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THE GLOBAL REORGANIZATION OF MICHELIN: AN APPROACH FROM THE PERSPECTIVE OF THE MICHELIN MANUFACTURING WAY PHILOSOPHY IN THE MANAUS INDUSTRIAL HUB

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A B S T R A C T

Daily, in large industries, there is a concern about the continuous improvement of production processes, and many problems can cause an overload on a production line. Therefore, the adaptation of a more connected manufacturing company that is aware of its responsibilities and is combined with the quality of the product becomes a key factor for the company to get rid of operational difficulties and know how to deal innovatively with the problems that arise. Because of this, the issue of this research is: how can we adapt a production model in which absolutely all the company's employees, from the typical worker to the top manager, remain interested in the success of the business? The general objective is to understand how Michelin's reorganization process took place in the Manaus branch by describing the results achieved by the company's Global Reorganization Projects. The specific objectives are: to explain the procedures established in the Global Reorganization Projects over time; discover the positive and negative aspects of the Project in an already consolidated corporate culture; and present the production management tools currently used by Michelin, especially at the Manaus branch. The research is a mixed case study, of the exploratory-descriptive type, with Content Analysis of the qualitative type. The results demonstrated the creation of a semi-autonomous environment, where internal responsibility and the simplification of operational methods are involved, and the Manaus branch has been implementing continuous improvement of production processes as factory digitalization advances.

1. INTRODUCTION

Every day, whether by the so-called back office, managers, or even by the senior management of large companies, there is concern about the continuous improvement of production processes, especially concerning the reduction of costs and losses and the allocation of unnecessary labor. In this context, it is clear that the priority aspect in the industry is to remain within the margins considered satisfactory for obtaining profits, with lower costs, ensuring the organization's competitiveness.

However, along with these indicators, attention must be paid to the role of the consumer, who, in turn, considers their expenditure on a product or service due to the price and the quality added to it. In 2017, Michelin, one of the world's leading tire manufacturers, headquartered in Clermont-Ferrand, France, launched a global

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reorganization project to boost growth in a way that would be able to meet the demands of customers and employees.

The responsibility of a project of this magnitude goes beyond the need for improved operational interconnections, because any failures could result in an unfeasible and catastrophic global-scale project. Knowing this, the problem of this research arises: how can we adapt a production model in which absolutely all employees of the company, from the operational worker to the top manager, remain interested in the success of the business?

The purpose of this article is to present how Michelin's reorganization process took place in the Manaus branch, through the description of the results achieved by the company's Global Reorganization Projects, describing the procedures established in the Global Reorganization Projects, notably regarding the indicators of development of new methods and improvement of processes over time; to evaluate the positive and negative points of implementing a global reorganization within an already consolidated corporate culture; and to present the production management tools currently used by Michelin to identify whether they will help the company in the process of transforming the production system, especially in the Manaus branch.

The motivation for the study arose as it was realized that production techniques and production line planning and organization systems are becoming much leaner, causing companies that achieve these adaptations to develop and maintain a more autonomous and humanized production line, and therefore, lead employees to work with more motivation and dedication, influencing the increase in productivity/year; reducing the production cycle; reducing the volume of work in process and material stock; and increasing customer satisfaction.

The demand for operational excellence has led organizations to seek ways to identify and reduce waste through methodologies and techniques developed for this purpose, while also reconciling organizational characteristics. Thus, this work aims to present the MMW methodology as an organizational tool oriented towards operational excellence, according to the premises and culture of the organization studied, where MMW emerges as an alternative to the search for improved efficiency, promoting an alternative view to the renowned Toyota Production System.

The research is relevant because it seeks to develop academic material within a broad theme, but it has very peculiar characteristics due to its delimitation within the Michelin company and its production process related to the manufacture of tires in the city of Manaus.

In this way, the research can contribute theoretically by generating reference material and encouraging new works involving the same theme. In addition, the research is justified by describing which opportunities the company took advantage of to transform not only its production process, but also the lives of its employees, customers, and the environment. In this case, the research is shown to be relevant in terms of academic production and its contribution to the socio-environmental context.

2. LITERATURE REVIEW

2.1 Industrial Transformation

For Almeida and Cagnin (2019), the industrial process worldwide has been pointing towards the so-called "industry of the future", corresponding to a new technical system. It is a non-exclusive form of a set of technologies, often called 4.0 technologies, corresponding to a 4th industrial revolution. These systems can be arranged in different ways and at various levels of maturity within the industry, whether homogeneous or heterogeneous, and are known as Readiness Level Technology (RLT) composed of Artificial Intelligence (AI), big data, robots and cobots, Internet of Things (IoT), additive manufacturing, simulation, virtual and augmented reality, in addition to collaborative platforms (Frank et al., 2019).

According to Chung and Tseng (2019), this system aggregates manufacturing and process industries, and an essential part of the services for the industry is the High-Intensity Knowledge Services (HIKS). Liao et al., 2018), Xu et al., (2018), and Thoben et al., (2018) mention the need to pay attention to two points of clarification, related to whether the industry of the future satisfies all the innovation processes of the future occurring in the current industry, and whether the industry of the future has other characteristics besides the implementation of 4.0 technologies.

In the face of technological innovation, it is clear that there is also a concern about the employment of human labor, because the spreading understanding is that automation processes increase the risk of unemployment and generate long-term social impacts.

For Acemoglu and Restrop (2020) this should occur because there will be a need for a connection between the necessary skills and qualifications, since the industrial context, in terms of technology, has been changing at multivariate speeds between production sectors, depending mainly on the functions performed, but in general, at an accelerated pace.

What should be kept in mind is that these new skills and qualifications are necessary for the continued employment of human labor in an environment that has a high projection of becoming increasingly technological and automated, but that with this, the classic hierarchical chains also begin to become smaller, which automatically causes a new management process, changing from the intermediate to the most direct (Acypreste, 2020), with the insertion of semi-autonomous groups.

2.2 The Industry of the Future

According to Almeida and Cagnin (2019), the industry of the future will encompass not only what has been described so far, but also beyond, from the energy and ecological transition to new advances in the field of materials, life sciences (biotechnology, genetic engineering, etc.) and quantum technologies, which will give rise to new activities and new businesses.

It is essential to mention that, above all, the future industry needs to be ecological and sustainable because the world is already experiencing a process of degradation, and the effects of climate change are increasingly intense and recurrent across the globe. What is expected of the industry of the future is that, through technological advances, it will offer systems, products and services that are not currently offered, such as efficiency in the field of energy transition or in developments in the fields of health, biofuels or chemical and biological micro processing, something that perhaps even today does not have well-defined concepts (Sacomano et al., 2020).

Among all these changes (technological, energetic, ecological) and futuristic trends, the digitalization (broadly) of society and the economy in general, and of industry in particular, represents the most immediate and universal revolutions achieved so far. And not only that, it enables an open, responsive, and flexible economy, without limits or barriers established in other times or questioning of outdated rules; the industry of the future requires an evolution of regulations (and their simplification), facilitating fluidity and porosity, but also provides security for assets (Schwad, 2020; Sakurai and Zuchi, 2018; Lucena et al., 2020; Dalenogare et al., 2018).

3. METHODOLOGY

The methodological procedures are presented with characteristics of a mixed case study, of the exploratory-descriptive type, initially summarized by a literature review to understand the evolution of the global industry up to the present day, with the so-called Industry 4.0 or industry of the future.

To this end, the case study was composed of a type of triangulation of methods, which involved verifying documents available in physical media and through the company's intranet, the bibliographic survey with collection of literary data, and the on-site visit with direct participant observation. Thus, in a triangular approach, these methods were chosen to generate a deeper understanding of the case studied.

The on-site observation involved the participation of management, coordination, and supervision team members, who directly relate to the production process and have experience in the Michelin Global Reorganization Project in Manaus. In addition, a documentary analysis was carried out of information from La stratégie d'innovation du groupe Michelin au servisse de la mobilité durable, 2017; the Document de référence, 2018; Le digital orienté humain: human life 4.0 by Michelin, 2018; and the Sustainable Development Goals – Michelin's Approach, 2020 – all official company documents.

Recently, supporting the actions and disseminating its organizational management model, works related to the MMW methodology were published, aiming to promote the methods and offering the academic and scientific community a new perspective on models that lead to organizational excellence (Santos at al., 2025; Santos et al., 2024; Oliveira et al., 2022).

The documentary research provided the basis for the information extracted from the company's internal balance sheets to be analyzed qualitatively using the Content Analysis method:

- Bibliographic Survey: Primary Research with data collection in books, articles, periodicals, dissertations and theses to support the literature review;
- Documentary Research: Primary Research with collection of documentary data in the company itself and in the intranet environment in other branches in Brazil and around the world;
- On-site Observation: Direct participation in the survey of sensory perceptions, from the point of view of structural reorganization for employees and for the business group itself;
- Content Analysis: Convergence of methods and qualitative data processing.

4. RESULTS AND DISCUSSION

Over time, whenever a new methodology was implemented at Michelin, care and patience were taken to ensure that the model was adapted to the reality of employees, depending on the factory's location. The reorganization processes have always focused on allowing management to go beyond the limits of the classic system, since improvements in the technological environment have also evolved over the years.

The current Project, which has been in effect since 2017 and has had planned revisions over time, has come to permanently change the "command-control" and make accountability active at different levels of the organization while machines are performing more basic functions.

Founded in 1889 by brothers André and Édouard Michelin in Clermont-Ferrand, central France, the then "Michelin et Cie" began its history with reorganization and restructuring. In that year, the Michelin brothers began managing a family factory, which had previously belonged to their grandfather, where production was concentrated on manufacturing brake pads made from canvas and rubber. At that time, the workforce consisted

of just over 50 men, but in their youth, the ambitious brothers were on their way to something much bigger, bringing something new to the market.

It wasn't long before the company introduced the first removable bicycle tire in 1891, an innovation that enabled replacing or repairing a tire in just under 30 minutes. Previously, bicycle tires were made of rubber attached to the rim, which was durable but not very grippy and not very practical for repairs or replacements. In 1894, Michelin innovated again and launched the first carriage tire on the French market, making travel quieter and more comfortable. From 1900 onwards, with the brand's success growing, the company decided to expand its business to Europe and the USA, which would allow it to produce tires for cars, trucks and buses a few years later.

4.1 From Michelin of Yesterday to Michelin of Today: Case Study

As the company expanded, it attracted workers from different locations, with a wide range of skills that could be used in various sectors. The managers used the strategy of retaining their employees by offering them good working conditions and social benefits. This was very good for the factory, as it prevented the spread of ideologies contrary to the company's vision and kept any potential wave of unionization at bay. In 1955, François Michelin took over the business and implemented the first structural reforms by cutting benefits. However, he did so because the state began offering better social, educational and health conditions than previously.

In 2010, the company considered its restructuring by developing the "Ramp Down & Up" model, which sought to improve management through individual impacts, but with collective ramifications for the employees, their families, and the communities in which the company was located. And this thinking was based on the belief that Michelin employees, in France or any unit worldwide, could carry out their activities constructively, being part of a process in which the Reorganization Projects would produce good results for the commercial sector and flexibility for the employees.

Thus, a culture of empowerment was born, based on a model of decision-making autonomy in the planning and execution of tasks, and this involved all employees. The explanation was that the more connected employees were with the functions, the more they would implement the Restructuring Project semi-autonomously: establishing trust between the employee and the practice of their workforce generates the diagnosis. In other words, employees would feel more confident in solving problems if they were included in planning actions and developing strategies for problem-solving.

4.2 Michelin's Reorganization: The Case of Manaus

Michelin, the company in the case study, is part of the global tire manufacturing market and is among the best positioned, with around 19% of the worldwide market share, with annual gross revenues of around 20 billion dollars. The Manaus unit is located on the AM-010 highway, occupying an area of over 1,000 square meters in the city's rural area. It was acquired from the Levorin Group in December 2016 and has been increasing its workforce over the years, doubling the number of employees between 2017 and 2022.

The Manaus branch and all other companies in the group worldwide are part of a new global reorganization project currently in effect. In this Project, the company is working on creating regions spread around the world, responsible for managing sales and developing better customer relationships, and are made up of branches in Africa, India, the Middle East, South America, Central America, North America, East Asia, Australia, China, and Europe. Thus, all of them have been responsible for transforming their operations with a view to customer satisfaction, simplifying operational methods, and accelerating the digitalization process of their activities.

The focus is on the global internationalization of the standards that are already consolidated in their factories in France, especially at the head office in Clermont-Ferrand. The Manaus branch has been implementing this new global perspective to create a corporate identity with social ties, with open dialogue between employees, forming semi-autonomous groups, and disseminating a more human environment for the community.

In this new guise, Michelin has also introduced corporate governance and accountability tools to translate social and professional ties into responsibility and success. Michelin does not want to be just a factory where its peers are given tasks to complete; it intends to continue applying the methodology devised by Édouard Michelin, in which its employees "must know exactly what they are doing."

During these Reorganization Projects, the company became aware of activities related to climate, biodiversity and the use of natural resources: it has been recognizing greenhouse gas emissions and accounting for carbon to offset the damage to the environment caused by its activities; it has been following the public commitment made at the 21st United Nations Conference on Climate Change held in Le Bourget, France, especially regarding the reduction of emissions, new cycles for unusable products and reduction of non-renewable energy consumption; annual reduction in water consumption; gradual decrease of the volume of solid waste generated and implementation of the circular economy through environmental management tools.

5. MAJOR FINDINGS AND OUTCOMES

Michelin, the company in the case study, is part of the global tire manufacturing market and is among the best positioned, with around 19% of the worldwide market share in the sector, with annual gross revenues of around 20 billion dollars.

The Manaus unit is located on the AM-010 highway, occupying an area of over 1,000 square meters in the rural area of the city, and it was acquired from the Levorin Group in December 2016. The French production culture is different from other cultures worldwide, so the organization of physical space, the distribution of tools, planning time, and inventory turnover must be based on each location and product line.

In other words, considering these parameters for bicycle and truck tires creates different scenarios in each reality. In this sense, it is tough to establish a production system that meets all these needs equally and satisfactorily.

However, the current Reorganization Project is leaning towards using well-known systems tools, such as Lean Manufacturing and World Class Manufacturing (WCM), which help reduce losses and help identify areas for improvement in the company's production process, including in Manaus.

Figure 1 and Figure 2 exemplify Michelin's Management Tools from the Global Reorganization Project, with the main production management tools used at Michelin. Figure 3 exemplifies MMW's process applications.

	INSTALLATION MQP: This is a briefing for installation management. Purpose: to ensure SAFETY on the construction site, the COMPLIANCE of what is being built/installed and ON-TIME DELIVERY.
	RAMP-UP MQP: This is a briefing for managing the ramp-up phase. Purpose: to ensure SAFETY during ramp-up, to manage QUALIFICATION actions, to manage PRODUCTION and QUALITY.
	MQP N1: Set of practices + tools for VISUAL MANAGEMENT OF THE ROUTINE at the operational level; Purpose: To allow teams to MASTER AND IMPROVE the performance of their sector (Island).
	RAPID RESPONSE DYNAMICS N2 and N3: Set of practices + tools for VISUAL MANAGEMENT OF THE ROUTINE and PROBLEM SOLVING of the management of the Atelier (N2) and the Activity (N3 - plant). Purpose: To support the MQPs N1 and improve the MASTERY of the performance of the various sectors of the factory.
	MANAGEMENT DU GOULOT - Bottleneck Management: Set of good practices and tools for VISUAL MANAGEMENT OF ROUTINE and PROBLEM SOLVING applied to the bottleneck equipment/sector. Purpose: To master and continuously improve the TRS of the bottleneck.
	PPP MEETING: Set of meetings and best practices held by the factory Management Teams and the Industrial Management. Purpose: To anticipate actions that affect the PERFORMANCE DOMAIN and the PROGRESS of indicators. To control risks and explore opportunities.
	BC, BIB SOLV and BIB SOLV plus: PROBLEM SOLVING tools based on market MASPs. BC: Does the Standardization/Standard culture solve the problem? 5M, Ishikawa; BIBSOLV: BC + 5 Whys after further observation of the problem with the team; BIBSOLV+: Bibsolv + CSD analysis (defect-free configuration) + Causal diagram (Mauser).
	BIB STANDARD: One-week event with operators + support team based on 5S and Kaizen; Purpose: to improve safety, quality, productivity and well-being without major investments, through the implementation of visual standards in a work area.

Figure 1. Michelin's Management Tools from the Global Reorganization Project - I.

	EI STUDY: Study and implementation carried out by an Industrial Engineer based on a set of techniques and tools specific to Michelin's Industrial Engineering. Purpose: To identify and implement PRODUCTIVITY GAINS (tons/man-hour).
	BIB FLEX: One-week event with a multidisciplinary team based on the SMED technique. Purpose: Reduction in set-up time.
	BIB DETECT: A one-week event with a multidisciplinary team that CHALLENGES the corrective and preventive MAINTENANCE STANDARDS of a machine - based in part on TPM. Purpose: Increase machine performance and provide robustness/stability to machine uptime.
	BIB BOOST: A week-long event with a multidisciplinary team that carries out a STUDY and IMPLEMENTS improvements in a workplace. It can focus on PRODUCTIVITY or QUALITY. Purpose: Strong gain in performance in the short term (KAIZEN).
	BIB ENERGY: A week-long event with a multidisciplinary team that diagnoses opportunities for reducing energy consumption and builds a short- and medium-term action plan. Purpose: Significant reduction in specific energy consumption.
	BIB INNOVATION: One-week event with a multidisciplinary team + EXPERTS who challenge the current state of the production process and product through benchmarking and innovation. Purpose: Strong cost reduction.
	TPM - TOTAL PROCESS MASTERY: Set of methods that aim to implement improvements to reduce process variability. Based on six-sigma methodology techniques. It is applied with a focus on a product property: "Poka Yoke". Purpose: Reduce the % of "scrap" and/or reduce customer complaints.
	VSM: One to two-week event with a multidisciplinary team that analyzes waste throughout the production chain and defines a short/medium/long-term action plan. Purpose: Improve the level of Customer Service by optimizing the production flow. It is used as a basis for building the factory's PROGRESS PLAN.

Figure 2. Michelin's Management Tools from the Global Reorganization Project - II.

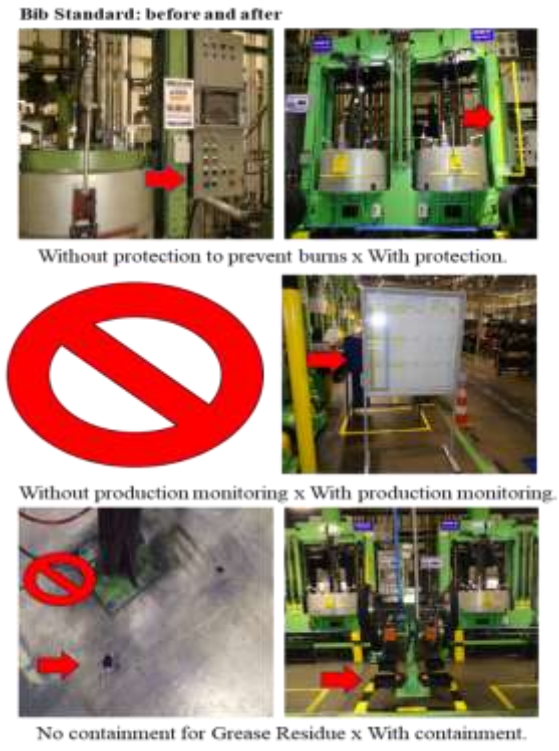

Figure 3. Michelin's Management Tools from the Global Reorganization Project - III.

6. CONCLUSION

Michelin's Global Reorganization Project breaks industry paradigms in at least two critical ways: machines do not

necessarily need to replace operators, but operators do need to be qualified and progress in their academic careers so that their skills and competencies can be allocated to the necessary positions; and meetings between groups of operators during working hours do not mean a loss or increased costs due to the factory's operations being temporarily halted or with reduced workforce, but rather that they are discussing the solution to a problem that will allow the development of a faster production process and the achievement of goals proposed by senior management and, subsequently, built together with the operational team itself, now semi-autonomous.

Michelin in Manaus follows the model of its French parent company, focusing on individual autonomy to generate collective results. Its factory is located outside the city's Industrial District. With this, the company seeks to provide attractive benefits so that employees remain motivated and their quality of life is improved, spreading this feeling of well-being to the community where they live and promoting environmental sustainability to maintain life on earth.

The case study sheds light on the problem of this research, demonstrating that the company has kept its employees interested in the business's success since its foundation, since the company cares about the well-being of each employee, offers benefits, and continuously trains them.

And it was concluded that these strategic plans and the adoption of production models with the use of operational autonomy and production management tools used in a combined manner, help to increase the company's values, making it strong and keeping it among the market leaders, at the same levels as its biggest competitors.

7. SUGGESTIONS

As a suggestion, it is recommended to explore each of the stages of the MMW organizational management philosophy, in order to present greater details of its application and operational effectiveness.

8. RECOMMENDATIONS FOR FUTURE WORKS

Future work would involve further exploring the application of the methodology, detailing the steps through additional examples of how the model's tools are used, thus facilitating understanding and comprehension of the organization's philosophy.

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