

## **ABSENTEEISM DUE TO THE COVID-19 PANDEMIC AND ITS IMPACTS ON PRODUCTION IN A FOOD PROCESSING COMPANY**

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### **Abstract**

The coronavirus pandemic has brought about deep and unprecedented transformations in the world economy and population, and industries have suffered various impacts in different areas. Given this scenario, the way of working had to adapt to avoid an increase in the number of absences from work and the consequent drop in productivity. Absenteeism is a phenomenon that originates from extrinsic and intrinsic factors and is quite expensive for organizations. To this end, 188 employees who work in three different shifts in a 24 hour period participated in the study. For statistical analysis, the correlation coefficient of R was used. The loss of productivity between the periods from 2019 to 2021 was (1%) through the adjusted R<sup>2</sup>, yet the loss of productive hours in the same period was (8%). The results indicate that there was a weak relationship between absenteeism associated with a drop in productivity in the period of the Covid-19 pandemic.

Keywords: Absenteeism; productivity; workers; food industry; Covid-19.

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## 1 Introduction

The first initiatives to identify the Coronavirus, also known in the medical world as Severe Acute Respiratory Syndrome (SARS-COVID) took place in China at the end of 2019. From its complications, the virus spread around the world very quickly, which made the World Health Organization (OMS, 2020) take a stand and declare it a global pandemic. In this way, the same institution reported that the effects of the virus required restrictive measures in order to protect the health of the entire population.

This is an atypical and unprecedented scenario involving a disease that generates major clinical and psychological problems in human beings, directly impacting their ability to work. According to (Franco et al., 2020; OMS, 2020), Covid-19 is a highly contagious respiratory syndrome, with less severe symptoms such as cough, shortness of breath, sore throat, fatigue, loss of taste, fever, diarrhea, and nausea, as well as more severe complications such as pneumonia, severe acute respiratory syndrome, renal failure, and others.

Faced with this global challenge, the world economy has undergone some changes arising from the health crisis due to the Coronavirus-19 pandemic, which has exposed some difficulties in industries, both in the financial and organizational spheres. According to (Brazilian Institute of Economics, 2020), the speed at which the virus spreads is incomparable with the ability to produce indicators of its impacts on the economy.

Faced with this organizational scenario, the routine of the most productive sectors was changed, being remodeled at the company's sectoral level, in the search to avoid contamination and maintain the level of productivity. Even so, (Marcato et al., 2020, p. 6), reveals that “the stoppage of some production lines reflects a scenario of deterioration in the financial conditions of companies, shortage of inputs and retraction of domestic and external demand.” In this way, to balance the production system, the pace of processes was accelerated with the objective of maintaining sustainability and profitability for the organization. Also, (Conte et al., 2020) explain that the pandemic, despite being a health crisis, has direct effects on economic aspects.

Therefore, it became essential for companies to reinvent themselves and establish internal policies to protect against the coronavirus by reducing personal contact. In this way, some employees took sick leave, and for others, the routines of distributing tasks in opposing shifts were

intensified. Other employees began working from home. All of these changes aimed at mitigating the impacts of the virus contamination. As a result, the workforce reduced, and consequently employees had to increase their work goals to be met. This impact of the pandemic on the intensification of labor demands may have been a limiting element for some employees, impacting their health, quality of life and productivity.

In this regard, the reduction in work performance contributes substantially to productivity costs, as it does not only affect the specific work in question, but also the coworkers (STRÖMBERG et al., 2017). In addition, (Sanderson and Cocker, 2013) explain that the loss of productivity can be associated with the difficulty of meeting deadlines and concentration deficits, preventing the worker from thinking clearly and being able to perform tasks with greater efficiency. In this context, work activities aimed at compensating for the new work policies with work intensification, which provided greater physical and mental exhaustion for employees. Thus, the time dedicated to leisure, family life and physical and mental recuperation was reduced, and this clearly impacted the health of employees.

From the perspective of (Oliveira, 2004), the productive sector must reconcile the search for economic growth with the preservation of the living conditions of employees through the integration of organizational management. From the point of view of productivity, there is a very strong relationship with absenteeism, although it must be considered that presenteeism is also a phenomenon that expresses a loss of productivity due to functional limitations.

In general, absence from the workplace due to health problems leads to a drop in productivity, becoming a burden on the economy of organizations (BEVAN, 2015; KOCAKULAH et al., 2016; NAGATA et al., 2018). According to (Chiavenato, 2010), absenteeism is the frequency or duration of work time lost when employees do not come to work, thus constituting the sum of periods in which employees are absent from work, which is accepted as attributable to an individual's disability (OENNING et al., 2012).

It is revealed by (Penatti and Quelhas, 2006) that absenteeism is a phenomenon that reduces the competitive advantage of organizations. Thus, it needs to be minimized so that there is a perfect balance between productivity and production capacity. Furthermore, high levels of sick leave are directly associated with negative effects on productivity and represent substantial costs for the organizational system, as well as for

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workers, impacting profitability, competitiveness and customer service (GERHARDT and SILVEIRA, 2009; AGAPITO and CARDOSO DE SOUSA, 2010; HAUKKA et al., 2013; BADUBI, 2017; MEKONNEN et al., 2019).

Corroborating the aforementioned authors, (Quick and Lapertosa, 1982; Ciconelli et al., 2006; Raja and Gupta, 2019) reveal that absences in the workplace generate several social and economic problems, reducing production, overloading workers and increasing the operating cost of labor.

In this scenario, absence from work can decrease productivity, increase overtime costs, and increase the workload for the employees who are present. This increase in workload can lead to health degeneration and consequently cause an even greater increase in absenteeism.

With regard to absences, in his research with 229 human resources (HR) leaders, (Gartner, 2020) showed that half of the companies had more than (81%) of the workers in their homes during the pandemic. It is known that in normal times, absenteeism levels in the USA are estimated at an average (1.6%) of the total work time (GERHARDT and SILVEIRA, 2009). The same authors also reveal that in the UK, absenteeism costs an average of more than thirty-two billion euros per year. Within this context, (Mekonnen et al., 2019) identified that absences due to illness vary between different groups. In Europe (3%) of employees are absent daily due to health problems, while in Estonia this number rises to (8.4%). The study by (Martins et al., 2005) on public and private services found a greater number of days lost in the public sector than in the private sector, an average in days of (3.82) and (2.13) respectively.

Faced with this reality, the implementation of organizational management processes to increase the success of organizations will allow for growth in the productivity and profitability of companies. According to (Ohno, 1997), the optimization of management is to control waste in production processes, with the objective of minimizing costs and raising the company's level of competitiveness.

However, it is relevant to examine how the quarantine and absences due to health issues affected workplace productivity. Given the complexity and multifaceted nature of the problem, the objective of the research is to investigate the relationship of absenteeism in the production process arising from the COVID-19 pandemic in a food processing company. This approach will have a mutual interaction, identifying significant contextual factors at the organizational support level.

## 2 Methodology

This study deals with a company in the food sector which operates in the production of flour, pasta and cookies. This company has a strong presence in the market of the southern region of Brazil. This research is a longitudinal, descriptive and quantitative study, as it investigates the impact of absenteeism on productivity arising from the COVID-19 pandemic period.

Regarding the methodological objectives, the research is considered descriptive because it seeks to understand and reveal the facts of the organization. According to (Gil, 2010), descriptive research intends to describe the particularities of a given population, allowing the identification of probable relationships between variables. As for its nature, it is considered applied research, linked to truths of local interest, aiming at the production of knowledge for practical application in order to solve problems (Gerhardt and Silveira, 2009). As for the approach to the problem, it can be considered combined, that is, qualitative and quantitative. Qualitative research focuses on understanding and explaining the dynamics of phenomena that cannot be reduced to the operationalization of variables, whereas quantitative research focuses on objectivity and uses mathematical language to explain causes and phenomena (Gerhardt and Silveira, 2009). The same author also reveals that the joint use of qualitative and quantitative research allows the collection of more information than could be obtained in isolation.

Regarding the research procedures, it is considered documentary, as according to (Pádua, 1997; Gil, 2010), the research does not involve many costs, does not require contact with the research subjects, allows for an in-depth reading of the sources, and is still a rich and stable source of data in order to describe and compare facts, establishing their characteristics and trends. According to (Marconi and Lakatos, 2003), they explain that documentary research is called the primary source of data collection, written or not.

This study was carried out in a company in the northwest region of Santa Catarina, in a production unit sector of a food factory, from May 2019 to May 2021. The company has approximately 600 employees distributed in different areas.

Within the context of data analysis, some criteria were established, such as: exclusion of individuals on maternity leave and vacation, since these absences are not considered absenteeism (ILO, 2013). The analyses

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also took place in a specific production line containing three subdivisions with a sample of a total of 188 employees. Employees work in different shifts, as the company operates continuously, 24 hours a day.

To meet the proposed objective, the documentary research was carried out using registered data provided by the investigated organization and took place during the first half of 2021.

Initially, the person responsible for work safety was contacted and a meeting was held with the production, work safety and HR managers. After ethical organizational adjustments were made, the spreadsheets and reports were released, where all data were analyzed, sorted and tabulated.

For the construction of the analysis of the work shifts, 8 hours of leave was considered as a day of absence. From this, the relationship was established between the hours of absenteeism and the amount of kilos produced in the same time period. The information came from the company, which has the monthly productivity report, as well as the days of leave of the employees.

After performing the data collection, the calculation of absenteeism rates was performed, which assesses the percentage of absenteeism. According to (Abreu et al., 2016), the calculations are expressed in percentage rates.

Where:

$$AR = (NAE \times 100) / NE$$

AR= absenteeism rate

NAE= Number of absent employees

NE= Number of employees in the period

Also considered were the averages of absenteeism, standard deviations of each year individually before the pandemic and during the pandemic, and the correlation of absenteeism with the productivity of this period.

As for the quantitative analysis, the data received statistical treatment of correlation coefficient R, which is a measure that determines the proportion of the variance in the dependent variable (productivity) that can be explained by the independent variable absenteeism. That is, it is a measure of the degree of association between two variables.

According to (Hair et al., 2009), negative values between variables indicate a negative correlation; that is, the higher a value of a variable, the lower the value of the other variable. When the values are positive, it indicates that the greater the value of a variable, the greater the value of

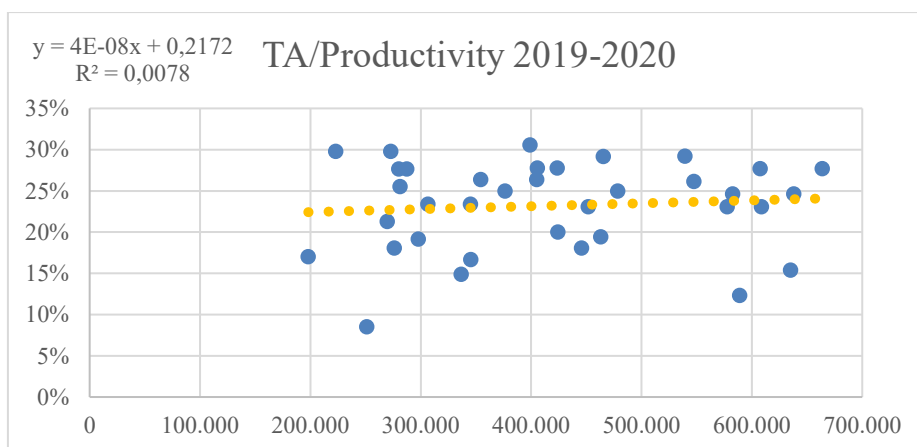
the other variable. The same author also explains that a value between 0.6 to 1.0 indicates a strong correlation between variables, and values between 0.01 to 0.69 indicate a weak correlation between variables. All analyses were organized and tabulated using Microsoft Excel 2019.

### 3 Data Analysis and Discussion

In the present study, in the period from May 2019 to April 2020, an absenteeism rate of (23%) was found among the 188 employees of the three work teams. During this period, the month of May stands out with an absenteeism rate of (31%). In the period from May 2020 to April 2021, an absenteeism rate of (21%) was found, and among these years the month of April stands out with an absenteeism rate of (34%). It can be considered that the months that stand out in terms of absence rates align with the period of greatest evidence of the spread of the coronavirus. However, it cannot be assured that all absences were caused by issues related to Covid-19.

Regarding the absenteeism and productivity rate (Graph 1), in the period 2019-2020, it is observed that the study found weak evidence in the decrease in productivity related to absences from the workplace, where it presented a value of  $R^2$  adjusted from (1%).

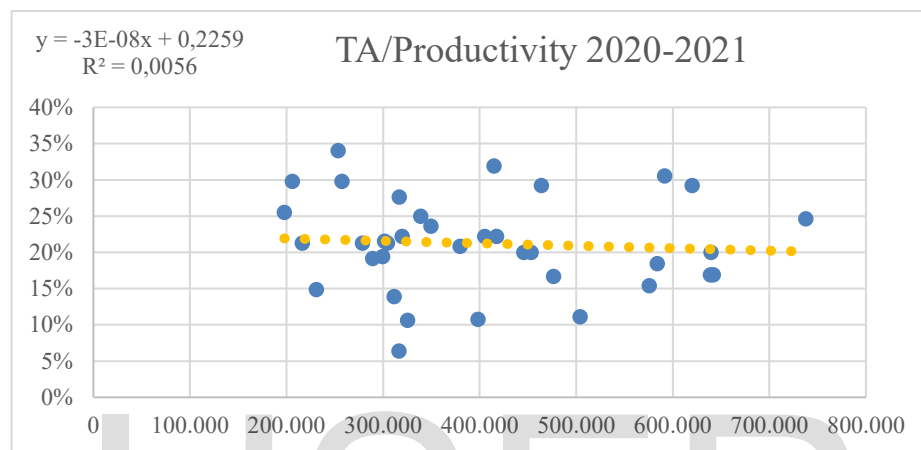
Graph 1. Absenteeism/Productivity rate relationship



Source: The authors 2021

In the period 2020-2021, according to (Graph 2) the adjusted R<sup>2</sup> value of (1%) stands out, not showing significance in the loss of productivity, which according to (Hair et al., 2009), these values close to zero do not present any correlation between the investigated variables.

Graph 2. Absenteeism/Productivity rate relationship



Source: The authors 2021

In this way, the present study identified that the productivity rates did not present significant changes in relation to their losses. It is suggested that the intensification of tasks to be performed by employees with their physical efforts met the organization's goal of productivity loss. Similarly to our study (Vieira et al., 2011) on productivity in a logistics company, the absenteeism rate was found to be higher in the afternoon, although it did not minimize the production process, and this period had the highest average individual productivity.

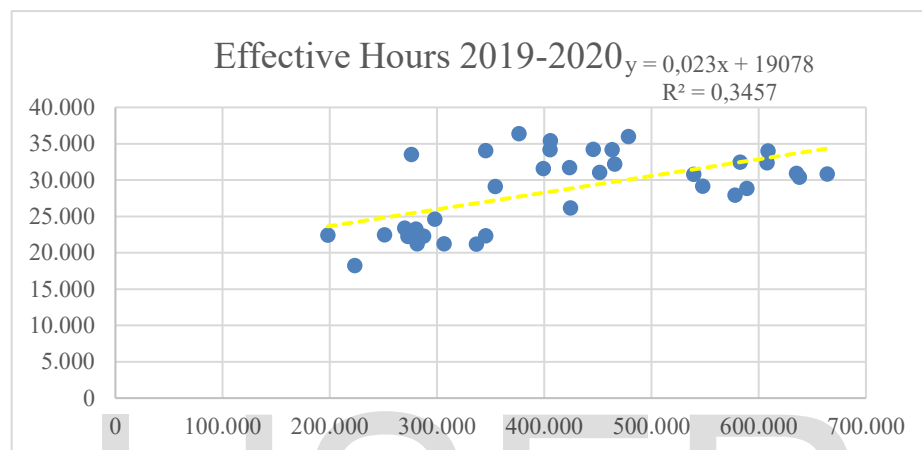
In this regard, the study by (Almeida et al., 2015) on the causes and disadvantages of absenteeism, it was pointed out that employee absences at the company are associated with physical fatigue, and lack of interest and commitment to the company. The disadvantage of this process is the loss of productivity and dissatisfaction of the customer and the employees themselves. It can also be considered that among these absences, problems of lack of engagement with the company may be linked, resulting in absences at the workplace and decreased productivity. It is thus clear that absenteeism is a multifactorial phenomenon with several facets that can affect organizational processes.

According to (Graph 3) in the investigation process, the effective hours and productivity from 2019 to 2020 were analyzed, and the



analyses show that in this period of the pandemic there is a value of R rate of (0.59), and an Adjusted R<sup>2</sup> of (35%).

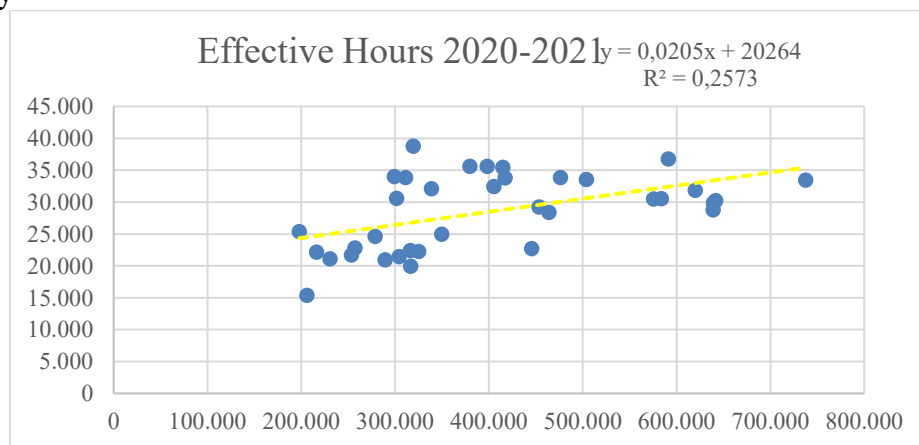
Graph 3. Relationship between effective hours worked and productivity



Source: The authors

In the period from 2020 to 2021, (Graph 4) presents the value of R (0.51), with an adjusted R<sup>2</sup> of (26%) and a loss of effective hours of (8%) of production.

Graph 4. Relationship between effective hours worked and productivity



Source: The authors

Based on the data collected, it was found that the productivity rate related to absenteeism in the pandemic period did not exponentially impact

the production volume in the three time periods involved in the research. However, the profile of employees, the design of the work environment and engagement at work can contribute to confounding estimates. In addition, a period of unprecedented pandemic crisis in which jobs are increasingly volatile can be an influencing factor in the level of productivity maintenance. This is unlike our study (CNI, 2021) on a Brazilian manufacturing company, with its measure of volume produced and hours worked, which showed that in the first quarter of 2021, labor productivity registered a drop of (2.5%) compared to at the same period in 2020.

This also diverges from our study (Strömberg et al., 2017) on the economic impact of absenteeism with 758 managers from different sectors of the labor market, where it was identified that production time and teamwork or difficulty of replacing a worker are linked to lost productivity.

To understand economic issues through productivity losses, (Zhang et al., 2011, p. 1) explain that to balance efficiency with equity, lost productivity must first be expressed in quantities such as the number of days or hours of work lost, and then evaluated as a monetary amount. In this context, the loss of effective time impacts the economic cost of the company. In this study, an effective loss of (8%) per year was identified. It can be considered that productivity growth is an essential element for organizational economic sustainability. In this way, the reduction of absenteeism becomes an important factor for the financial health of the company.

In the study by (Zhang et al., 2017) that estimated the impacts of absenteeism on productivity and wages using data linked to the employer, evidence was provided that lost productivity due to absence exceeds the wages of team workers, mainly in small companies, which is in agreement with our research.

According to (Nagata et al., 2018) in their research on the costs of absenteeism of four pharmaceutical companies in Japan, it was identified that the greatest productivity losses are associated with problems of neck pain, insufficient sleep, back pain, eye dryness, glaucoma and depression.

In the investigation by (Bevan, 2015), the economic impact of lost productivity through absenteeism in the European Union (EU) can reach (2%) of the Gross Domestic Product (GDP). We must consider the cost differences between the aforementioned research and our research, in addition to the work context being different from our study.

According to (Macedo, 2012), productivity is related to the input and output of the product of an activity. However, with the absence of employees in the input process, that is, in production, the output may be compromised by being minimized or overloaded, impacting the quantity of production, as well as the quality of the products developed. The pandemic has affected the health of the general population, although the results of the study showed no differences between the first year before the pandemic and the first year during the pandemic.

Given the complexity of working in an organization, which requires many personal skills, especially following the organization's rules and goals, it is observed that people have inherent needs to only perform mechanical tasks. In this regard, absenteeism becomes an element that expresses work dissatisfaction. In fact, the management of people at work must take place with an integrative view, and adjustments to issues of the work environment and personal expectations must result in a greater contingent in the workplace, thus characterizing work frequency as an efficient accommodation between productivity and personal satisfaction.

More in-depth studies are needed to determine the best times to predict whether absenteeism significantly impacted productivity, as according to the results presented, there are no robust correlations for such identification.

#### **4 Final Considerations**

This article aimed to explain the correlation between absenteeism and productivity. Our results showed that the absences in the period of the Covid-19 pandemic in the work routine did not significantly impact the productivity rate within the context of the investigated food processing company. Therefore, it is difficult to advocate such productivity loss rates for different samples and populations, as more homogeneous groups may have more robust responses.

In view of the above, it is suggested that further investigations be carried out into the economic burden regarding the health of employees and the effect of Covid-19 on the work environment, as well as the rates of each disease affecting employees during the pandemic period, or even carrying out a larger sample of the entire organizational context.

## 5 References

- ABREU, E.S. DE, SPINELLI, M.G.N., PINTO, A.M. DE S., 2016. Management of Food and Nutrition Units-a way of doing. Metha, Sao Paulo.
- AGAPITO, S.M., CARDOSO DE SOUSA, F., 2010. The influence of professional satisfação on absenteeism. *Rev. Port. Health Publishes* 28, 132–139. [https://doi.org/10.1016/S0870-9025\(10\)70004-3](https://doi.org/10.1016/S0870-9025(10)70004-3)
- ALMEIDA, D.R.O. DE, NASCIMENTO, I.G. DO, NETO, J.M. DA S., ALMEIDA, A.G. DE B., 2015. Causes and Desvantgens of Absenteeism: the case of the 24-hour auto center company in Porto Velho. XII Congr. Nac. Excel. in Management and III INOVARSE 2016 18.
- BADUBI, R.M., 2017. A Critical Risk Analysis of Absenteeism in the Work Place. *J. Int. Bus. Res. Mark.* 2, 32–36. <https://doi.org/10.18775/jibrm.1849-8558.2015.26.3004>
- BEVAN, S., 2015. Economic Impact of Musculoskeletal Disorders (MSDs) on Work in Europe. *Best Pract. Clin. Rheumatol.* 29, 356–373.
- CHIAVENATO, I., 2010. *People Management: the new role of human resources in organizations.*, 3rd ed. Elsevier, Rio de Janeiro.
- CNI, C.N., 2021. National Confederation of Industry 2020–2021.
- CONTE, B.P., PINTO, N.G.M., CORONEL, D.A., 2020. The Selic Rate and its Impact on the Brazilian Economy. *FAPERGS* 2. <https://doi.org/10.17648/2178-6925-v2-2020-22>
- FRANCO, W., BARBERA, F., BARTOLUCCI, L., FELIZIA, T., FOCANTI, F., 2020. Developing intermediate machines for high-land agriculture. *Dev. Eng.* 5, 100050. <https://doi.org/https://doi.org/10.1016/j.deveng.2020.100050>
- GARTNER, 2020. Gartner HR Research reveals that 41% of Employees are likely to work remotely at least part of the time after the coronavirus pandemic. [WWW Document]. URL <https://www.gartner.com/en/newsroom/press-releases/2020-04-14-gartner-hr-survey-reveals-41--of-employees-likely-to> (accessed 2.19.22).

GERHARDT, T.E., Silveira, D.T., 2009. Search Method. UFRGS, Porto Alegre.

GIL, A.C., 2010. How to Develop Research Projects., 5<sup>o</sup>. ed. Atlas, Sao Paulo.

HAIR, J.F., BLACK, B., BABIN, B., ANDERSON, R.E., TATHAM, R.L., 2009. Multivariate Data Analysis. Bookman, Porto Alegre.

HAUKKA, E., KAILA-KANGAS, L., OJAJÄRVI, A., MIRANDA, H., KARPPINEN, J., VIKARI-JUNTURA, E., HELIÖVAARA, M., LEINO-ARJAS, P., 2013. Pain in multiple sites and sickness absence trajectories: A prospective study among Finns. *Pain* 154, 306–312. <https://doi.org/10.1016/j.pain.2012.11.003>

BRAZILIAN INSTITUTE OF ECONOMICS, 2020. The world's biggest challenge since World War II. Rev. Editor. of Bol. IBRE 24 macro.

KOCAKULAH, M.C., KELLEY, A.G., MITCHELL, K.M., RUGGIERI, M.P., 2016. Absenteeism Problems And Costs: Causes, Effects And Cures. *Int. Bus. Econ. Res. J.* 15, 89–96. <https://doi.org/10.19030/iber.v15i3.9673>

MACEDO, M., 2012. Productivity management in companies. *Rev. Organ. Systemic* 1, 110–119.

MARCATO, M.B., TORRACCA, J., DWECK, E., MIGUEZ, T., FERREIRA, K., VILAR, M.C., 2020. Impacts of COVID-19 on brazil's manufacturing industry.

MARCONI, M., LAKATOS, E., 2003. Fundamentals of scientific methodology, Editora Atlas S. A. <https://doi.org/10.1590/S1517-97022003000100005>

MARTINS, R.J., GARBIN, C.A.S., GARBIN, A.J.Í., MOIMAZ, S.A.S., 2005. Absenteeism for dental and medical reasons in public and private services. *Rev. Bras. Health Ocup.* 30, 09–15. <https://doi.org/10.1590/s0303-76572005000100002>

MEKONNEN, T.H., LAMESSA, S.K., WAMI, S.D., 2019. Sickness-related absenteeism and risk factors associated among flower farm industry workers in Bishoftu town, Southeast Ethiopia, 2018: A cross-sectional study. *BMC Res. Notes* 12, 1–7.

<https://doi.org/10.1186/s13104-019-4223-2>

NAGATA, T., MORI, K., OHTANI, M., NAGATA, M., KAJIKI, S., FUJINO, Y., MATSUDA, S., LOEPPKE, R., 2018. Total Health-Related Costs Due to Absenteeism, Presenteeism, and Medical and Pharmaceutical Expenses in Japanese Employers. *J. Occup. Environ. Med.* 60, e273–e280. <https://doi.org/10.1097/JOM.0000000000001291>

OENNING, N.S.X., CARVALHO, F.M., LIMA, V.M.C., 2012. Indicators of absenteeism and diagnoses associated with medical leave of service workers in an oil industry. *Rev. Bras. Health Ocup.* 37, 150–158.

OHNO, T., 1997. *The Toyota Production System: in addition to large-scale production.* Bookman, Porto Alegre.

ILO, 2013. International Labour Organization, *Public Service Magazine.* <https://doi.org/10.21874/rsp.v86i1.3668>

OLIVEIRA, D.P.R., 2004. *Strategic Planning: concepts, methodology and practices.* Atlas, Sao Paulo.

OMS, O.M. de S., 2020. Novel Coronavirus - 2019-COVID. *Mater. Methods* 10, 1–5. <https://doi.org/10.13070/mm.en.10.2867>

PADUA, E.M.M., 1997. *Research Methodology: theoretical-practical approach.* Papirus, Sao Paulo.

PENATTI, I., QUELHAS, O., 2006. Absenteeism : The consequences in people management, in: *III SEGeT - Symposium of Excellence in Management and Technology.* pp. 1–11.

QUICK, T.C., LAPERTOSA, J.B., 1982. Analysis of Absenteeism in Steel Mill. *Rev. Bras. Health Ocup* 40, 62–67.

RAJA, H., GUPTA, R., 2019. The Impact of Employee Absenteeism on Organizational Productivity With Special Reference To Service Sector. *Int. J. od Res. Humanit. Arts Lit.* 7, 581–594.

SANDERSON, K., COCKER, F., 2013. Presenteeism: Implications and health risks. *Aust. Fam. Physician* 42, 172–175.

STRÖMBERG, C., ABOAGYE, E., HAGBERG, J., BERGSTRÖM, G., LOHELA-KARLSSON, M., 2017. Estimating the Effect and Economic

Impact of Absenteeism, Presenteeism, and Work Environment–Related Problems on Reductions in Productivity from a Managerial Perspective. *Value Heal.* 20, 1058–1064. <https://doi.org/10.1016/j.jval.2017.05.008>

VIEIRA, A.M., TOLEDO, R.C., VIEIRA, A.C.C., COSTA, W.J. da, 2011. Analysis of Impacting Factors in Production and Organizational Productivity in Work Shifts of a Logistics Services Company., in: *Engep- XXXI National Meeting of Production Engineering*. London.

ZHANG, W., BANSBACK, N., ANIS, A.H., 2011. Measuring and valuing productivity loss due to poor health: A critical review. *Soc. Sci. Med.* 72, 185–192. <https://doi.org/10.1016/j.socscimed.2010.10.026>

ZHANG, W., SUN, H., WOODCOCK, S., ANIS, A.H., 2017. Valuing productivity loss due to absenteeism: firm-level evidence from a Canadian linked employer-employee survey. *Health Econ. Rev.* 7. <https://doi.org/10.1186/s13561-016-0138-y>

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