Figure 2: Regional distribution of producers of clothing and accessories



Source: The authors (2020)

Thus, there is a concentration of organizations, 76.4% in two regions, while in other regions the presence of companies producing the clothing sector is extremely limited, which reduces the capacity of a local response to a demand for masks cloth in endemic or epidemic contexts. Table 3 shows the mapping of suppliers taking into account the total clothing, population and Population/Companies.

Table 3: Supplier mapping by region

Region	Total clothing	Population (thousand)	Population/Companies
North	587	18113	30856.9
Northeast	8241	56926	6907.7
Southeast	25629	88350	3447.3
South	15967	29932	1874.6
Midwest	4024	16172	4018.9
Brazil	54448	209498	3847.7

Source: The authors (2020)

When considering the inhabitants ratio by number of confections, it appears that in the country in general there is a total of 3847.7 inhabitants for each company. However, this relationship can vary considerably between regions. In the southern region of the country there are 1874.6 people for each company, in turn, in the northern region, the number of inhabitants for a single producer is eight times higher than the national average (30856.9). This reinforces the scarcity of local supply capacity.

An important feature of clothing production in the country is the agglomeration of groups of companies in specific regions, the local production arrangements. Brazil has important local

production arrangements for textile manufacture, among which the ones located in the states of São Paulo, Paraná and Santa Catarina stand out, which concentrate 57% of all production (SEBRAE, 2003). Table 4 illustrates this fact, the concentration of the number of clothing in the states of São Paulo (26.8%), Santa Catarina (14.8%) and Paraná (9%), also highlights the potential for local arrangements in the states from Minas Gerais, Rio de Janeiro, Goiás, Rio Grande do Sul, Ceará and Pernambuco.

Table 4: Productive potential by State

State	Manufacture of clothing items and accessories	
	n	(%)
Rondônia	133	0,2%
Acre	35	0,1%
Amazonas	79	0,1%
Roraima	22	0,0%
Pará	214	0,4%
Amapá	30	0,1%
Tocantins	74	0,1%
Maranhão	243	0,4%
Piauí	370	0,7%
Ceará	2871	5,3%
Rio Grande do Norte	467	0,9%
Paraíba	293	0,5%
Pernambuco	2611	4,8%
Alagoas	161	0,3%
Sergipe	156	0,3%
Bahia	1069	2,0%
Minas Gerais	6470	11,9%
Espírito Santo	960	1,8%
Rio de Janeiro	3629	6,7%
São Paulo	14570	26,8%
Paraná	4874	9,0%
Santa Catarina	8041	14,8%
Rio Grande do Sul	3052	5,6%
Mato Grosso do Sul	247	0,5%
Mato Grosso	244	0,4%
Goiás	3245	6,0%
Distrito Federal	288	0,5%

Source: The authors (2020)

According to Bettoni (2016), in the state of São Paulo, the region of the Textile Pole stands out, in the metropolitan region of Campinas, including the municipalities of Americana, Nova Odessa, Hortolândia, Santa Bárbara d'Oeste and Sumaré. The Blumenau Spinning and Weaving and Clothing Industry Union (SINTEX) is made up of businessmen from the textile and clothing industry, on a territorial basis that covers 18 municipalities in the Itajaí Valley, including Blumenau, Indaial, Jaraguá do Sul, Pomerode and Gaspar (SINTEX, 2020). The state of Paraná, in the northwest of the state, such as Maringá, Cianorte and Londrina, are part of the textile hub (BUSINESS BUSINESS RPC, 2017).

At least 10 states and the Federal District have adopted the use of the mask as mandatory and despite the mandatory use, many people are still not using it (for not having access to the mask or because they simply do not want to). In this way, the role of the State in crisis management is to encourage use, providing a mask for the population and controlling its use. And in order to face the crisis, short-term public policies were created, whose actions aimed to supply the absence of the product in the market. As reported in Jornal do Comércio (2020), the Government of the State of

Pernambuco in partnership with the Textile and Clothing Chain Management Unit (NTCPE), the body responsible for implementing public policies for the sector, contributed technical material to the hub textile from Agreste do Estado, which is made up of the cities of Caruaru, Santa Cruz do Capibaribe and Toritama to produce PPE's, as well as supporting the creation of the virtual store "Masks for all", where fabric masks with a conformity standard recognized by the NTCPE, whose quality seal issued by the agency was acquired by 100 micro and small companies.

The Government of the State of Ceará according to Brasil (2020) took as a measure of economic incentive to companies in the textile sector of the 8 macro-regions of the State, the creation of the "Todos com mascaras" project, which was launched in April 2020 through the public notice acquisition of 1.5 million masks, in order to guarantee the manufacture of masks to be distributed as a means of reducing dissemination and at the same time generating employment and income throughout the State of Ceará. Other states have also had specific policies to combat COVID-19. It is worth noting that these short-term public policies created by the municipal governments of the aforementioned states do not guarantee a way out of the post-crisis, in reality, nor does there exist public policies that will be able to bridge this gap in the future.

Thus, it is clear that given the deficit in the productive capacity of masks in the country and the growth in demand, the configuration of the masks production supply chain in the pre-crisis, the global production chain cannot meet the needs of the population, therefore, the configuration of a short production chain for contingency or emergency situations is essential for the management of public health crises such as COVID-19.

Such a short supply chain configuration involves the need to provide greater capillarity to the supply chain, given the lower potential to meet demand in some regions, such as the northern region. In the current format, the emergency mask production chains that have emerged throughout Brazil are extremely unequal, if there is much availability of inputs and producers for supply chains in the South and Southeast regions, such productive capacity is extremely modest in the North Region of Brazil so that the response time to demand is slower and there is a greater dependence on resources from other regions, which can become extremely serious in a context of drastic restriction of locomotion.

Conclusions

Due to the outbreak caused by COVID-19, countries have faced a scenario of extreme difficulty in the acquisition of PPE. As the spread increases, more countries will suffer from the pandemic, consequently, the search for basic inputs to contain COVID-19 will increase in the global market, making the supply crisis much more serious, where the disruption of the supply chain will be inevitable at some point. This supply crisis evidenced in the world, has only proven that the centralization of the production of PPE in other countries, as in China for example, has generated serious problems in the fight against the disease in the world.

In view of this scenario, it is clear that the interdependence between nations is enormous, and that a crisis in one continent causes serious damage to the others. In this way, developing alternative and local supply channels can assist in managing a pandemic as evidenced at this time. If we analyze the production of masks, one of the items in the COVID-19 Package that are used as a barrier to contamination, its scarcity in the market could be minimized, by stimulating local production as the study itself proposes, that a supply chain be created masks with local production, as a way to alleviate this problem.

This research corroborates the need to encourage the organization of short supply chains (local) that promote the production of resources that meet the needs of the population in the different regions of Brazil, precisely because they understand that in a continental country like Brazil, divergences between the productive capacity of the different regions are enormous. With this, the research shows the existence of productive capacity, as well as evidencing the need to optimize the logistics network so that the production of the main producing centers is transported quickly to other regions.

In the period after the pandemic, it is necessary to create and use policies to encourage the development of masks supply chain suppliers, especially in the North, Northeast and Midwest regions of Brazil, in order to enable the prompt production of articles by the installed capacity. Of region. Suppliers of fabrics and related articles (trims) from regions with less tradition in the segment should receive tax and extra-tax incentives in order to remain competitive and in operation, as such organizations are fundamental to the success of a policy that requires the massive use of

masks by the population. The actions seen by the State Governments in this period of crisis were short-term policies, in order to mitigate the impacts generated by COVID-19 in the sector, trying to minimize the spread of the virus through the local production of tissue masks, as a means of supply the market.

It is also worth noting that stimulus should not be given only to the production of masks but to other components of the hospital supply chain that are considered strategic (difficult to access or concentrated in a small number of suppliers), as well as, the state can provide incentives for the development of organizations in this chain in different regions of Brazil, that is, greater decentralized productive capacity.

In this way, the local production of masks has the potential to provide a quick alternative, in the face of scarcity in the global market, considering the drastic reduction in inventories in the health sector and retail, as well as representing a way of heating the local economy in a recessionary scenario.

The configuration of a supply chain and local production corroborate the strategy recommended by WHO for the massive use of masks by the population, as a way of reducing the potential for transmission and individual protection. The widespread use of such resources tends to dilute the level of contamination of COVID-19 over time, in order to spread the demand for health services over a longer time horizon, in order to avoid excessive demand and collapse health system.

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