



Economia Aziendale Online

Economia Aziendale Online

Business and Management Sciences
International Quarterly Review

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leading manufacturers of motorcycles: the
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Pavia, March 31, 2021
Volume 12 - N. 1/2021

www.ea2000.it
www.economiaaziendale.it



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A comparison of the strategy of two world's leading manufacturers of motorcycles: the case of Ducati and Honda

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ABSTRACT

Based on the experience of leading manufacturers Ducati and Honda this paper outlines the main characteristics and the differences of the process of quality and lean strategy of the two firms. The principal successful factors are analyzed in the production and organization strategy. The methodology is based on primary and secondary data. It argues that lean manufacturing has increasing importance for eliminating waste based on integration on original Toyota model of lean production with the local and regional process of management.

Basata sull'esperienza dei principali costruttori Ducati e Honda, questa ricerca delinea le principali caratteristiche e le differenze del processo di qualità e di strategia snella delle due aziende. I principali fattori di successo sono individuati nella strategia di produzione e organizzazione. La metodologia si basa sia su dati primari che secondari. I risultati mostrano che la produzione snella ha un'importanza crescente per eliminare gli sprechi sulla base dell'integrazione del modello originale Toyota di produzione snella con processi di gestione locale e regionale.

Keywords: strategy, lean management, benchmarking, innovation, value stream map, learning, leadership, creativity,

Cite as:

Riva, A., & Pilotti, L. (2021). A comparison of the strategy of two world's leading manufacturers of motorcycle: the case of Ducati and Honda. *Economia Aziendale Online*, 12(1), 81-98.

Section: *Refereed Paper*

Received: February 2021

Published: 31/03/2021

1 – Introduction

This paper explores the challenges and the opportunities of lean management in the contest of two smart and learning factories -Ducati and Honda - to the continuous improvement towards the implementation of practices of excellence.

This paper reports the interesting case of Ducati (Cavaliere Ducati, 1991; Graziadei, 2006; Verona et al. 2002) and Honda (Rumelt et al. 1996; Pascale, 1984; Prahalad et al. 1990). It assesses the process of organizing and the management system (Mella 2012; Riva and Pilotti 2018a,b; Pilotti 2019; Riva, 2005, 2006, 2007, 2010; 2012) and the production in Ducati and Honda.

While there is a broad range of literature on lean manufacturing (Holweg, 2007) still few papers are written on the process to determine critical success factors in motorbike sectors. The two key questions of the paper are:

1) *How are the philosophy and the methodology to produce the motorcycles of Ducati and Honda in the motorcycle industry?*

2) What are the analogy and differences between the two production and management strategies?

The outline of the paper is as follows: the second section describes the theoretical review and the methodological aspects; the third section reports the making of lean process of Ducati both the design and the implementation process; the fourth section analyzes the relevance on Honda with the discussion of the critical factors that could have led to success; in the fifth section there is the discussion and last concludes.

2 – Theoretical background and methodological approach

2.1 – Theoretical background

The idea of lean management is linked to the Toyota production system (Deming 2000; Ohno, 1988; Shingo, 1981; Womack and Jones, 1996) a manufacturing philosophy pioneered by the Japanese engineers Ohno and Shingo. The just-in-time production methods are a key element of lean production. Ohno studied Henry Ford because he reduced waste at early Ford assembly plants (see fig. 1).

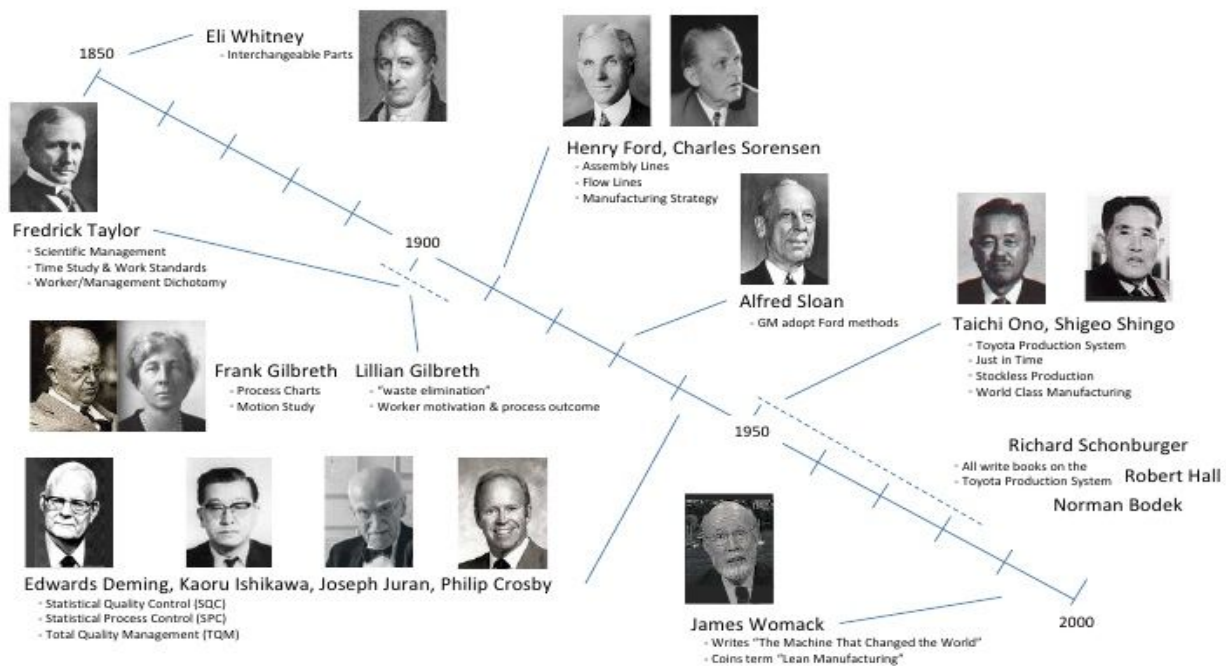


Fig. 1 – Evolution of lean management

(source: elaboration from <https://in.pinterest.com/pin/595812225679715741/>)

Several studies have shown how the methodology of *lean manufacturing* (see fig. 2) (Womack and Jones, 1990; Collis, 2016; Imai 1986; Abegglen et al. 1985), learning organization (Senge, 1999; Pilotti 2005, 2011; Turchetti e Geisler 2013; Coda 1988; Ugolini 2004), knowledge creation and control (Nonaka, 1995; Quintas et al. 1997; Mella 2012, 2015a, 2015b, 2018, Schillaci 1987; Gazzola and Colombo 2014; Gazzola et al. 2020, Broccardo 2010; Stack et al. 1992) and industry 4.0 and benchmarking (Riva, Pilotti 2018, Aiello 1996; Cautela et al. 2014; Boston Consulting Group, 2015; Chui et. al. 2010; D’Averni, 2015). In *lean management*, there is a systems approach to a problem (Senge 1999) and is stressed the importance of learning activity and a smart control system based on innovation (Simon, 1995; Kaplan e Norton, 1996, 2001, 2004a, 2004b) and kaizen actions of improvement (Deming, 2000; Guido 2010) based on long term commitment.

These methodologies are also coherent with the theory of *synchronous manufacturing* and the *theory of constraints* and *kanban strategy* (see tab. 1).

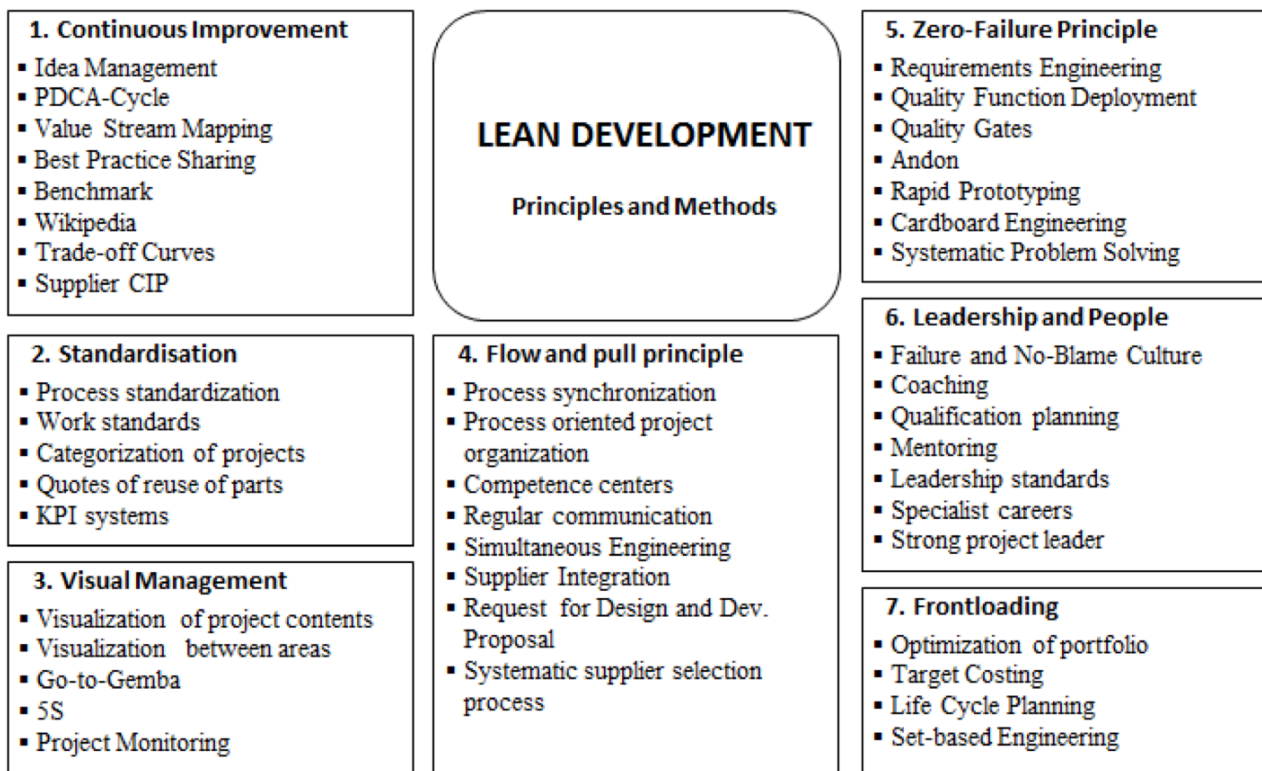


Fig 2 –Lean principles (source elaboration from Rauch et al. 2016)

Quality management practices in lean production stress the concept of built core competence and eliminate waste (Liker, 2004) and reengineering (Dixon and al. 1994; Hall and al. 1993; Hammer and Champy, 1993) by using a group of methodology (just in time, poka-yoke, source inspection automated inspection, sigma six, visual management (see fig. 3).

The resolutions of problems come from rethinking how the process is organized (Goldratt, 1992; Chase R. and Jacobs, 1992).

LEAN based on Kamban Strategy	AGILE based on Flexibility Order System
satisfy the costumer by adding value and eliminating waste	satisfy the costumer by configuring to order
long-term relationship with supplier	“fluid cluster” of suppliers, virtual supply chain
measure output-criteria, e.g. quality, cost, and delivery (qcd)	measure customer satisfaction
smooth workflow	allow for unpredictability
plan ahead	face the unpredictable
reduce stock to a minimum throughout	supply chain stock reduction is not the key

Tab. 1 – Lean and agile system (source: adapted from Christopher et al. 1999)

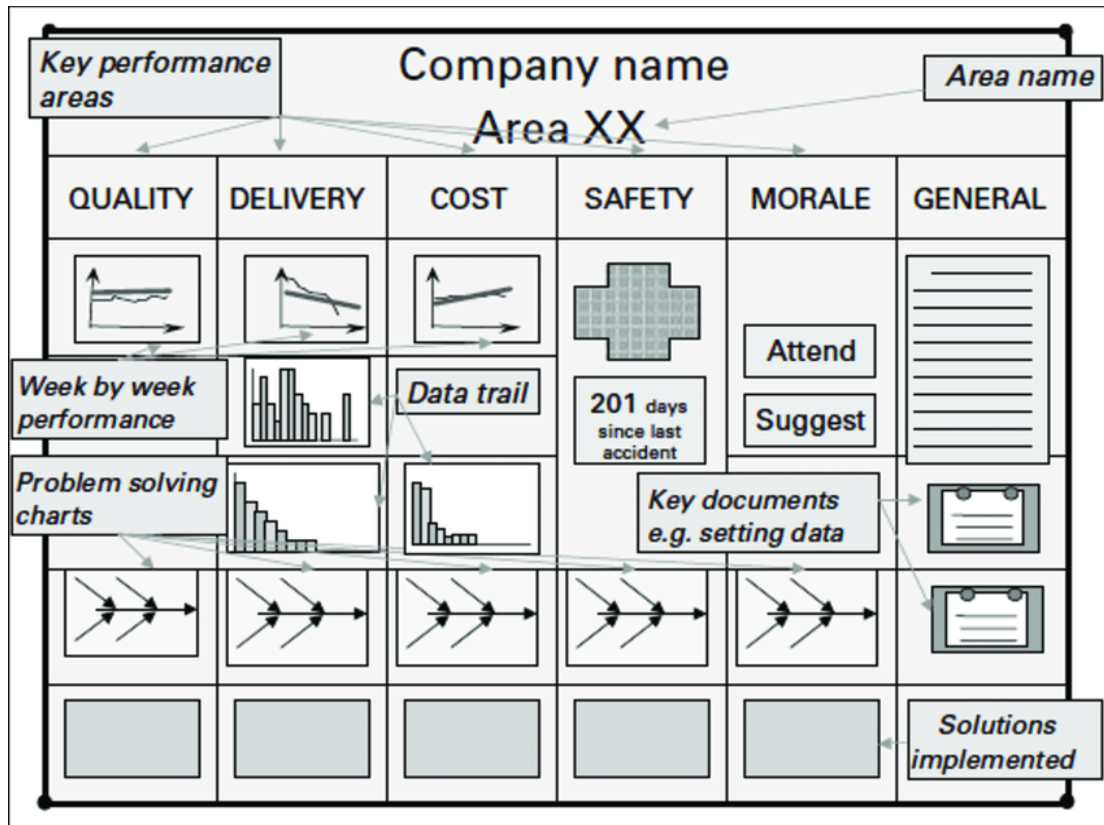


Fig. 3 – Visual management and improvement in lean management (source: elaboration from Tezel et al., 2017)

2.2 – Methodology

The method of case study is used because it permits to underline the main innovations in the strategy of the company. The empirical method of this analysis follows the logic of grounded theory (Glaser and Strauss, 1967) developing a case study methodology (Eisenhardt, 1989). We based our sample on two leader firms: Ducati and Honda. The companies selected are successful motorcycle manufacturers and are world-class leaders. The method of comparison of cases is used because it permits us to underline the strategy and organization during the time and CSFs (critical success factors).

We analyze the case based on the previous literature using primary and secondary data. We visit the Ducati factory in Borgo Panigale near Bologna. About secondary data, we study a set of data and documents (see tab. 2).

MAIN SECONDARY DATA	FOCUS ON
Ducati production system (source www.ducati.com)	<i>lean management</i>
Ducati in AUDI Annual Report 2020 (source www.audi.it)	<i>strategy</i>
Ducati lean strategy (www.leanmanufacturing.it)	<i>lean management</i>

Honda production system (source lean.org)	<i>lean management</i>
Honda Annual report 2020 (source www.global.honda.com)	<i>strategy</i>
Honda production system (source www.hondanews.eu)	<i>lean management</i>

Tab. 2 – Ducati and Honda secondary data used in this research (source: our elaboration)

About primary data, we collect data and information by contact and interviews with the experts (see tab. 3) about the areas of research (see tab. 4).

Director of Museum Ducati	1 interview
Expert about Honda e Ducati	9 interviews

Tab. 3 – Interviews (Source: our elaboration)

Ducati and Honda have a relevant role in innovation in lean management.

1) What is the organization of a lean strategy in Ducati and Honda?	- principles - strategic guidelines - system of control
2) What are the main critical success factors (FCS) and the difference in lean strategy in Ducati-Honda?	- best practices - analogies - differences

Tab. 4 – Main issues covering during the interviews (source: our elaboration)

The method of case study is used because it permits to compare the main analogies and difference.

3 – The Strategy in Ducati

3.1 – Introduction and history

The Ducati was founded in 1926 in Bologna, northern Italy, as an industrial components manufacturer, Ducati produced its first motorcycle engine in 1946 (Ducati Cavalieri, 1991; Graziadei, 2006; Verona et al. 2002).

Ducati moved to lean manufacturing after the acquisition of Ducati in 1996 by the Texas Pacific Group. Ducati did a turnaround beginning by changing the international subsidiary structure and by introducing innovations.

The Ducati Factory is in Borgo Panigale in the area near Ferrari, Maserati, and Lamborghini factories (see Fig. 4).

The Ducati factory is near the center of Bologna. Some main competitors of Ducati are Harley-Davidson, Yamaha Motor, Honda Motor. The productions of Ducati are motorcycles: Superbike, Hypermotard, Monster, Streetfighter, Multistrada, Diavel, and also motorcycle parts

and components (accessories, apparel, safety gears) and services (dealer service, maintenance service).



Fig. 4 – Ducati line production (source: Newaltas, 2020)

Each day the factory can produce also more than 300 motorcycles (see tab. 5). Also, it exports about 90 percent of the total amount of motorcycles.

MARKETING
<ul style="list-style-type: none"> • 55,451 motorcycles worldwide. This was an increase of 1.2% over 2015. • 8,787 motorcycles were delivered to customers in the USA (main market). Sales were up across Europe, and other markets, such as China, where sales doubled, Brazil and Argentina. • 780 dealers in over 90 countries.; sales network of the Bologna-based motorcycle manufacturer • 731 million EURO (\$830 million US), turnover (net sales) of which was up 4.1% over 2015.
PRODUCTION
<ul style="list-style-type: none"> • 1,558 employees, compared to 1,197 in 2012, registering an increase of 30% in new hirings over the past four years. • seven new models: 1299 Superleggera, SuperSport, Multistrada 950, Monster 797, Monster 1200, Scrambler Café Racer, and Scrambler Desert Sled.
FINANCIAL RESULTS
<ul style="list-style-type: none"> • operating result of 51 million EURO (\$54 million), compared to 54 million EURO (\$57 million) in 2015 • operating margin of 7% to the Audi Group.

Tab. 5 – Marketing, production, finance in Ducati (source: our elaboration from Ducati)

3.2 – The strategy and the critical factors leading to the success of Ducati

Ducati radically changes its production philosophy in 1997 following the acquisition of TPG with the introduction of lean management and the new strategy has permitted to improve the level of quality of the products, decrease the cost of production, to reduce the time of production. The change of operational strategy has increased quality and customer satisfaction. The focus on the quality of the product is important for the strategy of Ducati that is present in the different international markets. The production of Ducati is made using the lean production system based on some important strategy:

3.2.1 – Global lean strategy with strong supplier relation and outsourcing

The suppliers have a valuable role in the quality strategy if between it and the company established a cooperative relationship which constitutes an advantage for end customers. The lean strategy in Ducati is based on five lean principles (Womack and Jones 1996): determine the value desired by the customer, design the value stream for each product providing that value (eliminate waste), make the product flow continuously, use pull strategy, research perfection reduction the number of steps and the amount of time and information needed to serve the customer continually falls. Suppliers provide essential products and services for end-customer satisfaction and competitiveness. It outsources some things like casting, molding, painting, and some other pre-assembled parts (outsource 90 percent of the painting).

3.2.2 – Just in time and delivery time

The delivery time for a byke is about 40 working days. Ducati produces three different kinds of engines and six different brand families for motorcycles, with three production lines for the engines, and four production lines for the motorcycles. For the pull-driven system, the materials are delivered just in time. In the "supermarket" area of the factory, the manufacturing trays are loaded up with exactly the right parts for each step of the manufacturing process (Ohno 1988, Liker (2004). The Ducati's production for just in time in two phases: first it is built the main body of the engine, and second then it completes the assembly on the main production.

3.2.3 – Built-in quality

A culture to stopping and fix problems, to get quality right the first time). The application of this strategy requires that it is always rigidly applied and is also observed at the highest levels of the corporate hierarchy. Industrialization of the improvement is the most important activity of the company and should be of interest to all staff. To teach the majority of people to use the elementary statistical method shall be the seven statistical tools are developed. The process is the essence of each organizational unit.

3.2.4 – Constant improvement (kaizen)

Ducati was able to reduce over 85 percent of the defects in the final product compared before the turnaround process in 1997 when Porsche engineers came to introduce the production just-in-time philosophy based on the Toyota model. The success of managers is measured in how well they cultivate individual creativity and innovation throughout the organization (see fig. 5).

改善

Kai = Change Zen = Good

Fig. 5 – Kaizen concept (source: elaboration from Deming 2000)

They are important factors: industrialization of improvement, focus on processes, recognition of the efforts of the staff, quality upstream and downstream integration as quality and visual management

4 – The strategy in Honda

4.1 – History of Honda

The Honda Motor Company was founded by Soichiro Honda in 1946. He was very interested in automobiles and enter also them into races for passion. Honda was the first Japanese manufacturer to make its product in Europe in Belgium (1963) and North America in Ohio (1982). The Honda factory in Taiwan celebrates 50 million productions of motorcycles (see fig. 6).



Fig. 6 – Honda line production (source: Kamorjonday, 2020)

The history describes as Honda possessed a superior competence at engine design which was continually translated into new products, it had experienced success with the Supercub in Japan before it entered the U.S. market; after Honda was successful in its entry into the U.S. market and, over time, extended that success from smaller bikes to larger bikes.

There is a various theory of Honda improvement and success in entering in the American market (Pascale, 1984; Ohmae, 1982; Mintzberg et al. 1996):

i) Honda's cost advantage based on the successful exploitation of scale and learning economies;

ii) Based on Honda executives, the company's early scale in Japan came from its having a better product, to discover opportunities, to experiment, to learn quickly from mistakes, to rapidly revise design problems (Rummelt, 1996);

iii) Honda's success is based on "core competence" and "strategic intent" and "stretch" to the processes to create the desired strategy (Prahalad and Hamel, 1989,1990).

Honda manufacturing subsidiaries virtually everywhere around the world operate as autonomous companies (see tab. 6).

MARKETING:
<ul style="list-style-type: none"> • Area served Worldwide Industry: Conglomerate • Divisions Acura Honda Automobiles Honda Motorcycles Founded Hamamatsu, Japan • Founder Soichiro Honda Takeo Fujisawa Headquarters Minato, Tokyo, Japan
PRODUCTION:
<ul style="list-style-type: none"> • Products Automobiles, Commercial Vehicles, Luxury vehicles, Motorcycles, Scooters • Electric generators, Water pumps, Lawn and garden equipment • Tillers, Outboard motors, Robotics, Jet aircraft, Jet engines, Thin-film solar cells, Telematics • Number of employees 218674 (2020)
FINANCIAL RESULTS:
<ul style="list-style-type: none"> • Revenue: 14.60 trillion • Operating income: 503.3 billion • Net income: 344.5 billion Total assets : 8 .22 trillion • Total equity: 6.76 trillion

Tab. 6 – Marketing, production, finance in Honda (source: elaboration from Honda2020)

Only one-third of Honda's turnover now derives from Japan and there are over eight manufacturing facilities throughout the world. Honda is not a top-down company, controlled by headquarters. Instead, Honda manufacturing subsidiaries virtually everywhere around the world operate as autonomous companies based on local conditions. Any problems that arise in the flexible factory can be addressed immediately by this team ensuring that the stream of automobiles going through the line is not impeded (see fig. 7).

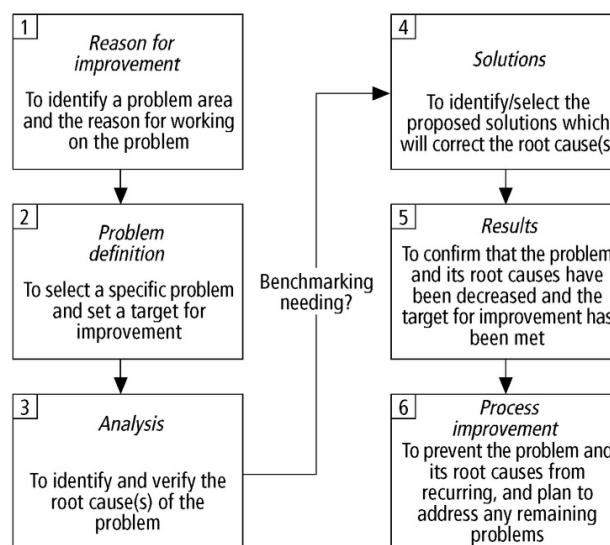


Fig. 7 – Improvement and benchmarking (source: elaboration from Deming 2000)

4.2 – The Honda approach to management and the strategy and the critical factors leading to the success of Ducati

The strategy of Honda is based on a set of important factors:

4.2.1 – Creativity of the team and orientation to people, customers, suppliers.

For Honda, the customer is a core value for the company. In globalization terms, the advantage Honda gains in being able to alter the production and capacity of individual models, depending on local sales trends and the marketing of the brands. The Honda philosophy consists of *fundamental beliefs, company principles, management policies* which are shown in tab. 7.

A) FUNDAMENTAL BELIEFS	
Respect for the Individual:	<p>a) Initiative: Initiative means not to be bound by preconceived ideas, but to think creatively and act on your initiative and judgment, while understanding that you must take responsibility for the results of those actions.</p> <p>b) Equality: the company is committed to this principle and to creating equal opportunities for each individual without consideration of the individual's race, gender, age, religion, national origin.</p> <p>c) Trust: Trust is created by recognizing each other as individuals, helping out where others are deficient, accepting help where we are deficient, sharing our knowledge, and making a sincere effort to fulfill our responsibilities.</p>
The three joys are:	<p>a) The Joy of Buying: the joy of buying is achieved through providing products and services that exceed the needs and expectations of each customer.</p> <p>b) The Joy of Selling: the joy of selling occurs when those who are engaged in selling and servicing Honda products develop relationships with a customer based on mutual trust. Through this relationship, Honda associates, dealers and distributors experience pride and joy in satisfying the customer and in representing Honda to the customer.</p> <p>c) The Joy of Creating: the joy of creating occurs when quality products exceed expectations, and we experience pride in a job well done.</p>
B) COMPANY PRINCIPLE (MISSION STATEMENT)	
The company is dedicated to supplying products of the highest quality, yet at a reasonable price for worldwide customer satisfaction.	
C) MANAGEMENT POLICIES	
<ul style="list-style-type: none"> • Proceed always with ambition and youthfulness. • Respect sound theory, develop fresh ideas, and make the most effective use of time. <ul style="list-style-type: none"> • Enjoy your work and encourage open communications. • Strive constantly for a harmonious flow of work. • Be ever mindful of the value of research and endeavor. 	

Tab. 7 – Honda's philosophy (source adapted from www.honda.com)

The quality strategy is based on continuous improvement: the company can't survive without innovations for the customers. Honda believes that local innovation is limited by the presence of machines whose sole purpose is to build cars cheaper and faster. Underlying this concept is the confidence that creativity and commitment, accompanied by a very accurate method can achieve significant changes in a positive sense in any kind of process. The focus is usually centered on the results for which the priority is quantity instead of quality (Liker 2004).

The role of culture is important for the definition of the strategy in a long time and to develop a strategic vision.

4.2.2 – Free-flow assembly online and quality control.

The production workers have a sense of control over the production process. The six management tools are constantly followed by managers where the total quality is applied. They are the data collection sheet, the histogram, the cause-and-effect diagram, the Pareto diagram, stratification analysis, correlation, the control intelligence card. The control card in the free-flow assembly is used to check if a process is in control or out of control. Sheet data collection teaches how to collect the data. The histogram allows you to understand the statistical structure of data. Ishikawa diagram is useful to identify the causes of a particular adverse effect. Particularly useful is the use of several key questions and six references that is useful to consider for any problem or situation

4.2.3 – Robot only for doing the dangerous task

Honda's factories are the most labor-intensive in the sector employing robots only in dangerous areas. Honda doesn't see robots as the best way to maintain productivity because after the automation is more difficult to improve the processes. The involvement of all staff is the most critical and most difficult component to get the cultural change in the total quality; the entire staff in problem solver, always looking for new improvements.

4.2.4 – Innovation and improvement of processes for speed up the production flow to reduce the time (lead time)

The analysis of the value stream map allows us to understand the areas that need an improvement plan (see fig. 8).

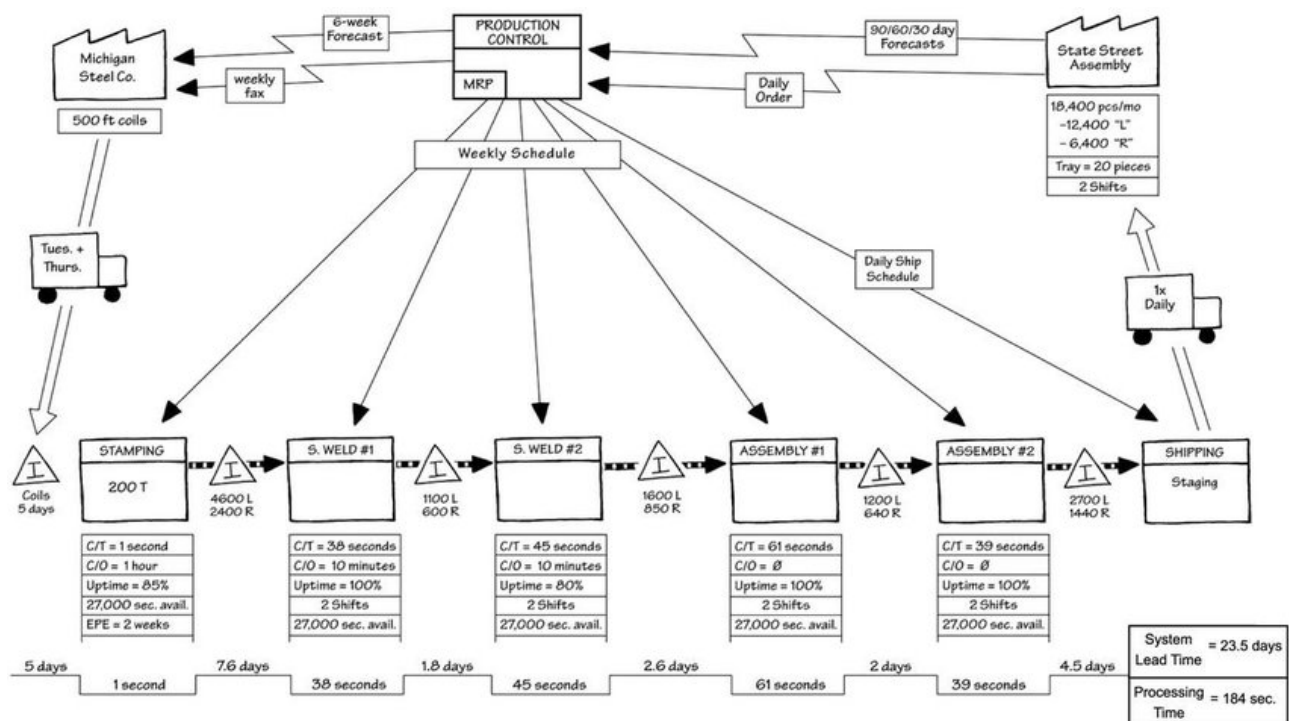


Fig.8 – Value Stream Map (source: our elaboration from Liker, 2004)

The drawing of a map of the flow or the physical layout allows you to focus on the principles hinges to improve. Honda's strengths lie in product and process innovation, primarily in designing new motorbike models and features (Stack et al. 1992). The culture of innovation in

Honda is based on a series of ideas and values: follow your dream; planning for the long term and emotive objective; love your work and make the workplace bright and positive; ensure a smooth flow of work; worker cycle activity improves the quality of product and process, reduce cost, improve safety and quality worker condition respect theory new ideas, time.

5 – Discussion

Ducati and Honda have some differences in strategy and management. Both Ducati and Honda stress the importance of classic Japanese instruments and techniques (Abegglen and Stack, 1985) but with the integration of local culture. In both, there is the integration of the "Japanese" model of production with some western models and local process of management (Camuffo and Micelli, 1987).

Ducati is more based on the classic "5 phases of lean strategy":
 determine the value for the customer,
 design the value stream,
 make the product flow "continuous pull strategy",
 research perfection, than on the quality control.

The continuous improvement of all business activity is based on the idea that man has the resources to implement continuous improvement. To pursue excellence requires that all staff use the most efficient methodologies to promote the quality that generates profit. The collaboration with the suppliers is valuable for the quality.

An important source of competitive advantage is based on the "core competence" and "strategic intent" of Honda (Prahalad and Hamel, 1989, 1990) in internal advanced combustion engines present in the motorbike (see fig. 9).

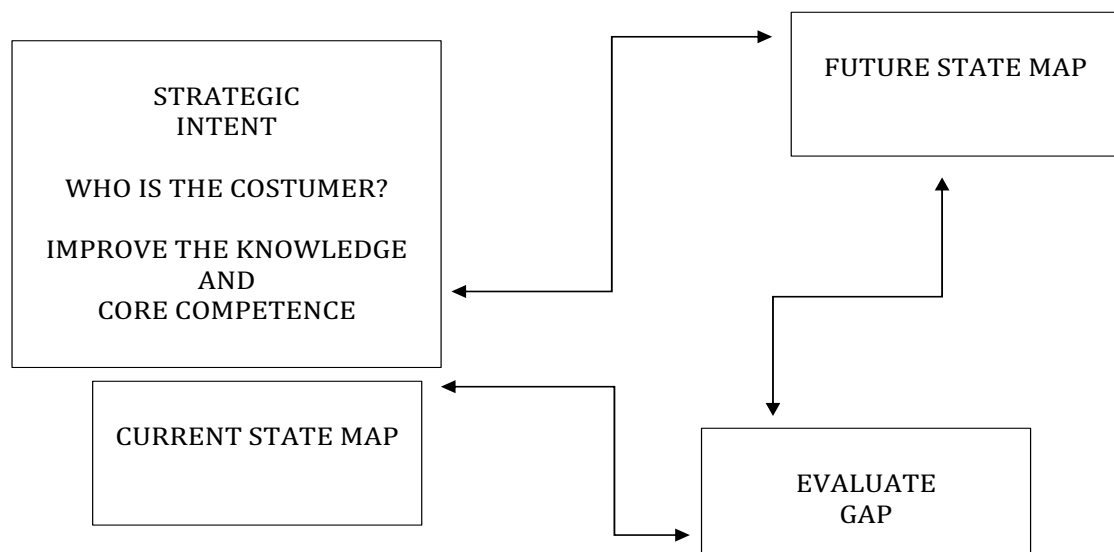


Fig. 9 – Honda Strategic intent and core competence and learning organization (our adaptation from Hamel et. al 1989, 1190; Liker 2004)

Honda is a "knowledge-organization" where the workers at all levels continually give suggestions to innovate. Throughout its relatively short history, Honda has welcomed the creation of knowledge (Nonaka, 1991). The value of this system of integrated "core competence" is very important. Honda's success in the international arena demonstrates the importance of continuous innovation and the creation of "core competence".

For Honda main strategy is to control quality and to develop "core competence" based on "strategic intent" with the creation and strong use of control of quality, build commitment, and

facilitate organizational learning to improve production and quality standards using a focus on customers and innovation (see fig. 10).

The exception to these principles also by managers and top management has extremely adverse effects because then empower all employees to imitate them.

The company's competitiveness stems from the new way of managing human resources and long-term action, which requires 5/10 years. Honda stresses that merit a relevant key to promotion.

Honda's localization strategy for "its conviction about doing it all in one place", in other words, combining engineering, design, and manufacturing functions in each of its large local facilities based on local preferences and circumstances

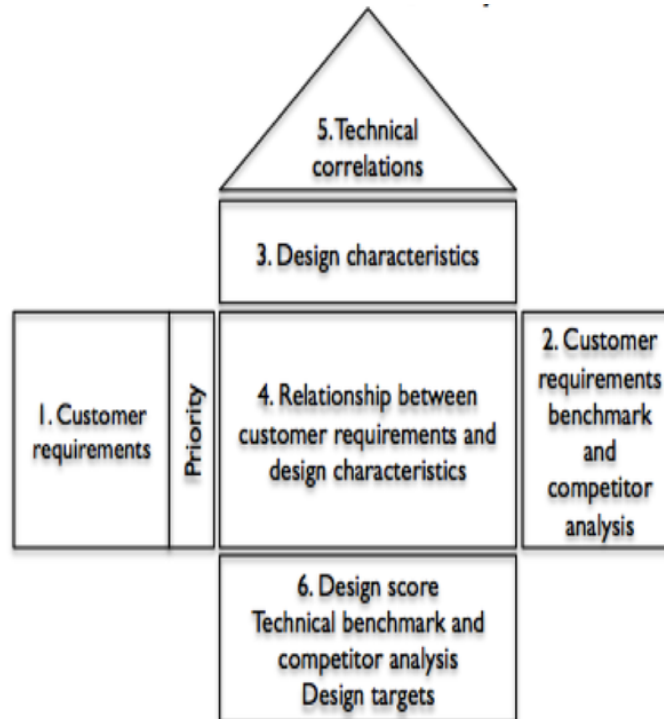


Fig.10 – Lean production and benchmarking in lean management (source: our elaboration from Collins 2016; Graziadei 2006)

6 – Conclusion

This paper contributes to the discussion about a comparison of lean strategy comparing Ducati and Honda.

For what concerns the *first question*: "How are the philosophy and the methodology to produce motorcycles of Ducati and Honda in the motorcycle industry?", we discover:

a – First, both the company follows some important principle of lean management (5P) (focus on process, team management, and creative problem (see fig. 11). In Ducati, the improvement of delivery time is not realized only by the innovations. It can be composed of: a) orientation declaration to the quality; b) appointment of the management representative; c) purpose and scope of the standard; d) organizational chart; e) list of procedures. On contrary, Honda invented the flexible factory and synchronized engineering: all of the vehicles coming into a factory's assembly zones share common designs, such as similar locations and installation techniques for functions like brakes or transmission.

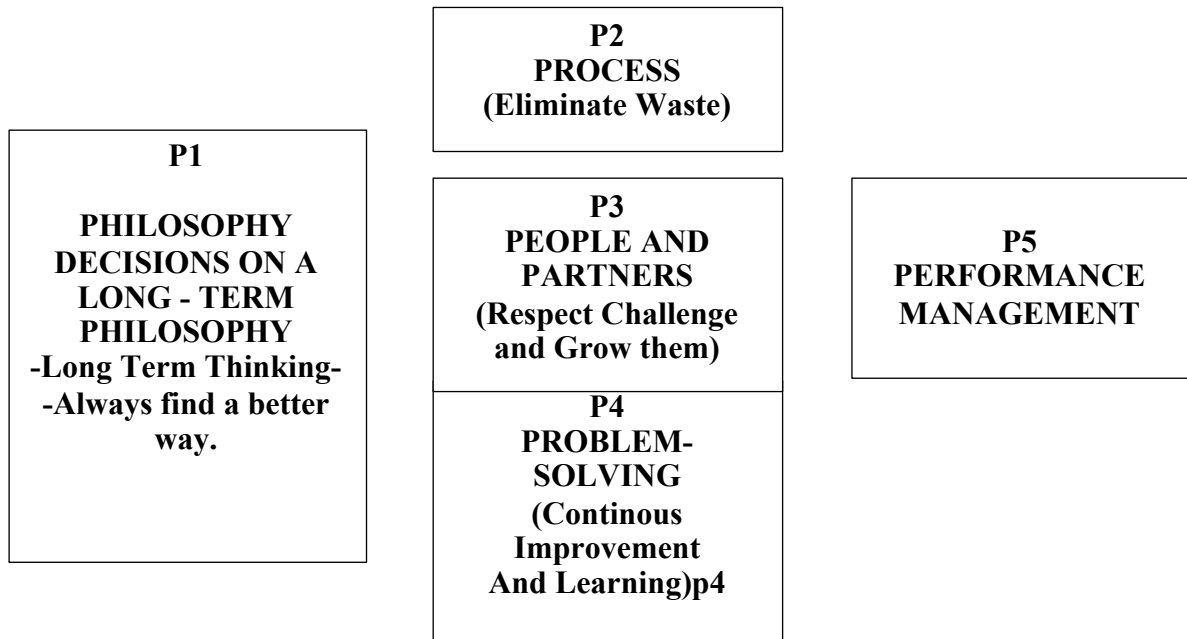


Fig.11 – Strategy of Japanese firm (5P) (source: adapted from Liker 2004)

b – Second, the importance in both companies of long-term vision and creativity for continuous improvement ("always find a better way" and "improving always"). Unlike other manufacturers, Honda can produce multiple bikes on a single assembly line. The basic values are all that a person considers significant, they have an important role because in a managerial system they determine the priorities. The involvement of all employees is important for total quality. So, it is important to transform the entire staff into a problem solver, always looking for new improvements. Involve employees means making sure that each person company performs two tasks: to perform their work. In Ducati, there is an integration of an Italian creativity model, German efficiency of Porsche, and kaizen from Japanese theory.

c – The answer to the first question is consistent with past studies (Collis, 2016, Riva and Pilotti 2018; BCG Boston Consulting Group 2015, Pilotti 2019, Imai 1986, Suciú et al. 2019; Womack and Jones, 1990).

For what concerns the *second question*: "What are the analogy and differences between the two production and management strategies?" we discover:

a – First, there are some differences between Ducati and Honda in some important implementation of lean production (see tab 8).

N°	CRITICAL SUCCESS FACTORS	DUCATI	HONDA
1	Focus on classic 5 phases of lean strategy	****	***
3	Built-in quality (jodoka)	****	***
4	Focus on delivery time -	****	***
5	Global lean strategy with strong supplier relation and outsourcing	****	****
6	Focus on design and elegance design	*****	**

7	Free-flow assembly online and quality control	**	****
8	Creativity of the team and orientation to people, customers, suppliers	***	****
9	Focus on flexible factory and synchronized engineering	***	****
10	Robot only for doing dangerous task	**	****
Level : ***** HIGH, *** AVERAGE, *LOW			

Tab. 8 – Benchmarking: the main difference between Ducati and Honda (Source: our elaboration. See also Ducati Annual Report (2020) Honda Annual Report (2020); Riva and Pilotti 2018a,2018b; Mella 2015; Pilotti 2011; 2019; Riva 2018 and 2010; Collis 2017; Reports from Hamel and Prahalad 1980, 1990; Liker 2004; Suciu et al. 2019; Graziadei 2006; Verona and Prandelli 2002)

b – Second, the suppliers provide essential products and services for end-customer satisfaction and thus for competitiveness. Honda's lean strategy is more based, compared to Ducati, on the quality control, team group; quality control takes priority over all other strategies and affects everyone. In Ducati very important are the design and Italian creativity model (based on important Italian art tradition in design (Riva 2018; Pillotti 2019).

c – The answer to the second question is in part consistent with past research (Cavaliere Ducati 2013, Collins, Holweg 2007; Camuffo and Micheli 1997; Mella 2012; Riva and Pilotti 2018a, 2018b; Pilotti 2019, Mella 2015 a,b; Gazzola et al. 2020, Deming 2000; Ohno 1988).

The original contribution of this paper and the production of new knowledge in the field are:

- a) *the analysis of two world's leading manufacturers of motorcycles: the case of Ducati and Honda;*
- b) *a comparison of the difference and analogies in strategic implementation of lean management.*

Future research can study the relation between strategic vision and collective implementation.

The limit of this study is to analyze only two cases. In summary, the application of lean strategy in Ducati and Honda can be a model to study the positive implementation of lean management and strategy also for other companies.

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