

 INNOVATION IN TIMES OF A PANDEMIC: THE CASE OF A  
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### ABSTRACT

**Objective of the study:** Highlight the innovations achieved in the pandemic period by a transformation industry that supplies products for civil construction.

**Originality/Relevance:** Qualitatively describes how innovations are carried out based on the innovation radar in an industry at an adverse time of a pandemic.

**Methodology/Approach:** It is characterized as a technical, descriptive, qualitative report through content analysis.

**Main results:** The results showed that the industry was directly affected by the lack of raw material during the pandemic period, and found solutions by innovating, mainly in the dimensions supply, solutions, value addition, organization, supply chain, and processes.

**Contribution:** As contributions of the study, information related to the business environment aimed at innovation in times of crisis and in the covid-19 world pandemic was pointed out, and the advance in measuring business innovations in a qualitative way using the innovation radar tool.

**Keywords:** Covid-19, crisis, small business, innovation radar.

### INOVAÇÃO EM TEMPOS DE PANDEMIA: O CASO DE UMA INDÚSTRIA DE TRANSFORMAÇÃO DA CONSTRUÇÃO CIVIL

### RESUMO

**Objetivo do estudo:** Evidenciar as inovações realizadas no período da pandemia por uma indústria de transformação, que fornece produtos para a construção civil.

**Originalidade/ Relevância:** Descreve de forma qualitativa as inovações realizadas com base no radar de inovação em uma indústria, em momento adverso de pandemia.

**Metodologia:** Caracteriza-se como um relato técnico, descritivo, de caráter qualitativo e aplicado, realizado por meio da técnica de análise do conteúdo.

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**Principais resultados:** Os resultados apontam que a indústria foi diretamente afetada pela falta de matéria prima no período de pandemia e encontrou soluções inovando, sobretudo, nas dimensões: oferta, soluções, agregação de valor, organização, cadeia de fornecimento e processos.

**Contribuições:** Como contribuições foram apontadas informações relacionadas ao ambiente empresarial voltado à inovação em tempos de crise, em especial na pandemia mundial da covid19, e o avanço na mensuração de inovações empresariais de forma qualitativa utilizando a ferramenta radar da inovação.

**Palavras-chave:** Covid-19, crise, pequena empresa, radar da inovação.

## INNOVACIÓN EN TIEMPOS DE PANDEMIA: EL CASO DE UNA INDUSTRIA DE TRANSFORMACIÓN DE LA CONSTRUCCIÓN CIVIL

### RESUMEN

**Objetivo del estudio:** Destacar las innovaciones realizadas durante el período de pandemia por una industria manufacturera, que provee productos para la construcción.

**Originalidad/Relevancia:** Describe cualitativamente las innovaciones realizadas con base en el radar de innovación en una industria en un momento adverso de pandemia.

**Metodología:** Se caracteriza por ser un informe técnico, descriptivo, cualitativo a través del análisis de contenido.

**Principales resultados:** Los resultados mostraron que la industria se vio directamente afectada por la falta de materia prima durante el período de pandemia, y encontró soluciones innovando, sobre todo, en las dimensiones de abastecimiento, soluciones, agregación de valor, organización, cadena de suministro y procesos.

**Aportes:** Como aportes al estudio, información relacionada con el entorno empresarial enfocada a la innovación en tiempos de crisis y especialmente en la pandemia mundial del covid-19, y el avance en la medición de las innovaciones empresariales de forma cualitativa utilizando la herramienta radar de innovación.

**Palabras clave:** Covid-19, crisis, pequeños negocios, radar de innovación.

## 1 INTRODUCTION

Like all economies, the Brazilian economy was directly affected by the covid-19 pandemic. In Brazil, the first case of covid-19 was registered in February 2020 in São Paulo city. As a result, health, political and economic difficulties were created and if, on the one hand, security measures were taken such as quarantine and the closure of non-essential activities in order to protect lives, on the other hand, there was a profound impact on activities of Micro and Small Enterprises (MSEs) that had, among other problems: limited resources, vulnerability of the supply chain and obstacles in communication with suppliers and customers (Caballero-Morales, 2021). It is noteworthy that this difficult situation, in relation to the damage caused by the pandemic until mid-October 2021, claimed 602,000 lives in Brazil (Brazil, Ministry of Health, 2021).

Previous crises directly affected some specific sectors of the economy, countries or companies, unlike the covid-19 crisis that affected the whole world at the same time. However, if a crisis brings financial losses and, consequently, causes organizations to reduce investments in innovation; on the other hand, it is an opportunity to carry out changes and seek and offer new solutions to serve the market and remain competitive, even in times of instability (Guderian, Bican, Riar & Chattopadhyay, 2021). (Guderian, Bican, Riar & Chattopadhyay, 2021).

In mid-2021, the indicators pointed to a growth perspective of the Brazilian Gross Domestic Product (GDP) of 4% for 2021. However, this growth was not homogeneous, that is, not all sectors reached this growth rate, which it is mainly explained by changes in consumer behavior as a result of changes in income. One of the sectors that showed a lot of optimism in this pandemic period was the manufacturing industry, which had consecutive increases, which took its growth indicator to the highest level since 2015 (Portal da Indústria, 2021).

Transformation industries linked to civil construction, together with some other activities, were encouraged, as they were considered an essential service in Brazil, regulated by Decree of the Presidency of the Republic No. 10,282 of March 20, 2020. However, this sector was affected indirectly by other variables related to covid-19, such as, for example, difficulties in the logistical processes of purchase and sale and significant exchange rate variation, causing inflation in the price of resources. In addition, concerns about the crisis in Civil Construction are inevitable, as it is nothing new for the sector and which, after five years of retraction, led the segment to shrink by 20.5% between 2014 and 2018, and to a timid growth of 1.2% in the first quarter of 2019. The sector was also heavily impacted by the economic consequences of the pandemic that imposed social isolation on individuals and the stoppage of economic activities in most countries of the world (Rodrigues, Santarém & Figueiredo, 2020).

Crises create a great challenge for organizations to remain in the market. Therefore, they act as an opportunity for learning and innovation to meet new consumer needs, improving relationships between teams, increasing their technological capacity, qualifying management and the brand, achieving business success (Gopalakrishnan & Kovoov-Misra, 2021). To understand how this process occurs in organizations, this study will address the concepts of crisis and business innovation. In particular, it will address the dimensions of the innovation radar, created by Sawhney, Wolcott and Arroniz (2006) and adapted by Bachmann and Destefani (2008). Faced with the changes that took place after the arrival of the new coronavirus in Brazil, directly affecting the industrial sector of civil construction, it becomes relevant

to understand how these companies are reinventing themselves to remain in the market. **Thus, the research question that guides this study is: What innovations were carried out by a civil construction manufacturing industry as a way to face the difficulties related to covid-19?**

In civil construction, some studies deal with the shortage of material for construction and other resulting problems (Gamil & Alhagar, 2020), but not directly on the covid-19 pandemic. Thus, it is necessary to expand research on this period in order to improve the resilience of organizations both in this crisis and in future crises (Caballero-Morales, 2021). Therefore, the objective of this technical report is to highlight the innovations carried out during the pandemic by a manufacturing industry that supplies products for civil construction, being able to contribute to its post-pandemic reconstruction and serving as a case for other organizations.

## 2 BUSINESS INNOVATION

Although covid-19 has triggered ostensible “insurmountable challenges” for organizations, many have demonstrated their ability to innovate during the crisis and sow the seeds to become more resilient in the future (Fretty, 2020). A distinctive feature of this covid-19-led innovation is the specific context and natural inspiration of the innovations. However, innovations can also be leveraged in the post-crisis period. Problems arising from crisis events are not the only need for companies to engage in innovation and new products (i.e. introducing goods or services to the market) and also innovation and process improvements (Heinonen & Strandvik, 2020).

A survey carried out in 2014 with the company Derovo, recognized in 2011 as the most innovative Micro and Small Enterprise (MSE) in Portugal, revealed that it was able to innovate and obtain profit through a single raw material: the egg. It achieved growth, internationalization, diversification and strong policy in its human resources processes in the midst of the Portuguese financial crisis that occurred between 2010 and 2014 (Marques, Siluk, Neuenfeldt & Cattelan, 2014).

In Finland, the family business Finnboat has survived three major crises through innovation: the economic recession of the 1990s, the financial crisis of 2008 and the recent covid-19 pandemic. With the 1991 crisis, a second backbone was created through innovation in the business model, with a new B2B business area. After the financial crisis of 2008, the company revamped its business model and value proposition, focusing on more affordable boat

products to meet the consumer's reduced purchasing power. And finally, during the covid-19 pandemic, it is in the process of digitizing and internationalizing its sales of boats and developing a boat with an electronic motor powered by solar energy. This study revealed that crises were drivers of major business innovations, as in stable periods, the company used to make more modest and gradual innovations (Leppäaho & Ritala, 2021).

In this sense, it is observed that certain crises can become beneficial for companies in a long-term environment, since they tend to take more risks and increase their efforts to innovate in these periods, mainly to guarantee their survival in the market (Leppäaho & Ritala, 2021). Some innovations can be implemented temporarily in order to reduce the impact of the crisis at that time, as is the case with Personal Protective Equipment (PPE). Other innovations can configure the “new normal” of that company and, therefore, be installed on a permanent basis, as is the case with remote teams (Gopalakrishnan & Kovoov-Misra, 2021).

When it comes to innovation in MSEs, they differ from companies of other sizes, mainly due to the fact that research and development (R&D) expenses are generally not expressive and, therefore, most innovations do not arise directly from R&D, but they emerge from the suppliers themselves (benchmarking) or from the organization itself, from the ideas of employees and entrepreneurs. In addition, cost is a determining factor, as well as the lack of recognition of innovation as a differential and this is reflected in the low registration of innovations as patents. Therefore, it is not enough to measure innovation in MSEs based only on registered patents or financial percentage in R&D, but evaluating the different dimensions that can be innovated (Bachmann & Destefani, 2008).

The speed of new technologies and the easy access to information require organizations to be able to adapt and learn (Martins, Neves & Macêdo, 2014). Business innovation can be an outlet for differentiation, with possibilities both in products and processes. The activity of innovating goes through several stages, such as “adaptation, imitation, experimentation, design, product development and research” (Bachmann & Destefani, 2008, p.5.).

The Oslo Manual is a material developed by the Organization for Economic Co-operation and Development (OECD), together with Eurostat, to serve as a reference for guidelines for collecting and interpreting data on innovation. The Manual defines four types of innovation: product, process, organizational and marketing innovations (OECD, 2005). In view of the above, the next section addresses the innovation radar and its applicability.

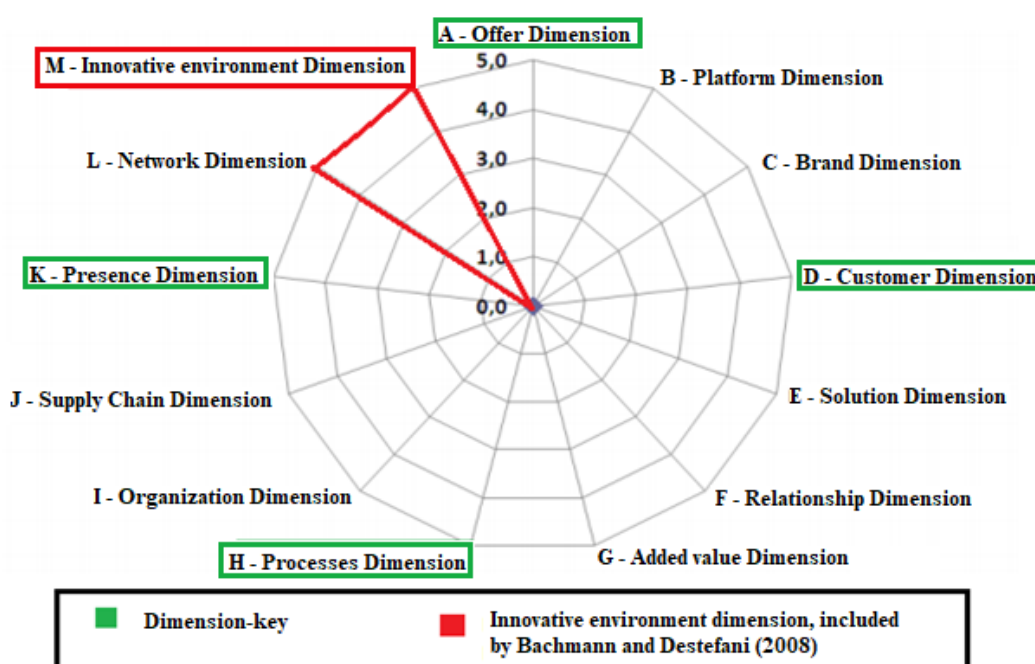
### 2.1 Innovation radar

Business innovation is not just about creating new products or traditional research and development. This limited view can restrict and cause an erroneous view of innovation. The proposal is to think holistically, that is, based on all the possible dimensions that an organization can innovate. Thus, the new definition of business innovation requires the company to create value for customers by creatively changing one or more dimensions of the business system (Sawhney et al., 2006). The innovation radar was developed and validated for Sawhney, Wolcott and Arroniz researchers in 2006 in the United States of America (USA), considering 12 dimensions of business innovation, which are based on four key dimensions: offers created by companies (what), customers served (who), the processes used (how) and the points of presence to offer the products (where).

In addition to the 12 dimensions addressed by Sawhney et al. (2006), Bachmann and Destefani (2008) the thirteenth dimension consisting of innovative ambience is included, as illustrated in Figure 1. The authors justify that the original radar ignores the internal environment of the organization and that an organizational climate conducive to innovation is needed for innovation to take place.

**Figure 1**

*Innovation radar*



Source: Adapted from Sawhney et al. (2006); Bachmann and Destefani (2008).



Each dimension offers the company different ways of innovating, as described in Table 1.

**Panel 1**

*Dimensions of business innovation*

	Dimension	What is it?	How to create innovation?
<b>Dimensions -Chaves</b>	<b>Offers</b>	Products and services	Creation of new products and services that are valued by customers. Such as for ease of use, portability and price
	<b>Clients</b>	Individuals or organizations that use or consume a company's offerings to meet certain needs	Discover new customer segments or reveal unmet (and sometimes unarticulated) needs. How to employ simplified prices, no contractual commitments, entertainment features, and stylish products
	<b>Processes</b>	Business activity settings used to conduct internal operations	Redesign your processes for greater efficiency, quality or faster cycle time. These changes may involve relocating a process or uncoupling its <i>front end</i> from its <i>backend</i>
	<b>Presence</b>	Distribution channels that a company uses to bring offers to market and places where their offers can be purchased or used by customers	Creation of new points of presence or the use of existing ones in creative ways
	<b>Platform</b>	Set of common components, assembly methods, or technologies that serve as building blocks for a portfolio of products or services	Exploring the "power of commonality" - using modularity to create a diverse set of derived offerings faster and cheaper than if they were standalone items
	<b>Solutions</b>	Personalized and integrated combination of products, services and information that solves a customer problem	Creating variety and depth in the integration of different elements, products and services
	<b>Customer experience</b>	Everything a customer sees, hears, feels and experiences when interacting with a company at all times	Rethink the interface between the organization and its customers. Such as the creation of more comfortable waiting rooms, halls with clearer directions and larger exam rooms with space for three or more people and privacy curtains
	<b>Value capture</b>	Mechanism that a company uses to recapture the value it creates	Discover untapped revenue streams, develop new pricing systems, and expand your ability to capture value from customer and partner interactions
	<b>Organization</b>	How a company is structured, its partnerships and its functions and responsibilities with employees	Rethink the scope of the company's activities, as well as redefine the functions, responsibilities and incentives of different business units and individuals
	<b>Supply chain</b>	Sequence of activities and agents that move goods, services and information from origin to delivery of products and services	Streamline the flow of information in the supply chain, change its structure, or improve the collaboration of your stakeholders
	<b>Innovative ambience</b>	Innovative environment - internal and external	Provide an innovative environment, based on incentives to employees in studies focused on innovation, creation of a mechanism for creating internal ideas, use of external sources such as FINEP, Araucaria Foundation, etc.

Source: Adapted from Sawhney et al. (2006); Bachmann and Destefani (2008).

The Innovation Radar by Sawhney et al. (2006) provides a broad view of innovations in organizations. The Innovation Radar of Sawhney et al. (2006) enables a broad view of innovations in organizations. Because it is a global and robust vision, the radar was adapted by Bachmann and Destefani (2008) to meet the demand of the Brazilian Service for Support to Micro and Small Enterprises (SEBRAE), which began to adopt it in order to evaluate the degree of innovations of companies (Paredes, Santana & Fell, 2014). It is a tool used in innovation projects aimed at SMEs. The Local Innovation Agents Project (ALI) is highlighted, which is a partnership between SEBRAE and the National Council for Scientific and Technological Development (CNPq), being the largest Brazilian innovation program (Carvalho, Resende, Carvalho, Pontes & Correa, 2020).

It should be noted that the innovation radar was used in several business sectors. Among the published studies, the following are highlighted: (i) A study of the application of the innovation radar: the degree of organizational innovation in a small company in the metalworking sector (Paredes et al., 2014); (ii) Measuring innovation through the degree of sectoral innovation and the sectoral characteristic of innovation (Oliveira, Cavalcanti, Paiva & Marques, 2014); (iii) the Innovation Radar as a tool for achieving a competitive advantage for micro and small companies (Carvalho, Silva, Póvoa & Carvalho, 2015).

Recently, the following studies used the innovation radar methodology: Measurement of the degree of innovation in local productive arrangement: a study in confectional enterprises of Santa Cruz do Capibaribe-PE (Guedes & Moutinho, 2020); Innovation radar as a competitive advantage: a case study (Lima, Silva, Silva & Henrique, 2021); Innovation and small body companies: the case of the national truck capital (Escobar, Araujo, Florêncio & Escobar, 2021); dissertation from the University of São Paulo (USP) published in 2020, entitled the Methodology for identifying opportunities for innovation in services of control system integrators, using the innovation radar to measure the innovation maturity rates of the integrator (Barbosa, 2020).

Also noteworthy is a literature review carried out by Carvalho et al. (2020), considering the period from 2011 to 2020, exploring the databases Web of Science, Scopus and the Brazilian Journal of Innovation (RAI), finding 34 relevant articles, which used the innovation radar in the ALI Program as the basis of the work.

SEBRAE (2010), in its Participant Manual, reports that the model treats innovation as a management process and not in isolation and mentions the concern of not only evaluating the



results (number of innovations), but including and considering the progress of organizations' innovation processes.

## 2 TECHNICAL PRODUCTION METHOD

This technical report has a professional emphasis and describes the experiences of the investigated organization on the subject of innovation in times of crisis (Scafuto, Costa & Mazzieri, 2021). In it, a manufacturing industry linked to civil construction was investigated, with the aim of highlighting the innovations made by this company during the covid-19 pandemic. The research was carried out using a qualitative method with content analysis and, through a descriptive approach, as it intends to “observe, register, analyze and correlate facts and phenomena (variables) without manipulating them” (Cervo & Bervian, 1983, p.84).

To achieve a global view of the studied organization, the instrument adopted by Silva (2012): Diagnosis of innovation, blocks II and III, was used as a basis. This is a diagnosis that was validated by SEBRAE Distrito Federal and SEBRAE Paraná for use in the ALI project, an instrument theoretically supported by Sawhney et al. (2006) and Bachmann and Destefani (2008). The Innovation Diagnosis aims to “measure the degree of innovation in which the company is and measure which innovative activities are being developed by the company” (Silva, 2012, p. 64) and is composed of 42 objective questions, covering 13 dimensions, with a time horizon of 3 years.

The studies found in the literature used the innovation radar in order to measure innovation quantitatively (Paredes et al., 2014; Oliveira et al., 2014; Carvalho et al., 2015; Guedes & Moutinho, 2020; Lima et al., 2015; al., 2021; Escobar et al., 2021). In the study for this technical report, it was possible to evidence the innovations in a qualitative way. For this, the data collection instrument was adapted, making it an interview script with open questions in order to highlight the innovations made by the company during the pandemic period. That is, from February 2020 to August 28, 2021, the final date, on which the interview was applied. The application of the instrument was carried out in person with the owner of the company on August 28, 2021 and lasted about an hour and a half.

In addition, two other sources of data were used, document analysis and analysis by observation. Document analysis began ten days before the interview, verifying the company's data using the CNPJ at the Federal Revenue Service of Brazil, the National Institute of Industrial Property (INPI) and the company's social networks. On the day of the interview, document

analysis was carried out by checking invoices and e-mails, which reinforced the interview responses.

The analysis by participant observation was carried out at the headquarters of the studied company, during the factory visit and at the time of the interview. To record what was observed, the diagnostic evidence field was used, as the interview progressed, the business owner described what was done, physically showing the evidence of innovations. It was possible to observe several actions reported by the entrepreneur. Among the main ones, the following stand out: the new products produced by the company and changes in packaging. It was possible to check the items in stock and touch them, in order to differentiate and understand the reason for innovation compared to existing products in the pandemic period; disclosure of the company's brand on customers' billboards, making it possible to show it in photos and physically on a company's customer; IBC container solutions, observing this item at the company's headquarters and also at a customer; change of warehouse and new machinery, observation *in loco* with notes of the main improvements resulting from the changes. Afterwards, the information and evidence collected through interview, documents and observation are presented. First, the problem situation is presented and then the evidence of innovation found in each dimension, and finally the discussion of the results and conclusions.

#### 4 PROBLEM-SITUATION CONTEXT

From the application of the research, it was possible to identify actions carried out by the company in each dimension of the innovation radar, as explained below. It is a transformation industry located in the state of Paraná, whose main economic activity is the manufacture of paints, varnishes, enamels and lacquers, with a registered trademark in Brazil and Paraguay. The company is considered a Small Business (EPP) according to its annual revenue, and began its activities more than 13 years ago in the state of Paraná, Brazil. It has 15 direct employees, not counting outsourced workers. The company operates in the real estate paint market, supplying products to construction companies and shopkeepers who sell construction products located in the state of Paraná and Santa Catarina, in addition to exporting to Paraguay. The main products manufactured by the company include, water-based enamel paint, grafiato and texture coatings, acrylic paint, paint for tiles, acrylic putty and spackling putty, sealer, primer and paint for floors and courts.

The choice of this company for this study is justified because it is a company that has had a significant expansion in its short time of existence, a fact that drew the attention of

researchers to know and understand the actions taken and that led to the result obtained. Also, due to the fact that the organization faced difficulties caused by covid-19 and managed to overcome the situation through innovation, remaining competitive in the market.

Given the context of the covid-19 pandemic, with its restrictions and consequences, the company had to innovate to remain active in the market. For this reason it is necessary to apply an instrument, aimed at mapping innovation activities: the Innovation Radar, which will be described below.

#### *4.1 Types of intervention and mechanisms adopted*

The innovation radar is an instrument capable of measuring the ability to innovate in organizations, developed and validated in 2006 in the USA by Sawhney, Wolcott and Arroniz, and adapted in Brazil in 2008 by Bachmann and Destefani. With the adaptation, the innovation radar now has 13 dimensions of innovation: offer, platform, brand, customers, solutions, relationship, added value, processes, organization, chain and supply, presence, network and innovative ambience dimension.

The measurement of innovation in different dimensions makes it possible to see the organization from different perspectives, which provides a broad view of the organization that contributes to the creation of actions that improve organizational performance. The use of the innovation radar in this work was to qualitatively highlight the innovations carried out by the industry studied during the pandemic period.

The innovation diagnosis was carried out with objective questions, but, in this case, it was used with open questions and, instead of measuring the degree of innovation, the innovations made in the aforementioned period were described in each dimension of the innovation radar.

## **5 RESULTS OBTAINED AND ANALYSIS**

After presenting the company and the scenario in which the instrument was applied, as conceptualized by the Innovation Radar, the various dimensions with the appropriate actions taken by the company are presented below.

**Offer Dimension** - The company successfully launched several new products on the market, including: burnt cement texture, drywall plaster, laying glue and rubberized texture. In addition to these products, the manufacture of leveling compound and also other colors of rubberized

paint were identified by the company as potential products to be offered to customers and are in the feasibility study phase for implementation. The new launched products were well accepted and the company expanded the portfolio of offers to customers, which was demonstrated by the online catalog and by the history of offering products to customers and making sales.

With regard to the specific characteristics of the products, there was no alteration for ecological reasons, considering that they contain of a type of limestone, which is an organic product, even used for soil balance. The company considers that the chemical composition and balance of its products are adequate, as it underwent a consultancy in this area in 2018, when it made significant changes, improving the quality of its products. Currently, when necessary, the company makes small adjustments to the composition, with the help of the chemist responsible for the company.

The owner reported the following situation occurred in the pandemic, in relation to the characteristics of the products: "many competing companies have tampered with the formula of products seeking cost reduction to achieve competitiveness". However, he stated that this change in the formula and even the exchange of suppliers can compromise the product quality. For this reason the company preferred to maintain the quality of its products, sought to reorganize other steps and focus on the relationship with its customers.

In terms of design, the company made changes to all product packaging, changing the material and readjusting the design and layout. These changes in packaging were motivated by situations that occurred during the pandemic, according to the owner's report: "We had difficulties with packaging, mainly in relation to the supply of paper and plastic, in addition to tripling the price, they ended up being unavailable in the market". To adapt to what was happening, "We had a package for all products, today we have several packages and each product line has its own package". The main reason for this change in the company was due to a lack of packaging and a significant increase in prices, which was confirmed by the invoices presented and the observation of conversations with packaging suppliers. The spackle, which was offered in barrels, is now offered in plastic refills and most of the paints that were bottled in aluminum cans are now offered in plastic buckets. These packaging changes were made quickly, as the company ran the risk of not being able to deliver the products anymore due to lack of packaging. This was a way out to minimize the increase in packaging prices.

**Brand Dimension** - The company has a registered trademark already recognized at the INPI in force and another that was sent for registration after the start of the pandemic, which was evidenced from consultations on the INPI website and registration documents presented by the studied company. This new brand was strategically created to serve another group of consumers.

Despite being an industrial company, it promotes the brand several times, also aiming at brand recognition in the final market and not just for shopkeepers and builders. This brand exposure takes place on customer totems and facades, catalogs, caps, billboards, stickers and social media.

**Customer Dimension** - The company has a loyal portfolio of customers. However, it recognizes that it is possible to advance and expand the regions and the number of customers. However, at the time of the crisis, the organization's posture was strategically conservative. This is due to the already reported problems faced in the pandemic, especially packaging. Therefore, the company preferred to serve current customers well, rather than expand its portfolio and not be able to maintain the quality of service, according to the report: "we could have opened 30% to 40% more market, but we chose to keep our current customers".

A few new customers were attracted, as is the case with customers obtained in Paraguay, where the company started an export process. This happened mainly because of the need of this foreign market and also because of the devaluation of the Real against the dollar, making it feasible for the company to export and also for Paraguayan customers to import.

Another niche, which was strongly attended by the company, was the public tender sector. However, with the arrival of the pandemic, "bidding was the worst market in terms of a pandemic, because in addition to the municipalities' resources being focused on health, the agreed prices did not follow the market price adjustment. So, I do not see this market with good eyes and the way it is it is not viable for the company to continue serving", reported the businessman.

**Solutions Dimension** - The offer of new solutions occurred by changing the packaging of spackle from the barrel to refills. As a result, the container industry had to offer: Intermediate Bulk Container (IBC) to stock the product inside stores. At first, the company made a financial contribution and invested in this solution, as a way to refine the relationship with its customers. Later, it began to offer this solution as a source of revenue, purchasing from a supplier and

reselling it to retailers. Several containers with products were observed in the industry and in a customer who started using this innovation. In addition, documents proving the acquisition of containers after the start of the pandemic were analyzed.

**Relationship Dimension** - Customers have a direct channel with the company via telephone and WhatsApp, through which all requests, suggestions and solutions for eventual problems are quickly answered. Evidence of this interaction and freedom in customers is that all newly launched products, mentioned in the offer dimension, were suggestions from customers. The pandemic made face-to-face sales difficult, but as the company was already adapted to online service, this was not a problem.

The company has easy access to customers through Facebook, WhatsApp, email, website, external salesperson and the company's own headquarters, which is used for customer service when necessary. Its main differential is good service from beginning to end of the order, including after-sales service. It uses strategies that contribute to increasing the engagement of its customers, offering gifts, sponsorships and direct negotiation.

**Added value Dimension** - The company has a system for adopting new ways of generating revenue, using existing facilities and resources. It does so by offering new products and optimizing its processes, with the future goal of opening its own sales channels in cities with difficult access to the existing market. As such cities already have delivery routes, the delivery cost will be optimized and reduced.

**Process Dimension** - To obtain greater efficiency, quality, flexibility and a shorter production cycle, the company systematically modifies its processes, purchases different equipment from those previously used and adopts more modern production management techniques. In 2020, it drastically changed the entire layout of the factory, moving from a 600m<sup>2</sup> warehouse that was improvised to its own structure of 2,000 m<sup>2</sup>, adapted and designed for the existing production system. This change resulted in a broader and more organized environment, greater productivity, excellence in logistics, and improvement in internal communication, which was confirmed with the design of the industrial floor plan and visualization of the application of the layout in the new company headquarters.

In addition, the company invested in several new machines and tools to optimize and improve processes. It was observing the operation of a new filling machine, which has balanced



processes, which increased this capacity by 100%, enabling standardized filling. A new forklift was purchased that operated faster and more efficiently and provided forklift operator training to all plant operating staff. The company has its own delivery trucks that are constantly being reviewed in order to avoid wasting time and, when necessary, it outsources this process. The statistical controls used by the organization to demonstrate the improvement in processes after these implementations were presented.

The company carried out the implementation of a management system for raw material inventory control integrated to the production system, it was possible to observe it in operation. Likewise, it started to use an application in the process of direct communication between the sectors in real time, which improved communication and is preventing errors in the process stages. The businessman explains that "it's simple things that end up collaborating a lot for the organization and today what's most lacking in companies is communication".

**Organization Dimension** - The company systematically reorganizes its activities, or changes the way employees work to improve their results. During this period, it went through a human resources and work safety consultancy, so that its activities, in addition to being efficient, are fully in compliance with current legislation. Supporting documents were presented, demonstrating the stages of the consultations, as well as adjustments that the company had to make, such as the payment of commission on the payroll, which was previously done informally.

In 2020, it entered into two partnerships with companies in the field in which, in addition to the constant exchange of knowledge, they teamed up to carry out joint purchases, obtaining better prices on materials, increasing their competitiveness. The businessman reports that "We joined forces in order to buy and bargain on prices, we exchanged learning and information, which ended up strengthening the industry, as we managed to have another way of seeing the market". Despite being companies in the same industry, they are in another region, so they are not considered competitors but partners.

**Supply Chain Dimension** – With regard to actions to reduce transport costs, the company strategically chose to acquire its own fleet of delivery vehicles. Thus, it can deliver faster to the customer, standardize the services with its own drivers and organize the cargo in the customer's store, creating a competitive advantage. The owner admitted that the cost became 20% higher, however, the company ends up gaining an advantage by using this solution. To

minimize cost, the trucks always meet specifications and the cargo is always organized. Eventually the company outsourced delivery, which occurs only when the number of orders are far above average.

With regard to cost reduction in the purchase of raw materials, the company, based on the partnership mentioned in the organization dimension, managed to reduce the cost by making purchases together with other companies. In addition, the company had a single barrel supplier for over 10 years. With the arrival of the pandemic, this supplier was unable to meet delivery commitments, which forced the studied company to look for new suppliers. This had a positive outcome as it created more options and bargaining power, which was demonstrated through invoices and documents proving such negotiations.

**Presence Dimension** - As it is an industrial company, it does not have its own points of sale, only those of its resale customers. The owner, having 22 years of experience in the paint trade, ends up encouraging and helping other entrepreneurs to open their businesses. Consequently, it becomes a strategic partnership, as this new business ends up being a customer and frequently buying the company's complete line.

There is a desire to create industry-owned stores. Mainly in regions with difficult entry. This is a future project currently underway, a market study was carried out and documented by the interviewee. Regarding sales intermediation, the company has only one external seller and does not have product distributors. Due to the pandemic, it chose to maintain its customer base, seeking to serve them in a timely manner and with quality products.

**Network Dimension** - Most of the company's customers are from other cities, with contact not being made in person, with the exception of the customer who requests a visit or, eventually, receives a visit from the external salesperson. As the company already worked using the website, WhatsApp, Facebook, Instagram, email and telephone to contact its customers, even before the arrival of the pandemic, communication was maintained in the way it was, as identified by research on the company's social media networks.

**Innovative Environment Dimension** - The company makes routine use of consultancy or support from entities such as SEBRAE, SENAI, SESI, Universities and Commercial Associations. It should be noted that the pandemic made this type of action difficult at the company, mainly because it is mostly face-to-face. Despite this, it presented documentation of the participation

of a consultancy in the Export Qualification Program (PEIEX), offered by ApexBrasil, in partnership with the State University of Western Paraná (Unioeste). In addition, as mentioned, it carried out consultancy in human resources and work safety. It also carried out a consultancy related to environmental issues, adapting all processes in order to fully comply with environmental legislation and contribute to the environment.

New information and technologies at events (seminars, congresses, etc.) and technical or business associations are always welcome at the company. However, since the beginning of 2020, this type of programming has been scarce, given the pandemic period. On November 2, 2021, an event by the Brazilian Association of Paint Manufacturers (ABRAFATI) will take place, and the company intends to send representatives with the intention of seeking new knowledge.

The company has advisory services from its suppliers for product development and maintains permanent contact in search of new knowledge. It considers it important to receive suggestions from the collaborators themselves, despite not having a formal system for collecting ideas. The company does this more naturally given that there are few employees. When a collaborator brings a new solution, the idea is debated and, if it proves to be viable, it is applied immediately. This speed in the application of ideas and the openness that employees have to make suggestions, allows for frequent innovations and improvements.

## 6 DISCUSSION

It is noted that the company already had a system aimed at innovation practices, and that the pandemic was an incentive for some actions to take place. Most of the innovations made by the studied company have an gradual character. That is, constant improvements and support are generated in the various phases of a product or process (Audy, 2017). This is a characteristic fact of MSEs, in which innovation occurs most often by modifying and improving processes (Silva & Dacorso, 2013). In addition, some innovations that were already happening in the company were maintained and, therefore, will not be highlighted in the discussion.

The highlight during the pandemic, which confirms the statement of Gamil and Alhagar (2020), was the lack of raw material. The main problem was the lack of packaging in the market, which could cause the company to suffer serious consequences if it did not act quickly. As an example, one can mention the eventual shutdown of its production, which would drastically affect all other sectors. The company took advantage of this difficulty to innovate in several aspects: it sought new suppliers, bargained prices, changed the packaging of its products,

including offering them in refills and creating solutions, such as IBC containers. These innovations can be considered in the following dimensions: Offer, Solutions, and Added Value.

Another action, which is also worth mentioning, refers to the partnerships created in the pandemic period for the company to remain competitive. The company used information from partners to internally reorganize in the search for efficiency in its processes. In addition, it was able to reduce costs by purchasing together with two other organizations. These innovation actions can be considered in the dimensions: Organization and Supply Chain. Precisely those considered as little explored by a survey with 1,139 MSEs in Paraná, but with potential for competitive differential (Carvalho et al., 2015).

The creation of new products also occurred in the pandemic period, and all were created from suggestions from the customers themselves, which can be considered innovation in the dimensions: Offer, Relationship and Processes. These innovations are tied to the principle that business innovation should create value for customers and not new products or services (Sawhney et al., 2006). In this sense, the company has been exploring the needs of its customers to create assertive offers.

One of the dimensions with more evidence of innovation was Processes, which corroborates the information highlighted by Sawhney et al. (2006) that, in chemical industries, the emphasis is on process innovations. The company moved to larger warehouses, made changes to the production plant layout, invested in modern machinery and implemented a new management system in the production sector. Changes that had a positive impact on different sectors of the company, optimizing processes and reducing costs. The relative impact also reflected in the Supply Chain dimension.

It was evident that, in the studied company, the pandemic was not so overwhelming. There were some mishaps, with emphasis on the shortage and increase in the value of packaging, which brought uncertainty to the company. However, it managed to overcome these problems, innovate and continue supplying products to customers, in addition to offering new solutions, generating competitive advantage.

It is still relevant to highlight some contributions of this report. In a practical way, this study analyzed the impacts of the pandemic on the company's management, as well as presenting the innovation actions used as a way out of the adverse situation faced, contributing to future decisions regarding competitiveness. Theoretically, there was a contribution in the tool, applied in a deeper qualitative formation. Before that moment, it was mainly applied quantitatively and analyzed superficially. Now, the possibility of replicating the study is

created, mainly by understanding the dimension that the Innovation Radar took in Brazil. And yet, there is a social contribution, which is linked to the fact of showing how the company behaved during the crisis period and how it was able to remain competitive, a reality proven here: through innovation.

## 7 FINAL CONSIDERATIONS

The analysis of the results made it possible to highlight the innovations carried out by a civil construction manufacturing industry as a way to face the difficulties caused by covid-19. It was found that the company systematically seeks gradual innovations to improve its processes, however, with the arrival of the pandemic, it had to act quickly in order not to suffer irreparable losses.

Among the biggest problems faced in the period from February 2020 to August 2021, the increase and lack of raw materials, especially packaging, is accentuated. In response to this and to other obstacles, the company made several innovations, highlighted in the dimensions: Offer, Solutions, Added value, Organization, Supply chain and Processes.

As a contribution, there is the contribution of information related to the business environment and focused on innovation in times of crisis, especially in the global covid-19 pandemic. In addition to the progress in measuring business innovations in a qualitative way, using the innovation radar tool. It should be noted that the actions taken by the company in a period of crisis can be replicated and adapted by other companies.

Research related to the impact of the pandemic on companies is still incipient, mainly because it is a relatively recent event. Future studies may explore how other sectors behaved in the pandemic period, whether there was a willingness to innovate and what the motivating factor was. The development of more qualitative studies is recommended, considering the dimensions of the innovation radar, as most studies have been quantitative and show the scores of each dimension and not the innovation actions themselves.

## AUTHORS' CONTRIBUTIONS

Contribution	Ceolin, M. J. A.	Damke, F.	Silva, E. D.	Bulhões, R.	Meneghetti, M. R.
Contextualization	x	x	x	x	x
Methodology	x	x	x	x	x
Software	----	----	----	----	----
Validation	x	----	----	----	x
Formal analysis	x	x	----	x	x
Investigation	x	x	----	x	----
Resources	x	----	----	----	x
Data curation	x	x	----	----	----
Original	----	----	----	----	----
Revision and editing	x	x	x	----	x
Viewing	x	x	x	x	x
Supervision	x	----	----	----	----
Project management	x	----	----	----	----
Obtaining funding	----	----	----	----	----

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