**THE EFFECTS OF THE COVID-19 PANDEMIC ON THE PRO-ENVIRONMENTAL BEHAVIOUR STEMMING FROM SUSTAINABLE ACTIONS (SPILLOVER EFFECT) OF CIVIL CONSTRUCTION EMPLOYEES**

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**1 INTRODUCTION**

Since Covid-19 started to spread across the globe, a great unprecedented challenge was established worldwide, not only for the healthcare system but also for the economy (Oqubay, 2020). Although, some authors agree with Wolfe, Duvnavan and Diamond's (2007) idea that events such as this exert critical selective forces in politics, society, economy, and human behaviour concerning nature as well as the human genome. The Covid-19 pandemic has already become one of the most significant socioeconomic disturbances on the planet since the Great Depression due to the need to slow down the virus' propagation with social distancing measures, including closing down schools, universities, non-essential businesses, as well as closing down borders between countries (Hall, Scott & Gössling, 2020).

By closing down companies and thus altering the routine of thousands of workers to the inside of their homes, especially for companies considered non-essential, a reorganisation of businesses has been triggered in an effort to keep themselves afloat in the market so as not to be also decimated by the virus.

When discussing the importance of themes such as sustainability, the literature has always presented workplaces as an essential awareness and transformation locus, especially with the rising number of companies that have been looking into implementing organisational sustainability strategies in their routines (Young & Tilley, 2006). Boiral (2005) claims that the employees' direct engagement in such strategies may improve the environmental performance of companies. Such engagement demands incorporating actions as a habit, taking the daily and weekly time in which the employee "lives" in their organisation into account.

Thus, the workplace may become an essential locus for developing habits that may "spill over" and promote sustainable lifestyles (Cox, A., Higgins, T., Gloster, R., Foley, B, Darnton, 2012; Schäfer & Süßbauer, 2018). Spillover refers to the observable and causal effect of one behaviour over another in distinct locus situations. Studies on the spillover of rationalised behaviour or routine actions (tacit knowledge) onto nearby areas (neighbourhoods) or even close to the home environment, the everyday life (Margetts & Kashima, 2017; V. Muster & Schrader, 2011; Viola Muster, 2011; Thøgersen, 1999), are still recent; regarding cases in which such effect occurring is verified, it is possible that the results or the continuity of such behaviours, previously acquired, have been directly impacted by the pandemic scenario, mainly for a workplace is vital in the development of habits that might "spill over" and promote sustainable lifestyles (Cox, A., Higgins, T., Gloster, R., Foley, B, Darnton, 2012).

This process can happen in any company and any industry, but it is expected in more labour and workplace-intense activities, which are more controlled and regulated, daily actions can be fixed as a routine. On the one hand, the Construction Industry is acknowledged as one of the most important activities for the economic and social development of the country, but on the other hand, it still acts as a great environmental impact generator (Santos et al., 2011). In March 2020, Brazil and the Ceará State notified its first COVID-19 cases, initiating a series of restrictive measures to counteract the proliferation of the disease. The first lockdown in the Ceará State happened on May 8th, 2020, with Fortaleza being the second Brazilian capital to establish the measure; it lasted 24 days, ending on July 1st of the same year and thus initiating the State's economic recovery plan (Brisa, 2021). The proposed isolation measures harshly affected the construction industry since it was not a priori considered an essential activity, which would only change in the March 2021 decreet (Povo, 2021).

Considering the previously presented context and in order to expand knowledge, we aim to answer the following question: **What are the pro-environmental behaviour changes, formerly identified by the spillover effect, of the construction workers due to the COVID-19 pandemic?**

For this purpose, the following specific goals were set: to identify the environmental behaviours which spill over to the home and to describe the effects of the COVID-19 pandemic on the previously identified behaviour. In recent studies made by Alla, Hassan, e Chen (2020), in which they observed the effects of the COVID-19 pandemic on the environmental behaviour of green IT practices in Malaysia, it was observed that the rigorous control caused by the proliferation containment measures made so that there was a carbon emission reduction by the educational entities in the entire country, while due to staying at home being made mandatory, the power consumption in home networks also rose, mainly because of the increased numbers of online meetings and home office workers.

The authors then discovered the existence of a significant variation in society regarding pro-environmental behaviour between different groups of people; however, they emphasise that the positive result of this sustainable behaviour is temporary and directly linked to the lockdown.

Meanwhile, O'Connor e Assaker (2021) report the enormous impact suffered by waste management due to the limitation of commercial activities, mobility, and the manufacturing sector. They found out that the amount of waste increased in the countries where the social distancing measure of staying at home was observed. To them, there was an intensification in the use of disposable products, and panic shopping increased production and consumption, frustrating the plastic pollution reduction efforts. Still, they identified that several countries implemented policies to guarantee sustainable waste management, protecting the safety of the waste handlers.

Regarding the methodological aspects, this study is qualitative in nature, based on the analysis of data collected by creating five focus groups (two with management teams, one of the main office and one of the construction site; and three with workers of two distinct construction sites), and during two direct observation periods (non-participative) in the workers' household (constituting a two-year period), which characterises it as a longitudinal study, with semi-structured and documented interviews. The analysis of the obtained answers was carried out through content analysis.

The present article is structured in five sections which include, other than the Introduction and the Conclusion, the Theoretical Framework, the Methodology and the Analysis and Discussion of Results.

**2 Sustainable behaviour during the pandemic**

It is well known that consumers are important influencers of sustainable practices and businesses, influencing the various stages of consumer behaviour, from the purchase choice of goods and services, the care and maintenance of goods, to the items and waste destination choice (McNeill et al., 2020). Furthermore, the world crisis resulting from the COVID-19 pandemic has notedly highlighted the need for entrepreneurial and consumer practices that consider the impacts from a sustainable point of view (Hoefel & Tripoli, 2020).

Individuals' sustainable behaviours are pointed to as one of the following years' consumer tendencies. Among them are concepts such as "less is more", which states that consumers are reevaluating their buying habits, rejecting materialism and consumerism and favouring simpler experiences (Scherer & Santos, 2020). A growing percentage of consumers is conscious of the negative impact that excessive and irresponsible consumption is causing in the world, which reflects in positive practices such as consumption reduction (Binkley, 2008), the pursuit of sustainable products made by socially responsible companies (Shaw et al., 2006; Zerbini et al., 2019), rejection to disposable plastic packaging and a change in the means of access to consumer goods (Bardhi et al., 2012).

This sustainable behaviour is characterised by Sheth Sethia e Srinivas (2011) as guided and supported by a conscious mentality that reflects a sense of caring for self, community, and nature. Responsible self-care as in pursuing positive emotions such as happiness and life satisfaction; caring for the community concerning valuing and supporting social networks; and caring for nature concerning environmental protection and moderate usage of natural resources (Balderjahn et al., 2013). To achieve the goal of "caring for self, community, and nature", an individual goes through a consumer journey in which every practical action chosen by them will aid the development of their self-identity as a sustainable consumer.

Before these constant behavioural changes, researchers have sought to explore sustainable behaviour and its dimensions (Fischer et al., 2017) which explore the consumer stages – acquire, use, and dispose. Considering the context in which humanity lives and the innumerous consequences brought by COVID-19, not only in social and political matters but economic ones as well, Sarkis (2020) indicates that the global actions on virus containment include the closure of non-essential businesses, social distancing, smaller public gatherings, delay of sports events, cancellation of conferences, and requesting haven to populations.

New social sustainability norms arise as people live differently, i.e. social distancing, which resulted in working from home and fewer face-to-face meetings, as well as higher consumption due to longer home stays (Sarkis, 2020). Thus, working from home or being self-isolated for longer might not be as sustainable as it was originally thought. For example, researchers in the United Kingdom learned that the environmental impact of working from home was more significant during winter due to individual workers' home heating in comparison to the centralised office buildings (Turits, 2020).

Furthermore, consumers have started to embrace new behaviours resulting from social isolation and infection prevention measures. Such behaviours were transformed mainly by the imposition of stricter hygiene habits, the agglomeration in public spaces prohibition, and the temporary closure of non-essential businesses (Kirk & Rifkin, 2020).

It is fundamental to acknowledge that the pandemic brought us a new and unknown reality (Vanapalli et al., 2021). The temporary closure of restaurants and shops during the blocks and the "stay at home" directives imposed by the government, among other situations, have altered several life and consumer habits, creating uncertainties in the waste generation patterns (Bengali, 2020), although there was still a fixation on hygiene precautions due to fear of transmission. This changed behaviour patterns, such as using personal protective equipment (PPE), extensive demand for plastic-wrapped food and supplies, and using disposable cutlery, both for convenience and safety (Tenenbaum, 2020).

Companies recognise the need to commit to sustainability more and more, and, in the same way, it is expected that consumers consume sustainably and pave the way for sustainable development (Caruana & Crane, 2008; Connolly & Prothero, 2003; Devinney et al., 2011) since consumers are important social change agents, and awakening the sustainable consumption awareness will help motivate and strengthen more directed activities by the companies.

**2.1 Environmental Behaviour in Organisations.**

Kollmuss and Agyeman (2015) describe pro-environmental behaviour as everyday activities such as conserving water and energy, buying organic products, and separating solid waste, that is, a set of human activities that aim to minimise the adverse effects on the environment. Since human activities are discussed and proven as one of the main reasons for environmental problems, taking any individual effort into account would employ such findings to the pro-environmental behaviours (Chen et al., 2017; Stern, 2000).

In this context, and envisioning that employees spend around a third of their time in companies, researchers like Blok et al. (2015) state that the workplace contributes significantly to the minimisation of the employee's actions' impact on the natural and built environment, effectively impacting their sustainable behaviour. To the authors, this minimisation can occur due to exemplary pro-environmental behaviour from the department leaders and chiefs, by sharing values, intellectual stimuli, and by inspiring motivation, all of which provide a break in old routines, which is shown to happen more positively in the workplace when compared to the home environment (Nye & Hargreaves, 2010). In addition, the identification of ethical, cognitive, and environmental prerequisites for the current pro-environmental behaviour, such as ethical (pro-environmental values), emotional (connection to the neighbourhood), and cognitive (perceived behavioural control) values, aid in understanding this behaviour (Rioux, 2011). Environmental behaviour in organisations is the foundation for forming a more sustainable organisational culture since the demands for such adaptations are not only techniques but also a change in the company regarding values, beliefs and environmentally responsible behaviours (Harris & Crane, 2002). The companies' role in aiming to promote their employees' pro-environmental behaviour may certainly help society deal with the great challenge of environmental problems, partially driven by human activity; additionally, the individual efforts of each employee are essential so that the company can successfully take sustainable actions (Stern, 2000). That means, once the employees are aware of the environmental matters/policies and are receiving practical or procedural knowledge of sustainable actions, they may put them into practice even though they do not have pro-environmental attitudes due to the workplace structure, systems, culture, and rewards (Young et al., 2015).

**2.2 Locus spillover behaviour: spillovers**

Apart from the research on technological spillover (CARDAMONE, 2018; BERNSTEIN; MOHNEN, 1998; NADIRI, 1993), in studies on behaviour and habits, Verfuerth and Gregory-Smith (2018) use psychological concepts to state that spillover may be understood as the flow and drive of cognitive thoughts, emotions, or actions, from one field to another. Usually, the spillover effect proposes that participating in a specific behaviour affects the probability of engagement or release in a second behaviour (Nilsson et al., 2017). In research on environmental behaviour, Thøgersen e Crompton (2009) noticed a greater targeting for spillovers that occurred em a similar context, especially those in a home environment and, on a smaller scale, professional (work) environments; when such a thing happened, the studies aimed to comprehend the balance work and personal life.

Studies carried out by Tudor, Barr, e Gilg (2008) found that the employees' pro-environmental behaviour in their homes determines their sustainable actions in the workplace, indicating a spillover effect from the home to the work environment. Organisational and individual/cognitive factors functioned as essential predictors for sustainable behaviour. As such, employees who already engage in pro-environmental behaviour in their homes will probably do so in their workplace as well (Tudor et al., 2008).

Boström et al. (2015) carried out comparative qualitative research in organisations of different dimensions in several fields (hospitality/conferences, transportation, movie theatres, interior design, and hospitals/daycares) and concluded that a general approach to organisational environmental sustainability, including sustainability policies, strategies, manuals and/or codes of conduct, may assist in helping create a holistic vision that reaches other fields (e.g. ecological packaging, technical schemes and ones relating to risks and acquisition guidelines). It can thus be understood that a sustainable organisational culture, as proposed by Linnenluecke e Griffiths (2010), is a triggering element of the spillover effect. More recently, Gregory-Smith et al. (2015) have tried to comprehend and promote pro-environmental behaviour in the workplace through their research. Besides the home environment, the workplace is one of the leading microenvironments in which people spend most of their everyday life (COX et al., 2015), which is why the workplace is an essential scenario for the encouragement of sustainable lifestyles. Therefore, the potential spillover effects between home and work behaviours and between the two environments have recently attracted research interest (Viola Muster, 2011). Furthermore, Süßbauer and Schäfer (2018) reinforce that the dissemination of sustainable consumption as a meaningful activity in the organisational environment, combined with providing tangible support conditions and practical knowledge, are practices that should make up a corporation's systematic "greening" strategy.

**3 METHODOLOGY**

As the research's locus, a construction company that has been gaining notoriety for promoting its sustainability actions in all stages of its residential building projects was chosen. Its management model, which has been implemented over the course of its 43 years, is based on the lean quality system that is based on the lean manufacturing philosophy and encompasses the main concerns of the company: human capital, the environment, and the search for innovation and technology applied to the construction process.

The construction company received two important environmental stamps, its first LEED certification (LEED Certified – Core & Shell – v2009) of a residential project in the country, as well as its first A Level National Energy Conservation Stamp (ENCE) also known as "Etiqueta PBE Edifica/INMETRO", to be used in common areas of residential buildings all over Brazil.

As an exploratory work, the present study used a qualitative approach (Gil, 2002) by applying diversified techniques aiming to obtain greater clarification for the problem of the research, allowing data triangulation and giving greater data reliability when it comes to the validation of results (Souza & Zioni, 2003).

As for the specific methods for data collection, four techniques were used: documentary research of secondary data, semi-structured interview, focus group and direct non-participative observation, reinforcing Yin (2010) 's idea that case studies must incorporate multiple evidence sources. The documentary research allowed data collection of the company's 2014, 2017, and 2018 reports, which allowed checking its actions, management model, and social and environmental impacts.

The semi-structured interview happened in December 2019 with the Partner-Director of the company and lasted around 37 minutes; it was later transcribed for data categorisation and analysis. The focus groups are discussion groups that engage about a particular theme after receiving proper stimuli for the debate. This technique distinguishes itself by its particular characteristics, especially the group interaction process, which results from the data search.

Five focus groups were conducted. The first one was with the management of the first construction, directly at the site, with the involvement of six employees and the participation of the site's manager engineer, an engineering intern, the production supervisor, two safety officers and an assistant. The second group, also related to management, represented the employees of the main office, who are responsible for controlling, managing, training, and supporting all construction works of the company, all done in the company's headquarters.

Five employees that coordinate the "Lean and Green" department of the company took part, as well as an intern of the division, a civil engineer, an intern of the personnel management centre, and one from the recruiter division. In the third and the fourth groups, ten workers took part and were divided into two groups of five directly in the first construction site; in the fifth group, eight workers took part directly in the second construction site. In the three worker groups, two electricians, two electrician assistants, four builders, a carpenter, a rebar setter, and eight bricklayer's mates. The focal groups were conducted in the work environment in order to identify the sustainable actions taken and the participants' perceptions of the spillover of such actions into their homes.

Another technique used is direct observation, which for Cooper e Schindler (2011), refers to a flexible approach that allows the observer to react and report events as they occur. The direct non-participative observations occurred both in the visitations to the company sites (two construction works and the office, twice) and in the homes of the identified individuals in two distinct periods, having a two-year difference between the first observation and the last. The observations resulted in field diaries that were categorised during the content analysis, which resulted in identifying the employees who exhibited more significant evidence of the spillover effect in their homes. The key element for the spillover analysis were the visits to the employees' homes; in this type of direct observation, more confirmation of the transference process of the work practices to everyday life is obtained. The second visit had an analysis of the impact of the COVID-19 pandemic.

**3.1 Procedures for collection, treatment and result analysis.**

So that the research hereby presented could be further developed, it was necessary to have an interview with a representative of the construction company's senior management about its sustainable actions through a semi-structured script to collect further data. As for the focus groups, a semi-structured script for further data collection was used as the data collection instrument: a focus group script for construction managers and workers. The questions thus followed a line of thinking that started with definitions and concepts, identification of sustainable actions at the workplace and at home, the participants' perception of the spillover of the behaviour of the sustainable actions from the workplace to the home, and they finished with the assimilation of the advantages and disadvantages of maintaining the pro-environmental behaviour.

For the semi-structured script intended for the workers, four "instructive pictures" were included to explain more concepts, clarifying aggressions to the environment to arouse further understanding of the participants about the matter. To Krueger (1988), the focus group conduction could use stimuli tools such as posters, pictures, movies, or a story. The first figure presented an extreme amount of piled trash, without selective collection and surrounded by insects; the second one presents energy wastage in a home by showing several electronic equipments and lights turned on around the house; the third and fourth ones aimed to make them reflective about water wastage by showing a woman washing the sidewalk, and a boy brushing his teeth with the faucet and shower open; all pictures aimed to present a faithful reality of the population of the Ceará State. All participants of this group had the opportunity to look at and talk about each picture individually, thus giving their input.

The use of direct observation, with visitations to the company's employees' homes, was a crucial element in analysing the family members' sustainable behaviour in such a way that its comprehension allowed the reinforcement and understanding of the importance of change concerning environmental behaviour, brought by the workplace, and allowed data acquisition through informal conversations in the face of the environment's dynamism.

Therefore, field diaries were used to register the moments in which the researcher had been at the homes of the company's workers. The visitations were recorded with prior permission from the participants, who signed the informed consent form. During the time inside the home, notes were taken in scratches, later revised and complemented with the recordings made, and further added details after each event. Three houses were observed in June 2019, lasting around 2 hours and 23 minutes each and having 12 pages of information registered, and two houses in August 2021, lasting around 1 hour and 52 minutes each, having ten pages of information, thus constituting a longitudinal study. The analysis period is based on the COVID-19 pandemic.

When selecting the houses to be observed, the employees considered were those who displayed an understanding of the sustainability topics presented as well as showed a significant change in their home behaviour during their participation in the focus group, characterising the spillover. This process became more evident in the moment of categorisation that came from the transcriptions of the focus group talk, in which instructive sentences were chosen for each question of the interview script related to the defined categories.

Since testimonies, stories, and information of the individuals acting in construction were analysed, it was considered that the best way to analyse and treat the obtained data would be through a technique derived from Bardin's Content Analysis. Therefore, the content of qualitative nature (documents and transcriptions of the focus group sessions, interview and observations) were submitted to thematic content review, complying with the following steps: analysis organisation (pre-analysis, exploration of materials and obtained data treatment); encoding (defining the register and context units, listing rules and qualitative analysis, categorisation) (Bardin, 2011).

**4 Analysis and Discussion of Results**

**4.1 Identification of the spillover effect of environmental behaviour from the workplace to the home in construction employees;**

In order for the spillover effect to be identified in the employees' life, the company's main sustainable actions needed to be identified first, so the necessary mapping of this behavioural change could be presented since the workplace influences its actions by creating material and organisational conditions for everyday activities (Schäfer & Süßbauer, 2018).

The interviewees of the managerial division highlighted the importance of the topic to the company as there was a department specific to this subject, the Lean and Green department, in addition to the type of management implemented by the company, called lean production; to I9, 28-year-old coordinator of said department, and a specialist who had been working there for seven years, the department contributes to the control of the sustainable actions and the improvement of productivity in the company. When reporting the sustainable actions carried out by the company both in the main office and on the construction sites, she states:

"[...] we have waste generation reduction actions in the construction sites, material consumption awareness, waste recycling, [...] water use reduction on the site, reusing water during the permeability test, [...] worrying about the source of the materials. The green office actions, planting seedlings," (I9, 2019).

Table 1 below exhibits all categorisations made both by the managerial employees and the workers. However, the managerial body's greater perception of the company's sustainable actions is notorious, undoubtedly because it is more qualified than the worker body, but also because it participates directly in the planning policies, training, and monitoring of the company's entire environmental agenda; thus agreeing with the teachings of Claro, Claro and Amâncio (2008) which state that a greater comprehension of the importance of sustainability is directly linked to investments in education.

**Table 1:** Categorisation of the sustainable actions of the company according to its collaborators' perceptions.

|  |  |  |
| --- | --- | --- |
| CATEGORISATION OF THE SUSTAINABLE ACTIONS IN THE WORKPLACE | | |
| **MANAGERIAL** | | |
| * The environmental concern originates from the company's owner. * Adopting plazas around the city. * Benchmarking between construction works. * "Bosque do bem" (lit. Goodness Grove) project. * Striving for materials that are long-lasting and less harsh for the environment; * Greenhouse gases compensation; * Green commitment; * Visual communication for awareness. * Awareness of the amount of paper being utilised. * Awareness by the employees, through training and lectures; * Energy consumption control in the office/construction work; * Waste, water, energy, and fuel content control; * Correct waste disposal; | * Green office. * Concrete reuse encouragement. * Group feedback on environmental actions; * Employee retention; * Project innovation; * Implementation of environmental impact-reducing equipment in the projects. * Greenhouse gases emission inventory; * Well-utilised lean and green. * “Multirão do bem” (lit. Wellness joint action) association * Company’s sustainable culture perception * Wandering plazas, made with recycled materials; * Planting seedlings. | * Concern over the type and quantity of cement used at the construction site; * Material qualification; * Water reuse; * Material reuse; * Waste reduction; * Waste separation; * Training and lecture for employees and future residents of the buildings; * Training regarding sustainable actions; * Waste grinding at the site; * One cup per employee; * Non-grinded waste sale for recycling; |
| **OPERATIONAL** | | |
| * Use of collapsible cup for each worker; * Selective collection; * Green compromise; * Recycling awareness; * Correct disposal awareness; * Construction site noise decrease; * Conserving energy; | * Owners' example; * Cleaning; * Organisation; * Perception regarding the company being ecologically correct; * Seedlings plantation; * Wandering plaza | * Protecting the neighbourhood against dust; * Water reuse; * Sustainable actions training; * Waste grinding; * Use of tap water for the urinal; |

Source: Made by the author, based on research data (2020)

anent sustainability issues training routine that pervades the constant reminder of the quality standards. This strategy is aligned with the teachings of Law et al. (2017), who states that environmental awareness training that aims to develop and encourage sustainable behaviour changes in the workplace is considered a sustainable action.

Table 2 presents the main categories found by the employees' perception of the sustainable actions spillover from the workplace to the home. The main identified categories for the interviewed group of the executive department were: more conscience of sustainable issues and consumption, while for the workers, they were: more conscience of sustainable issues, selective collection, energy and water conservation. The more significant amount of categories found in the workers' perception might be linked to them having to operate as change agents, having to adhere to environmental actions inside their homes while they learn about them and their benefits, thus creating a sustainable consciousness, which is different from what was seen from the interviewees from the managerial department who already bring a culture of sustainable values with them from their homes to the company.

**Table 2:** Categorisation of the spillover effect by the company's collaborators' perception.

|  |  |
| --- | --- |
| **Managerial** | **Operational** |
| * Search for reclycled materials, such as notebooks (2); * Technical knowledge helps reducing wastefulness at home * Sustainable consumption (Mãe Terra brand); * Sustainable consumption (Natura brand) * Sustainable consumption (O Boticário brand) * Energy conservation (2). * Water conservation (2) * Greater worry over the energy consumption of equipments. * Vegan brands. (Lola) * My perception of sustainable practices in every environment I am in (3); * Water reuse; * Replacing the lights at home for LED lights. | * Selective collection (7); * Home awareness (6); * Environmental care and awareness (9); * Correct oil disposal; * Water conservation (5); * Energy conservation (4); * Seedlings plantation (4); * Water reuse (3); * Waste grinding. |

Source: Made by the author, based on research data (2020)

This fundamental awareness that contributes to the rise in individual environmental responsibility is, according to Young et al. (2013), crucial for reducing environmental impacts brought on by processes and practices carried out inside the organisations. This sustainable perspective can be encouraged by actions that teach recycling methods, the selective collection process, or even just reminders to turn off lights and computers (Tudor et al., 2008). Interviewee I5 confirms such information by stating:

“[...] At the company, we are encouraged to get this sustainability awareness, [...] in my home, we try to select the trash, to have a more conscious water consumption, [...] by taking shorter showers, the flushing thing, using the valve. The simplest and most practical [stuff] that we can memorise quickly in our everyday lives [...]". (I5, 2019)

Sustainable actions carried out at the workplace that encourages water conservation and reuse allowed for the spillover of the environmental behaviour in several interviewees, getting them to develop not only conscient consumption but also ways to reuse water for other domestic chores, as highlighted by the direct observation written in the field diary: "[...] I found the washing machine and questioned them on how the water that came from it was collected to be reused. I26 showed me an installation he made by connecting the washing machine hose directly to the bathroom, as pictured in Figure 1. A yellow pipe attached to the installation makes it so that the water can be collected in a bucket, [...] the water is then used to wash the sidewalk, his motorcycle, and in his renovation, [...] according to him, he learnt it at the company's training." – Comment Interviewee 26 - Carpenter

Figure 1 shows the spillover of selective collection to two of the observed houses, where the care in separating recyclable trash, picked up by local waste pickers, from organic could be noticed. The field diary from the electrician's assistant, Interviewee E13's home, reports: "[...] I noticed trash in both buckets, recyclable in the white and organic in the yellow. They describe how they separate glass, plastic, hygiene product bottles, cardboard, and paper. Sometimes when they notice a significant amount [of trash], they take all objects to a place in the Metrópole neighbourhood where they are weighted, and the weight price is turned into a discount on the energy bill".

**Figure 1:** Evidence of the spillover effect in home life.Uma imagem contendo Texto

Descrição gerada automaticamente

Source: Based on research data (2019).

The spillover of constructive actions was also specially recognised in two of the three houses visited in loco because they were undergoing a sort of construction or renovation.

"I26 showed me the places where the leftover rubble was

reused. He also showed how he was recycling the rubble that was being generated. He had already ground and sifted it through, leaving it ready for the next plaster [...]" - Comment Interviewee 26 – Carpenter.

The barriers most mentioned by the employees for the behaviour not to spillover from the workplace to the home were: lack of proper structure in the building they live in, no encouragement or investment in sustainable actions, and lack of public policies that show the importance and the ease in carrying out such actions.

**4.2 Description of the effects of the COVID-19 pandemic on the previously identified behaviour;**

In order to answer the second specific objective of this research, since the employees previously visited in 2019 had indicated in their talks in the focal group the possibility of the spillover effect in their homes, and having confirmed through direct observation inside their homes, they were again contacted and invited to partake in the study through a new direct (non-participative) observation in order to take note of the continuity of the pro-environmental behaviour or any changes in it due to the COVID-19 pandemic.

During the direct observation made in the home of Interviewee 13 - I13 in August 2019, there was substantial evidence of sustainable behaviour due to actions proposed and executed by his workplace, such as water conservation by installing mechanisms that direct the water used in the washing machine to a 20l barrel for use in domestic chores and car and motorcycle wash; separating organic from recyclable trash in buckets in different colours attached to the wall; exchanging all lights in the house for LED lights to reduce energy consumption; and grinding waste from the ongoing construction work to use in their own construction (Cox, A., Higgins, T., Gloster, R., Foley, B, Darnton, 2012; Gregory-Smith et al., 2015). For this first observation, I13, his wife and his son (a minor) participated. In her reports, the wife depicted the importance of the work done by the company in which her husband works and of his and his family's pursuit of understanding and putting the acquired knowledge into practice in the home.

In the observation on August 19th 2021, the couple reported that during the first lockdown decree established by the Ceará State Government, they chose to go to the state's countryside, to a town called Trairi. The decision was taken mainly due to the rise in food prices and the fear of job loss since, at the time, the construction industry was not considered essential, and the workers were warned about the possibility of not keeping their jobs (Brisa, 2021). When walking through the house to observe the previously displayed behaviours, the absence of the 20l barrel was noticed, as well as the mechanism of water reuse. Moving to the countryside made them remove the mechanism and take it to their relatives' house in the countryside as a way to conserve water since the consumption would be higher with more people, see Figure 1. As soon as they returned to their house in the city, the couple noticed a rise in the energy and water bills since the wife was still working remotely; they kept disposing of trash by separating the recyclables from the organic (O'Connor & Assaker, 2021; Sarkis, 2020). I13 said there was an increase in the consumption and the amount of trash produced by the family; he expressed: "we noticed that the amount of recycled material increased during the time we stayed at home, especially since we were looking to buy items that were easy to sanitise and discard (...) we noticed not only an increase in the trash but also in the price of what we constantly buy due to the pandemic" (O'Connor & Assaker, 2021).

**Figure 1:** Behaviour before and after the COVID-19 pandemic - I13.

Interface gráfica do usuário, Site

Descrição gerada automaticamente

Fonte: Própria, com base nos dados da pesquisa (2021).

Evidently, even with the consciousness of the need to continue with environmental behaviour, aiming to reduce the environmental impacts even further, the pandemic not only brought forward a need to adapt the family routine, making them move to another town in search of a more accessible lifestyle, but also an increase in the previously controlled consumption by the transfer in responsibility previously done at the workplace to the home (Alla et al., 2020). When questioned about a decrease in the company's focus on sustainable issues, interviewee I13 said that, during the entire time their work was interrupted, the company continued giving support to him and his family and that, recently, since returning to the activities, they have been receiving soap, face masks, and hand sanitiser for him and his family, as a way to prevent COVID-19.

This fundamental awareness that contributes to the rise in individual environmental responsibility is, according to Süßbauer e Schäfer (2018), crucial for reducing environmental impacts brought on by processes and practices carried out inside the organisations. This sustainable perspective can be encouraged by actions that teach recycling methods, the selective collection process, or even just reminders to turn off lights and computers (TUDOR et al., 2008).

During the second observation made in interviewee 26 - I26's home, it was confirmed that he carries the formerly presented behaviour on, according to Figure 2. The family keeps reusing the water from the washing machine in all domestic chores that allow its reuse. Since there are still renovations taking place, the water has been kept in buckets on the upper floor, covered up by ceramic tiles to use when making plaster. The interviewee still grinds the construction waste and uses it, just as he learned from the construction in which he works. Similarly to the previous observation, the family noticed an increase in energy and water consumption due to remote work and the online classes from the university both their daughters attend; however, they do not think that their previously acquired sustainable behaviour has been affected by the pandemic, especially since they spend longer together and keep each other in check as to any possibility of wastefulness.

**Figure 1:** Behaviour before and after the COVID-19 pandemic - I26.

Uma imagem contendo jornal, screenshot, foto, diferente

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The spillover effect approach supports this trend, especially relating to the interdependency between the home and professional environments, since it refers to how the experiences of one environment (work or home) affect the expectations in another one, such as affection levels, values, competencies, and behaviours. Considering the above, the employees of the studied construction company, due to its strong, sustainable organisational culture, which possesses practices and encouragements that promote pro-environmental behaviour, spillover from work to their homes, reducing the impact of actions inside the construction industry as well as in daily and family behaviour. Moreover, this behaviour is not temporary; it is permanent, resisting even the rigid rules of isolation due to a global pandemic.

**5 CONCLUDING REMARKS**

In the last decades, topics related to sustainability have been commonly utilised in companies' day-to-day, probably because an even more significant number of people have been gaining awareness of the limitations of natural resources and of the risks that we face as humans due to abusive and aggressive practices imposed on the environment. This scenario has allowed the emergence of a new paradigm, changing the relation standard between men and nature, making consumer costumers who are more demanding about environmental issues emerge, arousing in companies the need to analyse, innovate and/or reinvent themselves as a more sustainable business that seeks to minimise the environmental impacts in their processes. The primary authors and scholars lean into the idea that we are facing a sharp cultural change, which, inside the corporate context, would encompass not only the company but also its employees individually.

From a practical standpoint, this study offers a perception of companies' impact on their employees' awareness of sustainable practices, especially when they are directly linked to their commodity chain. Furthermore, the study on the permanence of sustainable behaviour emphasised by the spillover effect, especially during containment measures of a pandemic, confirms the importance of the company as a locus that allows behavioural changes.

Thus, the best solution for the existing environmental problems and threats is to review human behaviour on the environment and the relationship between human beings and nature. Observing the behaviour spillover in the home and its permanence over two years and a pandemic attests to a lasting change, not a temporary one.

This study has its limitations, for since it is a qualitative research, its results cannot be generalised. Moreover, quantitive research that restrains its context for construction companies that embrace sustainable actions are few; there are not many companies with international and national certification, and that completely adhere to environmental parameters requested by the local regulatory authorities, frequently functioning, due to its initiatives, as motivation for new environmental public policies, as is the case of the studied construction company. Thus, it would not be possible to reach a minimum amount that allowed statistical tests.

In conclusion, we propose to continue observing the possibility of the spillover effect of pro-environmental behaviour from the work environment to the home, be it in the construction industry or other industries that its actions have a high environmental impact, since the recent studies made are from foreign researchers, thus making a subject of lacking results in Brazil.