Evolution Of Japanese Theories, Based On Management Philosophies: Lean Manufacturing, Just In Time And Kaizen

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Abstract

In recent times, organizations have assigned to their processes administrative models such as: Lean manufacturing, Just in time and Kaizen, in search of productivity, improve their position in the market, sales strategies, reduction of failures and costs, customer satisfaction, inventory reduction, improvement of the work environment; in other aspects. The objective of this article is to analyze the progress and historical development of the use of these administrative approaches, through a descriptive bibliographic study of scientific articles dating from the period of 1950 to the present. There is evidence of a growing trend in the implementation of these approaches in organizations from multiple sectors, during the period studied, predominating a change of thought to achieve the optimization of resources and strategic decisions.

Keywords: Economies of scale, volume factor, productivity.

Introduction theoretical

After the Second World War, it was observed how Japan was able to recover from the consequences generated, and undertake a significant advance at the business and industrial level, through theories and philosophies, such as lean manufacturing, just in time and Kaizen. [1] Lean manufacturing (lean manufacturing), based on the reduction of "waste" or activities, in relation to production time, that do not add value to the product, Just in time, created in the 50s by the Toyota company. Regarding the production of strictly necessary goods, at the right time and in the due quantities, Kaizen (continuous improvement) deals with concrete, simple actions, which encompasses the employees of a company, from the board of directors to the operators. [2]

The extension of their contributions, linked to the transcendence of their bases, makes them
become consolidated lines of research with respect to their support tools and benefits.

A descriptive review of articles and research papers was carried out to analyze in a general way the development and implementation of these approaches for optimization, planning and decision making in organizations. Documents published in scientific journals, original company articles and books were considered a priority; Among the databases and search engines used are: Scopus, Scielo and Google Scholar.

Finally, the purpose of the article is to analyze the progress and historical development, for decades, to relate concepts and points of view and detail an overview of the evolution of the aforementioned administrative models. The structure of the article is as follows: Section two presents the definition and theoretical conceptualization of each one of the theories, section three describes the evolution of each one by decades. Section four states the future prospects and finally the conclusions of the research are presented.

**Theoretical Conceptual Schemes**

Lean manufacturing (lean manufacturing). This theory focuses on minimizing the waste of resources and raw materials, applying techniques both at the administration level and in production and is based on the reduction of production cycles, to increase efficiency and generate productivity in less time. [3]

Among the multiple benefits that lean manufacturing presents, the following stand out: Reduction of inventories and product cost overruns, the use of resources to the maximum and the reduction of delivery time. For lean to be implemented, it has several tools and pillars that help it meet established goals such as:


The five principles on which Lean manufacturing is based are:

1. Identify the customer and specify the value
2. Identify and map the value stream:
3. Creates flow by removing waste.
5. Pursue perfection.

By complying with these five principles, under a continuous review of the processes, a clear knowledge of the market need and suggestions from customers will increase productivity and the company will provide a better service [5].
Therefore, it seeks to implement new technologies, under a production process that from the beginning works with the required materials, to satisfy the client's need, guaranteeing a relationship between cost = benefit [6].

**Just in time (JIT).**

It is based on the application of the improvement of production models and the elimination of waste, achieving an adequate use of resources to supply the exposed demand, reducing inventories, minimizing costs, and increasing profit [7]. For [8] the objectives of just in time are:

- Continuous reduction of stock levels: follow up, to locate when it is appropriate to stop production.
- Minimization of the preparation time (setup) of the machines: reduction of waiting for each batch.
- Lot size reduction: By reducing the lots, stock will be eliminated, and it is verified which are generating cost overruns, to replace or eliminate.
- Process flexibility: With the decrease in manufacturing time, the growth of system flexibility benefits.

The JIT covers not only the managerial part and the employees, in turn, it is related to suppliers, distributors, generating a productivity cycle [9]. Therefore, it seeks alternatives to generate more productivity, at lower cost and less weather.

**Kaizen (continuous improvement).** It focuses on product improvement by reducing waste, and involving the entire organization, from top management to the bottom level [10]. Kaizen is focused on three spheres. The first sphere refers to Kaizen as "management philosophy": sustaining and progressing the models that are carried out. The following sphere, Kaizen as an element of TQM: They align it with Total Quality Management. And the third sphere as a principle of methodology and improvement techniques: It is based on four methods: the Kaizen Blitz, the gemba-Kaizen, the Office Kaizen and Teian Kaizen. Its applications seek to comply with sequential characteristics such as: Initially the elimination of some waste. Then the elimination of seedlings for shorter times, with the help of the workers; and ending with the total elimination of waste carried out by the analysis of an employee with high capacity and experience that helps to provide solutions.[eleven]

According to [10] the improvement guide, Kaizen must establish five levels:
- Individual (Kaizen point): Evaluate each job, analyzing and eliminating waste that arises.
- Work teams (mini Kaizen): Start making plans to improve the workplace on the line, using line modification, workflow, 5s and improve quality.

http://www.webology.org
Kaizen blitz: A frequent problem is reaching maximum performance capacity, and still having work to do.

Flow Kaizen teams: They typically work through a complete value stream, taking weeks or months for a project. They are the prime movers for creating future states. These teams are multidisciplinary and cross-functional. Kaizen Leverage: They are focused on optimizing the entire value stream so that the supply chain benefits. These teams usually have a project manager, typically original equipment manufacturer (OEM), supported by consultants.

**Evolution of Management Philosophies**

The development of managerial philosophies is evident from the review of the literature; This study began in the 1950s, when at the end of World War II, Japan's main objective was to try to rebuild what had been destroyed. What is historically known as the Japanese economic miracle is related to the surprising development that this country had, at the end of the war, with growth rates that were on average 9.3% According to Briceño, [12]. And the starring role in Japanese capitalism it was the business groups, as the central engine of Japanese capitalism, whose activities and philosophies spanned various sectors, from shipbuilding to steel production, from textiles to televisions, cars and computers [12]. With the passage of time, Japanese philosophies became more important and developed worldwide as one of the main organizational forces for the evolution of management and administration.

**Evolution of Lean Manufacturing**. 1950s Lean manufacturing is born, developed by Sakichi Toyoda, Kiichiro Toyoda, Eijy Toyodai and Taiichi, Ohno mechanical engineer at Toyota Motor Company; with the objective of improving the manufacturing process until it equals and improves it with the productivity of Ford. [3].

1970s. In 1978 Taiichi Ohno, a mechanical engineer at Toyota Motors, wrote the book "Toyota seisan hoshiki ”,” Toyota Production System: beyond large-scale production” Referring to the systematic model that had been developed since the 50s [3]. This system redefined the approach to manufacturing, ending up working with machines that had: the capacity for the actual volume needed, automated features that ensure quality, quick setups so each machine could produce volumes of many part numbers; order the machines in process sequence, and thus minimize production times and costs. [12]

1980s

Taiichi Ohno and Shingeo Shingo, Toyota engineers, in 1980, develop Value Stream Mapping or value chain mapping (VSM), initially to focus on the analysis and improvement of the disconnected flow lines in production processes, but it was developed as a tool focused on Lean Manufacturing, which through a The map allows visualizing and identifying value-added
processes and those that should be discarded by not adding any value [13].

1990s

The term Lean became officially known in the book "The machine that changed the world", written by James Womack, Daniel Roos, and Daniel Jones, in 1990, where Lean is introduced as a methodology that modifies the manufacture of automobiles and its processes. Based on change management, it frames success by appropriate modifications and makes suggestions against resistance to change. [14]. During this time, in organizations the term lean manufacturing, or lean manufacturing, covered both operational and strategic levels. That is, the philosophy was initially focused on an operational level, and it was developed simultaneously by the executive level until it included the strategic level. [fifteen]. An operational plan establishes the objectives and guidelines that must be met in the short term, and a strategic plan outlines the decisions and actions that will allow the organization to position itself over time "Construction without losses" or Lean construction, was proposed by Lauri Koskela in 1992: analyzes the principles and applications of Just In Time-JIT and Total Quality Management-TQM- and introduces conceptual changes in construction management to improve productivity, focusing all efforts on the stability of the workflow” [16]. Therefore, this management-based approach to project delivery redefines the methodology in which work is done throughout the entire delivery process, starting from the objectives of a lean production system in which profit is maximized. value and waste is minimized.

In 1994, Glenn Ballar and Greg Howell developed Last Planner, a planning and control tool; in order to reduce losses through the productive process, since it identifies the causes of the problems that lead to waste, and the timely decision-making that allows acting on time, increasing productivity [17].

At this time, the main concern of the organizations was to find a way in which the performance of the employees will improve, because under an analysis with respect to the traditional planning in which the projects were carried out, it showed that only half of the tasks carried out by the bosses was completed in the week. Making it evident that this traditional approach did not take into account the causes and consequences of a work process. In addition, they perceived the similarity in the shortcomings and problems presented by the construction industry and the manufacturing industry [18].

In mid-1996 Womack and Jones, thanks to the acceptance that the "machine that changed the world" had, published their second literary work in which they defined lean thinking or Lean thinking, [14] describing the five Lean principles:

● Determine the value desired by the customer
● Identify the value stream for each product, its relevance and recognize those "unnecessary" steps.
Perform value creation steps in a tight sequence so product flows smoothly to the customer.

- Allow customers to gain value from the next upstream activity as the flow is introduced.
- Define the number of processes, time and information needed to serve the customer.

Glenn Ballar and Greg Howell, in 1997, founded the Lean Construction Institute, as a way to develop and disseminate new knowledge about project work management [17]. Currently 12 countries are part of this institute.

In this same year, James P. Womack, founded the Lean Enterprise Institute Inc., as a non-profit organization that pursues the objective of establishing improvements every day, conducts research, teaches educational workshops, publishes books, organizes conferences and shares practical information on Lean thought and practice worldwide. It is currently located in Cambridge, Massachusetts [19].

In the late 1990s, both AlliedSignal and Maytag independently designed programs that combined aspects and generated a type of Lean Six Sigma. They directed employees with knowledge of the two methodologies, they carried out phases of projects that combine the two techniques, seeking to maximize productivity. And they concluded that united under the same methodology, they are not only aligned to minimize costs, but also to maximize productivity in the processes and, therefore, to make the companies that implement it more competitive in their respective markets [20].

Transition to postmodernity. In 2006, the Lean Enterprise Academy (LEAN), a non-profit organization located in Great Britain, focused on the study and extension of Lean thinking, organized the first congress on the application of Lean principles in services of health with the support of the National Health Service of the United Kingdom. This was the introduction of Lean thinking in health (Lean healthcare), in a structured and systematic way, which allowed many lean initiatives to be carried out in hospitals [21].

The Lean Global Network organization was formalized in September 2007, thanks to the impact that lean had in the last decade worldwide, by understanding the thinking and its practices that allow companies to be transformed. There were three founding institutes of the Lean Global Network, in the United States, the United Kingdom and Brazil; led by a group from MIT, which was part of the Toyota analysis. Today, LGN is made up of 21 education and research organizations and dozens of co-learning partners around the world [22]. During the economic crisis that Mexico experienced, in 2008 and 2009; some organizations developed lean manufacturing thinking, motivating increased efforts to improve productivity, and demonstrating that, when applied properly, unproductive processes and overproduction can be discarded, obtaining improvements and higher performance [15].

Before building the new factory in 2012, Nestlé Waters implemented the value chain mapping
tool or VSM, with the help of Lean experts, training sessions were held for staff to determine the improvement of the production process and thus minimize or eliminate waste. The result ensures more efficient processes, since it allows storage in the same place, saving time and reducing the need to transport stocks; the plant is large enough to allow production to be expanded to meet demand; and it was also possible to unite offices, storage and production, something that was not possible in the previous factory due to size restrictions [23].

Lean Global Network, publishes in February 2014, the Planeta Lean magazine, as a network to expand the knowledge and experience of LGN with lean thinking and practice around the world. Through storytelling, in-depth analysis, thought-provoking opinion and gemba-based actionable advice, Planet Lean has quickly become a major voice in the Lean Community, influencing debate and supporting transformations with its content. Our articles aim to contribute to the expansion of Lean Globally by helping people and organizations on a light journey to compare with others and learn from their successes and failures. Since its founding, Planet Lean has published more than 425 articles [24]. Nestlé could be considered a "Lean Enterprise", in 2016, thanks to the Nestlé Continuous program Excellence (NCE), which was developed with the perspective of transforming not only the company's operations, but also the general environment. Eliminating everything that does not generate value for both the internal and external customer, covering three objectives called the "three C's" (3C): Pleasing the consumer; provide Competitive advantages and excellence in Compliance with regulations and internal procedures [25].

Evolution Just in time. Decade of 1950 At this time, Taiichi Ohno began to develop JIT as a management strategy in Toyota, in search of an increase in profitability, perceiving the high rate of waste, unnecessary work and inventories, he gave it the name "shelf spaces", and focused on the use of production resources only when the need arises [7].

During this time, Shigeo Shingo developed the SMED (“Single -Minute Exchange of Dies”) or change of dies in less than ten minutes, a method that allows the reduction of time using the necessary tools in each production batch. It begins by observing the process carried out in each phase, in order to identify and separate internal and external operations. in order to reach the standardization of a new procedure. The benefits it presents are: transformation of non-productive time into productive time, which generates an increase in the production and productivity of the organization; possible reductions in the production batch, allowing variations in demand and delivery times without affecting the company, which implies the reduction of the stock, providing a larger place in the production site [26].

In 1957, the APICS school was created, as the main non-profit professional organization, focused on extending the knowledge and practice of Supply Chain management, operations and logistics, by generating a high rate of preparation to acquire knowledge with respect to administration. of production and inventories [27].
Decade of 1960. Sakichi and Kiichiro Toyoda and the engineer Taiichi Ohno created the methodology of the 5s, organization, order, cleaning, sterilization, and disciplines; as an improvement alternative to the Henry Ford assembly line, which was outdated and when implementing it only presented conflicts. Therefore the goal was to achieve permanently better organized, tidier and cleaner workplaces for higher productivity and a better working environment at Toyota[28].

In 1965 the foundation for Education and Research E&R Foundation Inc. was created, which resulted in the creation of international standards and the principles and practices of world-class manufacturing [27].

70s In 1971, APICS implemented the MRP "Material Requirements Planning" as a technique that plans, schedules, controls production and inventories, used to improve production phases. Generating an increase in interest towards manufacturing planning and inspection of matter and supplies [27].

The just in time was developed in the Japanese manufacturing industries in 1976, when observing the improvements that Toyota presented and at the end of this decade and beginning of the 80s it arrived in the United States, where it was initially implemented in the automotive industry as Omark, black and Decker, and hewlett-packard [28].

80s. Companies noticed just-in-time as the way to improve production, by minimizing inventory levels in each of the processes of the productive series and reducing inventory maintenance costs, purchasing and storage costs. With the support of the workers to fulfill it, in search of an increase in quality. Therefore, the approach used by organizations linked just-in-time production, total quality management and total staff involvement, and this was called the "triple offensive" [28].

Schonberger in the year 1983, highlighted that the Kanban system, in order for it to work, must execute seven fundamental rules; by not doing it in a good way, you can generate waste both in production and in labor. [29] in which are:

Rule 1: The kanban should be moved only when the batch it describes has been consumed.
Rule 2: the new function or movement will be executed only when the Kanban deems it necessary and authorizes it.
Rule 3: the quantity needed in each batch is the one issued by the Kanban
Rule 4: Kanban is a traveling card, where it always has to go hand in hand with a physical process. To comply with the request, it always goes from the beginning to the end of the process.
Rule 5: Each batch must produce the quantity required in each process. Rule 6: the Kanban seeks that the defective parts must be removed in the processes, the JIT requires that the search for the highest quality of the material in each process, without generating any loss on the product.
Rule 7: the procedures generated by the Kanban in all jobs must be specifically followed.

In 1985 Suzaki determined, under an analysis, that 70% of productivity improvements in the
Japanese automotive industry were attributed to operational improvements and management systems based on administrative philosophies, including JIT [28].

At the end of this time, Fasa Renault (FR) developed just-in-time, with the desire to reduce inventories, product costs, production time, and increase efficiency. So they made a grouping of resources according to utility, the first group of those that were inherent to the productive process they called it "synchronization model"; those found in another warehouse, but only used once a day "daily model", and required according to the need for demand "weekly model". In this way, the increase in productivity and utility was generated, as well as the reduction of cost overruns, since waste and losses decreased [30].

1990s

Harley Davidson chose to implement just-in-time in its operation, carrying out a strict control of its processes in conjunction with the opinion of its employees, since its products did not meet the expectations or customer satisfaction, its costs were higher in comparison and his competition had a high standard of demand. When analyzing the benefits obtained after the implementation, compared to previous years, it was possible to observe that the demand increased as well as the profits, since the production times decreased as well as the costs [31].

In the mid-90s Seat Volkswagen (SV) changed its location and its infrastructure, this caused it to be affected internally and externally. For this reason, it needed to be able to reduce inventories and reduce the costs of the production process; it was given the task of implementing just-in-time, and shortly after developing it, the manufacturing increments were much higher, the work improved, the execution time was significantly reduced [30].

General Motors Spain (GME) implemented just-in-time in 1991. Thanks to this and other administrative and operational management, it has become one of the best automobile companies of this decade [30].

In 1995, the Spanish company APTA, Suzuki's largest wiring supplier, applied just-in-time, seeking to restore production lines, comply with the established time and the requested design. This allowed them to provide their customers with satisfaction, quality, with benefits such as a reduction in stock when manufacturing the necessary ones and adjustable prices [32].

Transition to postmodernity

In 2012, Nestlé Waters implemented some philosophies, including just-in-time, allowing to see the needs and losses that arose in the process, making the decision to open a new plant. They made a brief comparison between the old factory and the new one, finding aspects such as limited storage and subcontracted warehouse space, long transportation times, increase in stock, among others. However, at the new location, transportation and waiting times were significantly
reduced, largely from stock control, shorter flows for raw material, and collection of waste from the production line also helped to ensure that materials are in the right place at the right time. excellent supplier relationships that deliver quality and timely resources and distributors [23].

Kaizen evolution

1980s. In 1986 Massaki Imai coined the term Kaizen in his book Kaizen: The Key to Japan's Competitive Success (Kaizen: the key to competitive success in Japan), defining it as: continuous improvement that involves all levels of the organization equally, institutionalizing not only as a management system, but as a philosophy” [33]. In this same year, Imai founded the Kaizen Institute, which offers business leaders adequate support in the design and development of continuous improvement that best suits their processes. In this sense, he completely revolutionized the world of management and made him one of the main gurus of business management [34].

The 90's

In 1992, the Japan Human Relations Association assumed Kaizen as a symbol of empowerment before problems, emphasizing the impetus and knowledge of employees in the face of continuous problems and their skill in solving [11].

"Gemba Kaizen. How to implement Kaizen in the workplace" was Imai's second literary publication in 1997, it complements what was said in his first book and focuses on Kaizen techniques aligned to improve results in the most critical areas of the organization, through small improvements. This perspective from a practical aspect contributes to its global expansion, since "the best solutions are the simple ones." [34].

Jon Miller and Brad Schmidt founded Gemba Research in 1998 as a consulting, practice and development organization focused on helping micro-enterprises and multinationals develop continuous improvement (CI) crops based on the Toyota Production System. It has positioned itself worldwide as a leader through the knowledge lines of Kaizen and Toyota Production System (TPS) [35].

Transition to postmodernity. In 2011 Gemba Research of Seattle and the Global Kaizen Institute merge to form the leading global strategic management consultancy, Kaizen Institute Consulting Group (KICG), with the mission of providing training, consulting and outreach services worldwide, helping clients implement kaizen , the Toyota Production System, and kaizen -based business strategies . Through tours, certification courses, online training, among others [35]

The Kaizen Institute, in 2012, helped Nestlé Waters carry out an exercise to identify the waste
found in the previous plant, based on the seven areas of Muda, a Japanese term coined for waste. The results obtained showed that waste was present in three main areas: production, input materials and output products, since they presented excessive handling, waiting time and a large number of defects. Therefore, some of the actions to take to minimize waste in the new plant and improve the environmental impact and organizational culture are: the creation of an organized work area, which would allow the efficiency of the production line, operations more efficient and automated warehouse [23].

Kaizen Consulting Group is currently a large-scale company that provides consulting and training services to organizations of various sizes and sectors of the economy and public institutions, in approximately 35 countries; It has a portfolio focused on building operational excellence by improving the quality of products and services, increasing productivity and motivating workers. [3. 4]

Results

To establish a future in the trend of these administrative theories, the changing environment that organizations currently face can be observed, since the market is changing rapidly and uncertainty is predominant in the business world, but it is also true that management approaches must understand and interpret those needs, as they did in the past. Therefore, it is necessary for companies to evaluate the situation in which they find themselves before implementing any of these models, which will make it possible to identify shortcomings or deficiencies and define which approach would generate greater prospects of success, taking into account that they are models that they do not depend on a limit or completion period and that they are not a "fad" that with the passage of time cease to apply. [36]

But as much as times change, there are some basic concepts of all these theories that will still remain:

1. Productivity: the way to do things well at the right time.
2. The competitiveness. understood that it is not only the conception of earning money, but transcending customers.
3. Optimality [18].

In this way, more and more companies are being built on the basis of what they know how to do and deliver to the customer, and not on what they produce. For McDonald's, selling quickly and with quality is the essence of its service, thanks to a well-established just-in-time model.

The extension of Lean manufacturing is gradually allowing competitive advantages to those organizations that have developed it. And it has become a model of continuous use not only in production or service companies, but of different corporate names, it is no longer just an
administrative approach, it is a concept that has allowed the creation of communities worldwide, which is increasingly on the rise, which focus on their progress and firmly believe in the benefits it provides. [18]

However, regarding Just in Time, there were organizations that justified themselves with a slightly variable demand, maintaining very high fixed costs, which triggered the need to produce large batches, in order to offset the costs of a large number of manufactured products that they were kept in stock until the time of use. Currently, these types of decisions have been modified and will continue to be renewed rapidly, so that smaller capacities will be supplied for each product design, still encompassing plus the interest of the client in being supplied in an efficient and effective way, in coordination with suppliers that understand the new modality of work [9].

Finally, Kaizen is the key to face the future needs of the relationship between human resources and technology, by comprehensively improving the procedures and processes of the companies, establishing an aligned management in the search for the essentials. Well, by giving importance to human talent, it generates a total commitment from it. Currently in the West, the cultural vision of work is being increasingly transformed, giving relevance to day-to-day activities, and determining the root cause of the problems that arise, to deal with them effectively and provide continuous improvement. Being much more than an administrative theory, it has become a philosophy of life around the world [37].

conclusions

With this work, the changes and development around administrative theories based on management philosophies are visualized, and they identify the contributions that have made and benefited organizations over time. Showing that changes do not always have to be extreme, or significant money investments. Rather, changes related to the total knowledge of the company could be made, with a staff committed to success, and proper management of each of the resources that are possessed, so that many of the weaknesses become strengths as well as their threats into opportunities.

The models studied have been maintained over time, by allowing short-term achievements, which encourage organizations to continue with the implementation despite the possible obstacles encountered.

Lean manufacturing has become an integral philosophy, demonstrating its versatility by being implemented in various scenarios of the industrial sector over the years. Today it has schools around the world, which are responsible for maintaining and improving the bases that Toyota once established, in order to optimize production processes and reduce unnecessary costs that used to be allocated to activities that did not provide benefits.
By applying the exposed mechanisms or techniques developed in just-in-time, the improvement of the established deliveries is guaranteed, the reduction of the stipulated times, the elimination of waste, since the necessary resources are used, at the right time, the reduction of the inventories and stocks that were generated in each batch established. In order to meet the established objective and the proposed strategies, you must have the support of a good leader.

It can be determined that Kaizen generates great results from small changes over a period of time. Therefore, different perspectives have been generated since it is not only based on achieving minimal changes, it also takes into account the entire circle of the organization from workers to senior management.

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