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HIGH PERFORMANCE IN CIVIL CONSTRUCTION





How Construtora Tenda leveraged its results by investing in Lean Thinking



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From groundwork & restructuring to renewal.

THE CONSTRUTORA TENDA STORY.

Tenda was founded in 1969, with the objective of providing affordable housing in order that an increasing number of families could own their first home, and today it is the second largest construction and real estate development company in Brazil, according to the 'INTEC' ranking - Construction Sector Technical Information.

With operations in nine Brazilian states (in the metropolitan regions of São Paulo, Rio de Janeiro, Rio Grande do Sul, Bahia, Ceará, Goiás, Pernambuco, Paraná and Minas Gerais), all of the construction company's projects are developed within the Federal Government Casa Verde e Amarela Project (formerly Minha Casa, Minha Vida), which is aimed at low-income families.



Construtora Tenda is present 9 States across the country, concentrated in the metropolitan regions of São Paulo, Rio de Janeiro, Bahia, Rio Grande do Sul, Pernambuco, Ceará, Paraná, Goiás e Minas Gerais.

HOW DID TENDA ARRIVE WHERE IT IS TODAY: THE BEGINNING OF THE LEAN TRANSFORMATION JOURNEY

Construtora Tenda has always had strong motivation for efficiency gains and innovation in its products and construction processes as a part of its DNA. As one of the pioneers in Brazil in the construction of masonry using aluminum molds, Tenda already had a foothold in technological efficiency in construction, however it was necessary to introduce concepts of efficiency in management and leadership.

The transformation journey started with the finishing process - which was carried out by large activity-based workforces, using teams of external contractors, without equilibrium, with large quantities of wasted material and time, leading to extremely high costs for this stage of the work, in addition to imbalances in progressing the execution of a building.

This imbalance also signified that the delivery lead time of the projects was extremely long, leading to extra costs to ensure the quality and maintenance of jobsite infrastructure due to the long time delay for final delivery of the project.



CHALLENGES ENCOUNTERED



THE TRANSFORMATION PROCESS

The transformation began at the point where value is added, where the product is built, and where there is a direct interface with the end customer, i.e. at the construction site. It was at the construction site that the 4 principles of process excellence - Free from Disturbances, One-Piece Flow, Rhythm and Pulled Processes - were implemented. In order to bring these principles to civil construction, we created the "LEI" concept:

Logistics: Having standardized and pre-assembled materials available at the point of use at the time that they are required;
 Execution: Standardize the work and ensure sufficient and balanced resources for execution with rhythm;
 Inspection: Quality assurance by those performing the tasks.

All this guided by Supervisory Management the Leadership Routines at the works site.



The production line concept used in industry can be applied, however in an inverted manner. Whereas in an industrial process the workstation - with employees, material and tools - is stationary and the product flows along the line to the final stage, in Civil Construction the product (building) is stationary and it is the workstation - with employees, materials and tools - which flows through the product. Having applied this concept, it was possible to define an equilibrium for work teams based on cycle times and Takt time.



The concept of standardized product structure was implemented with the assistance of Product Engineering. The building with all its subassemblies and components then becomes the master product, ensuring standardization in the execution of activities and the cost of hiring personnel and materials, as well as ensuring equilibrium in the work team.

During the process of standardizing structures, it was possible to reduce the number of subsets and components used,

further facilitating the standardization of operations and employee training.

The *just-in-time* concept for purchased materials was also adopted, in order to ensure on-time delivery by suppliers with the required quantity and quality. This allowed material inventory at the work site to be reduced, at the same time reducing shortage of these materials due to loss, theft and damage.

OPERATIONAL LEVERAGE:

LOGISTICS




Layout and supply and storage guidelines



Definition and introduction of assembly kits




Internal supply teams




Regular Communication


EXECUTION



Balancing and work instructions



Flow and setup between work sites



Structured Problem Solving




Regular Communication

INSPECTION




Inspection Checklist



Standard Appearance



Structured Problem Solving




Regular Communication


ENGINEERING



SUPPLY




Product Standardization



Project execution line



Target supplier cost

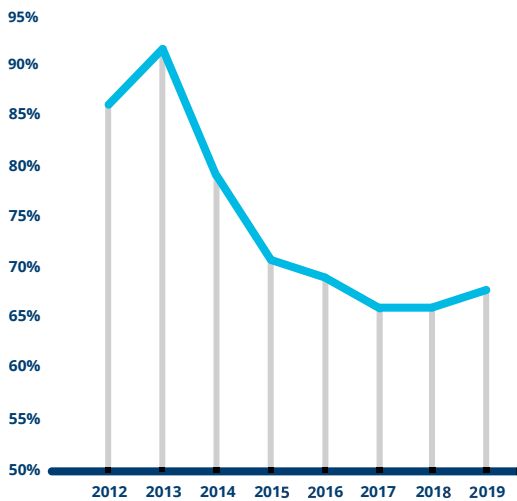


JIT Deliveries

RESULTS:

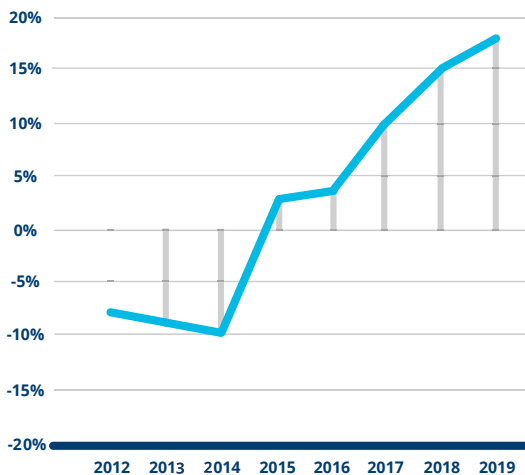
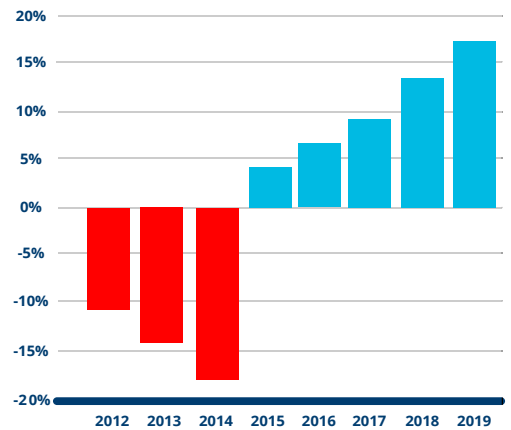
The transformations initiated in 2014 brought several positive results for the company which continue through to the present day, with further improvements always being sought. Among the principle problems tackled, the lack of flow of materials at the work site, imbalance in work teams, high costs with contractors, problems that persisted project after project, and the lack of quality in the execution of the products are among those that had, and continue to have, the most significant constant improvements.

For over seven years Lean Transformation at Construtora Tenda has accumulated a series of important results which have an ongoing contribution to the company's growth, as demonstrated by the following indicators:



Average improvement in operating costs of approximately 23%

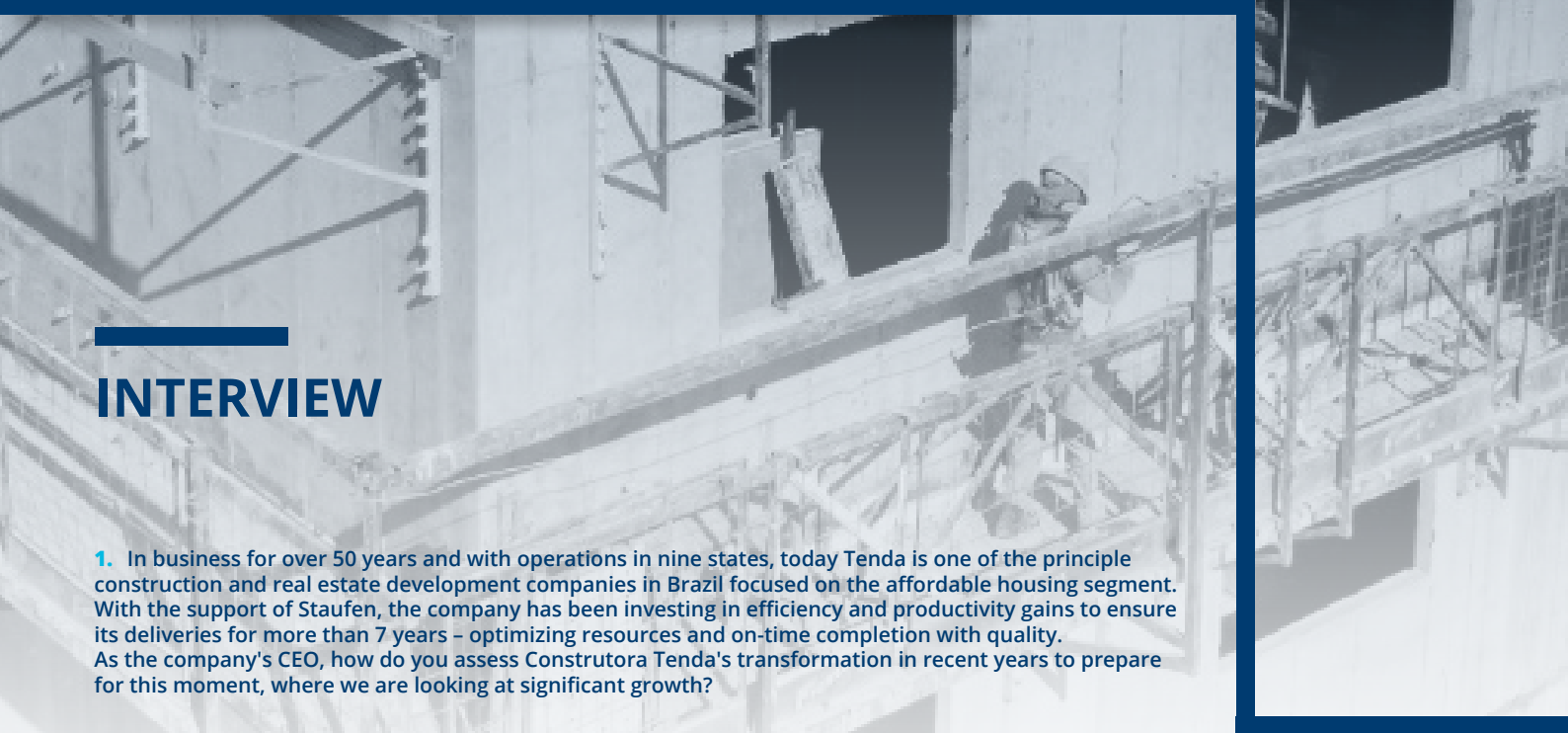
Average EBIT growth of approximately 9%



Increase in ROIC (Return On Invested Capital) of approximately 286%



Rodrigo Osmo
CEO of Construtora Tenda



INTERVIEW

1. In business for over 50 years and with operations in nine states, today Tenda is one of the principle construction and real estate development companies in Brazil focused on the affordable housing segment. With the support of Staufen, the company has been investing in efficiency and productivity gains to ensure its deliveries for more than 7 years - optimizing resources and on-time completion with quality. As the company's CEO, how do you assess Construtora Tenda's transformation in recent years to prepare for this moment, where we are looking at significant growth?

The company has an "industrial approach" as a strategic differential within its business model. We were able to create a virtuous cycle that allowed us to reduce our costs by more than 30% in this period through continuous improvement and gains of scale, making us the player with the lowest execution cost in the market. As a result, we were able to offer a substantially lower price than our competitors and were able to serve lower-income customers, generating increased social value. Our next step will be to migrate production from an on-site to an off-site approach, further leveraging our industrial approach.

2. Despite being one of the largest sectors of activity in the world, Civil Construction is also considered one of the most inefficient. There is a lot of waste and a lot of losses in this segment (with materials, equipment, labor, etc.). How does Tenda combat this waste in order to be able to grow and generate increasingly robust results?

At the beginning of our journey, we calculated that 60-70% of the labor component of each apartment built was wasted. The number seemed impressive, but those with knowledge of construction sites can identify this waste everywhere: in unbalanced activities, in the high waiting times between activities, in periods where contracted labor are stopped waiting for work to start, in materials not immediately available for use.

We decided to tackle this waste through an industrial approach, with the assistance of Staufen. We structure our production so that it has continuity and rhythm, that is, the same execution team produces the same number of apartments every day, non-stop, on different construction sites, similar to a production line. In doing this we apply several concepts of Lean Manufacturing across this expansive production line, eliminating waste and improving processes at each unit produced.

3. Over the past two years Tenda has been announcing significant investment in research & development and innovation, in particular with its entry into the wood frame segment. How did this investment come about (why wood?) and how should the company structure its processes going forward? What are the principle lessons learned in terms of productivity and efficiency gains which will be fundamental for this new era?

The great motivator was addressing a limitation in our ability to continue growing. Current construction methods require a high minimum local scale of 1,000 units/year in each city where we operate. There are only 13 cities that can support this scale, and we already operate in 9 of them. On the other hand, off-site construction - producing the houses in a manufacturing environment and only carrying out assembly at the construction site, would allow us to substantially increase addressable markets, encompassing the country's small and medium-sized cities.

There are several construction systems that can use an off-site approach: wood frame, steel frame, cross-laminated timber (CLT), precast concrete. We chose wood frame for three reasons:

(i) It is cheaper, given the Brazilian supply matrix: Brazil is the 2nd largest country (behind Russia) in terms of replanted pine forests (2 million hectares). The market is pulverized and highly competitive, different to the oligopoly in steel.

(ii) Eco friendly construction methods: the construction industry is responsible for 39% of global CO2 emissions. Forests sequester CO2, while cement and steel emit CO2. In the future companies will invariably have to adopt more sustainable measures. In our vision, wood frame technology is the future.

(iii) Superior product, due to its thermoacoustic properties (wood is a thermal insulator).

4. Tenda recently delivered its first projects using wood frame technology. What are the expectations going forward? How much growth does Tenda expect with this market expansion?

We expect to operate on a pilot scale at this learning stage through 2021 and 2022, and to accelerate production in 2023. It is a significant challenge: we aim to reach the production capacity of this first manufacturing plant of 10,000 units/year in 2026. In terms of on-site construction, we want to grow 10% to 15% per year, commencing construction of something close to 30,000 units in 2026. It is an ambitious plan, we commenced construction of 18,000 units in 2020 and we are talking about a company with 40,000 units in 2026.

5. There is a lot of talk lately about commitment to ESG. What is Tenda's position in this regard? Is investment in wood also linked to sustainability issues?

For a company like Tenda, which serves the lowest income segment of property purchasers, the ESG theme is close to our heart. We are collaborating in reducing the country's housing deficit, building dignified, quality housing for a public that cannot find alternatives in the market.

Another aspect in which ESG precepts are present is in off-site design. We chose to go with wood frame technology, which uses reforested wood as its principle component. This element has significant environmental impact, "sequestering" CO2 from the environment, unlike traditional construction methods.

6. Still on the subject of innovation, in recent years Tenda has taken important steps towards the creation of an organizational culture focused on improvement, innovation, and above all Digital Transformation. How was this journey and what has been its impact on the business?

Tenda started digital transformation process in 2018. Since then we have been able to eliminate many points of friction with the customer, improving their experience and contributing to a solid sales volume which broke records in 2020, despite the pandemic scenario. We are investing heavily in digital tools and channels: the rate of customers using our application has more than doubled from 33% to 72% in the last year, and development of the management and relationship platform with sales companies permitted an increase in 20% to more than 50% in their participation in Company sales.



Rodrigo Osmo
CEO of Construtora Tenda



7. Talking a little about the affects of the Covid-19 pandemic. What were the main impacts on Tenda's business, and what decisions have been taken in recent months to reduce these impacts?

This year of pandemic has put us in a natural remote working experience.

On the one hand, we found more efficient ways of managing our routine. Meetings start and end on time. We no longer waste time setting up rooms and projectors that don't work properly. Full days of travel have been replaced by 2-hour meetings. On the other hand, it became clear that we were unable to function as machines. The negative side of the excessive efficiency of remote work is the de-personification of employees. Informal ties were compromised, we no longer observed the subtleties of facial expressions, we no longer have relaxed lunches where we strengthen relationships and reflect on important topics that are not sufficiently urgent to be on the agenda of a structured meeting. Additionally, we miss collective procrastination as a spice for innovation and creativity.

To be honest, I think that we have yet to find an ideal balance between the efficiency of remote working and the importance of personal connections. We are testing innumerous new work concepts, but we have a lot of learning ahead.

8. As company CEO, how do you assess your role in leading this company in the face of all these challenges? And what do you personally look forward to in the coming years?

The company's accelerated growth, the need to undergo a cultural transformation and the stress in personal relationships arising from this new form of working remotely (which is here to stay) demand changes in my way of leading. Going forward I will focus on providing the correct context for the company, both in terms of strategic focus and cultural focus. It will also be important to ensure that our talent density is constantly growing.



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