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GENESIS OF LEAN MANAGEMENT

Lean Thinking can be traced back to the sixteenth century. At that time the Venetian Arsenal based in Venice Italy started to use an assembly line when manufacturing boats. This could be the first historical example of flow production which is an important concept of lean thinking Many centuries later in 1908 the famous car manufacturer Henry Ford introduced the Model T a modular car which was built using interchangeable parts. This innovation enabled Ford to pioneer flow production in his Highland Park plant in 1913 by placing fabrication equipment in process sequence. The Ford Motor Company was able to produce cars at a much faster more effective and efficient rate and use a moving assembly line. In 1926 Henry Ford added product variety to the manufacturing process and introduced the term mass production. Ford was able to automate the flow of materials through miles of conveyor belts and the final assembly line was rolled out to fifty more manufacturing plants around the world.

During the 1930s W Edwards Deming created a process of undertaking continuous improvement commonly known as the plan-do-check-act PDCA cycle. After World War 2 Deming was able to teach the PDCA cycle the value of statistics and other quality improvement methods to Japanese businesses. Through this Deming made a significant contribution to Japan's later reputation for innovative high-quality products and its economic power were born out of that.

Throughout the 1960s the Toyota Motor Company gradually developed a management system based on Lean principles. Taiichi Ohno led the process of turning the Toyota Production system (TPS) into an integrated framework with a focus on problem solving leadership production operations supplier collaboration product and process development and customer support.

From 1949 through to the mid-1970s the TPS approach was adopted and interpreted by other Japanese companies. When the productivity in quality gains became evident to the wider world, executives of the American companies from whom the east had learned, travelled to Japan to understand how their counterparts had so rapidly developed their thinking.

By the 1980s some American manufacturers such as Oh Mark industries, General Electric and Kawasaki were achieving success through considered application of the tools and techniques perfected in the east. Consultants took up the campaign and acronyms sprouted like weeds, yet they all referred to systems that were simply derived from TPS. Gradually a global knowledge and experience base developed and success stories became more frequent and attracted greater publicity.

Lean caught the imagination of manufacturing experts across the globe. Branded implementations quickly became commonplace and led to a rapid expansion in experience and knowledge creating debate on the wider application of lean particularly. Outside of its industrial origins, one of the core elements of lean thinking are the five key principles which to this day did not substantially differ from the techniques developed by Onoda Shingo and the originators at Toyota. The application in any specific industry sector significantly changes and

just as many firms copied techniques and lazy and unthinking ways, many businesses especially those outside of manufacturing have simply copied Toyota's example, often with poor results.

Ohno developed a new perspective on just-in-time production. When he visited the United States in 1956, he went to visit US automobile plants but was actually really impressed by his encounter with the US supermarkets. At that time Japan did not yet have many self-service stores. Ohno marvelled at the strong customer focus and the way the supermarket's supplied merchandise in a simple efficient and timely manner. It was a format that was driven by customer demand and not production.

MASS PRODUCTION VS LEAN PRODUCTION

In 1990, the term Lean was coined in Jim Womack's book, the machine that changed the world. Womack and his co-authors wrote an explanation of the fulfilment product design supplier management customer support and global management system pioneered by the best Japanese companies backed up through exhaustive evidence. The book clearly demonstrated the competitive superiority of the Japanese system when compared to the European and North American auto industry.

Whilst Lean Thinking originally came from the realm of manufacturing, it has since been proven to work in the service sector as well. Over the last 40 years lean has been used by businesses and public sector organisations to develop their services from a customer perspective and reduce running costs. In the last 10 years central government and the NHS have successfully employed lean across many departments and organisations in order to simplify work processes and structures. The Royal Hospital Bolton is an excellent example of a place where lean has been successful as they have had 3,700 members of staff directly involved in over 400 improvement events. Another great example is the Department for Work and Pensions DWP where the application of lean principles led to a 20% improvement for a variety of performance indicators. In addition, staff and unions are reporting positive improvements in culture and working environments.

In the early 19th century a revolution took place that changed the methods of industrial production. The shift was made from handcraft to industrial mass production because famous car manufacturer of Henry Ford. The concepts introduced by Ford divided labour into standard single tasks. This was done in order to reduce the need for employee training. Production lines were established to reduce the time used to transport semi-finished components and the new machines performed only one type of task. The primary objective was to reduce the dependency of unskilled workers as far as possible. By following this way financial benefits were materialised and the cost per unit for automobiles fell considerably.

At the same time a new class of workers was formed which carried out simple and repeated work tasks. These tasks required minimal levels of knowledge and were not very challenging for the work force. The result was that the automobile companies came to regard labour as a

variable cost. The labour component could be easily increased or reduced on short notice. One was then able to fit the use of labour according to changes in demand. This required access to a large pool of unskilled labour something that the USA had in abundance up until the time of the Great Depression in the 1930s. This proved to be a very difficult challenge for Henry Ford. However, this new trend in industrial operation was not entirely a benefit.

One challenge was the fact that the work methods were largely inflexible since the machine could only be used for one task. This led to the situation where the customers' freedom of choice and their wishes regarding to the end product were not given and special attention or consideration. Something best described in the quotation by Henry Ford, "Any customer can have a car painted in any colour he wants as long as its black". Henry Ford was obliged to produce a limited amount of automobile types in great numbers in order to keep the unit costs low. This meant that it was not possible to adapt automobiles to a market that had an increasing pace and wanted automobiles that met a variety of different needs.

Last but not the least, mass production had a huge problem with quality. In all the stages in production, products were manufactured in large batches in order to ensure maximum utilisation of manufacturing equipment. The downside was that if a defect occurred, it usually was not discovered until after a large number of components had already been produced with exactly the same errors. In addition, there was a risk that the defective product could be sent further down the line and built into assembled consumer products. The mass production solution for this problem was to have workers mobilize the end of the production line. They did only one thing, repair brand new cars. A considerable amount of time was spent in fixing the defects that should not have occurred only in the first place. The situation was wasteful and very costly.

These were the problems that Toyota captured and learned from visiting Ford plants in the US. Toyota's automobiles production picked up in speed in Japan after World War II. At this time the market was small and fragmented. Workers were done being regarded as a variable cost only since there was enough employment for everybody while there was a complete lack of capital to purchase western technology. Obviously, something had to be done in a different way. This mindset characterised Toyota's development and production in many areas. The result was what we know today as the Toyota Production System (TPS) which we have discussed briefly in the above section.

The tremendous forward movement with focus on quality, efficiency, and elimination of waste got noticed by the US, especially among the major automobile manufacturers in the mod 1980s. The automobile industry in the west realised that it was beaten in all industrial operations. Hence a major academic and practical study was initiated with Massachusetts Institute of Technology (MIT) as a partner. The study aimed at learning from the Japanese automobile industry and from Toyota especially.

To keep it to the point, let us compare mass production with lean production against few parameters. Mass production focuses on the product whereas lean production focuses on the

customer. The overall aim of mass production is to reduce cost and increase efficiency. The overall aim of lean production is to eliminate waste and add value. Mass production has an unskilled or semi-skilled and interchangeable workforce whereas lean production on the other hand has multi-skilled teams for workforce. Mass operation employs batch and queue operations whereas lean production employs synchronized flow and pull operations. Mass production makes use of single purpose machines and lean production uses human-scale and flexible machines. High productivity, low quality and medium cost are some outcomes of mass production. High productivity, high quality, and low cost are the outcomes of lean production. Mass production has a functional layout, long production runs and massive inventories whereas lean production has a cell-type layout, one-piece flow and zero inventories. Mass production has an isolated genius model with very little input from consumers and little respect for production realities. Lean production on the other hand has a team-based model, takes consumer input into account and has concurrent development of product and process design.

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