Final Project

"JUST IN TIME AND TQM-SYNERGISTIC PROCESS IN TOYOTA"

Submitted to:

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In partial fulfilment for the award of the degree of

Master of Business Administration

Submitted by:

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Academic Year 2020-21

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Academic Year 2020-21

CERTIFICATE

This is to certify that **Ms. Surbhi Sanjay Indurkar** has submitted the final project report titled, **" Just in time and TQM- Synergistic process in Toyota "**,towards the partial fulfillment of **MASTER OF BUSINESS ADMINISTRATION** degree examination. This has not been submitted for any other examination and doesnot form part of any other course undergone by the candidate.

It is further certified that he has ingeniously completed his project as prescribed by **DMSR, G. S. College of Commerce and Economics, Nagpur, (NAAC Reaccredited "A" Grade Autonomous Institution)** affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur.

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Place : Nagpur

Date : 25/07/2022

Department of Management Sciences and Research,
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DECLARATION

I here-by declare that the project with title "**Just in time and TQM- Synergistic process in Toyota**" has been completed by me in partial fulfillment of **MASTER OF BUSINESS ADMINISTRATION** degree examination as prescribed by **DMSR, G. S. College of Commerce and Economics, Nagpur, (NAAC Reaccredited "A" Grade Autonomous Institution)** affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur and this hasnot been submitted for any other examination and does not form the part of any other course undertaken by me.

Ms. Surbhi Sanjay Indurkar

Place : Nagpur
Date : 25/07/2022

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Ms. Surbhi Sanjay Indurkar

Place : Nagpur
Date : 25/07/2022

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Introduction:

Just in time (JIT):

The just-in-time (JIT) inventory system is a management strategy that aligns raw-material orders from suppliers directly with production schedules. Companies employ this inventory strategy to increase efficiency and decrease waste by receiving goods only as they need them for the production process, which reduces inventory costs. This method requires producers to forecast demand accurately.

The just-in-time (JIT) inventory system minimizes inventory and increases efficiency. JIT production systems cut inventory costs because manufacturers receive materials and parts as needed for production and do not have to pay storage costs. Manufacturers are also not left with unwanted inventory if an order is cancelled or not fulfilled.

Just In Time is part of the Lean Manufacturing System that tries to maximize the efficiency of the Manufacturing Process, Minimize the waste of Inventories, and reduce the Cost of Storing.

Just In Time Manufacturing System required a deep understanding of the customer's demand, Perfect Purchasing and Procurement System, and Effective Production System.

Just In Time is the concept, and it is not improving the company directly, yet, it influences another process to improve the company.

JIT Concepts:

The Purpose of the JIT System:

The purpose of the JIT system is to reduce inventory **costs** by only keeping inventory of materials that are needed for products that are currently being produced.

For example, Toyota, which was one of the earliest companies to adopt this strategy in 1970, may only order car parts from suppliers when they have an order for cars to be produced.

This way, they avoid having to pay to store extra components, as well as preventing unused parts from degrading or depreciating.

Requirements of the JIT System:

In order for this method to be successful, manufacturers need to be able to predict demand accurately.

The success of JIT also requires high-quality workmanship, reliable suppliers, and consistently error-free machinery.

Disruptions in the supply chain can easily result in an inability to produce goods, as was the case in 1997 after a fire at a Japanese auto-parts supplier forced them to temporarily halt production.

The lack of parts being supplied caused Toyota, a company that relied on them, to have to halt production for several weeks, ultimately costing them over $1 billion in revenue.

The diagram of steps involved in JIT:

1. **Design:** The JIT process begins with a review of the essential manufacturing building blocks: product design, process design, personnel and manufacturing planning. Then plans are put into place to eliminate disruption, minimize waste and build a flexible system.
2. **Manage:** A Total Quality Management (TQM) review ensures there is continuous improvement throughout the process. A management review defines workers' roles and responsibilities, defines and measures statistical quality control, stabilizes schedules, and checks out load and capacity schedules and levels.

3. **Pull:** Educate the team on production and withdrawal methods using signaling methods like Kanban. Review lot size policies and reduce lot sizes.
4. **Establish:** Vendor relationships are vital to the success of JIT. Review vendor lists. Settle on preferred suppliers, negotiate contracts, discuss lead times, delivery expectations and usage metrics and measures. Learn how to make the most of them in the supply chain.
5. **Fine-tune:** Determine inventory needs, policies, controls and reduce inventory movements.
6. **Build:** Inform your team about the skills and capabilities it needs to complete its work and conduct team education and empowerment sessions to educate them.
7. **Refine:** Reduce the number of parts and steps in production by refining, standardizing and reviewing the entire process.
8. **Review:** Define and implement quality measures and metrics and conduct a root cause analysis of any problems. Emphasize improvements and track trends to improve every aspect of JIT.

History of Just in Time (JIT):

Just In Time, sometimes called TOYOTA Manufacturing Production System, is part of the Lean Manufacturing Production System. There is a long story before becoming the Just-In-Time that we know today.

The Just In Time concept was first initiated by Eli Whitney in 1799, who has a large contract with the U.S. Army at the lowest cost, to Frederick W. Taylor, who studies time manufacturing and the standard of works of manufacturing in the late 1890s.

In the 1910s, Henry Ford first introduced the new Model T automobile system in The Ford System or Just in Time. Henry Ford is said by many as the one who first implemented the Just-In-time System.

Then, not remember the year, Toyota and Ford first were incorporated by Taichi Ohno, and then Just-In-time System was first introduced in the Toyota System Production System since that time.

Developed by Toyota with the vision to make vehicle orders in the quickest and most efficient way, here's the evolution of just-in-time manufacturing.

With the vision to make vehicle orders in the quickest and most efficient way, Manufacturing Global walks through the evolution of the just-in-time manufacturing method, created by Toyota.

1930's-1945: Japan's adoption of just-in-time (JIT)

At the end of World War II Japan's primary objective was to rebuild its industry with western methodology in mind.

Gerhard Plenert, identified four challenges that occurred at this time:

1. Lack of cash flow
2. Lack of land space
3. Lack of natural resources
4. An excess of labour

Taking 30 years to develop, Toyota pioneered the just-in-time (JIT) method. The introduction of this method helped the automotive manufacturer to optimise their processes in response to these challenges to make their operations lean.

1973: JIT spreads in Japan

In 1973, Japan faced an 'oil shock'; an economic and political crisis which emerged from export restrictions during the Middle East war.

This crisis coupled with Toyota sharing its 'Toyota Production System' - including the JIT method - brought about a rise in organisations taking notice of the automotive manufacturer's resilience.

1977-1980s: JIT enters the United States

Starting in 1977 through to 1980, articles in English began to emerge from Japan detailing the JIT method, which the US quickly began to adopt, as well as other western countries

1988: JIT rebrands to 'lean manufacturing'

In 1988, John Krafcik, CEO of Waymo, coined the term 'lean production' in an 'MIT Sloan Management Review'. Krafcik was using the term in reference to both Ford and Toyota production systems.

"Rather than continuing to refer to the different paradigms as recent Fordism and TPS, I would like to introduce two new terms here - buffered and lean production systems."

1996: General Motors publishes its Global Manufacturing System

Following its partnership with Toyota to build cars in the US, General Motors released its 'Global Manufacturing System'.

Based on the 'Toyota Production System', General Motors' system provided the company with flexible layouts and production processes designed so that all manufacturing facilities globally could build high-quality vehicles at a competitive cost.

Benefits of JIT:

Reduce Wastage:

The JIT inventory management model eliminates excess inventory and overstocking. We can have low inventory levels, significantly reducing the risk of inventory going unsold and sitting unused in the warehouse. We can also minimize the losses incurred due to defective products by easily identifying and addressing defective inventory items when production volumes are low.

Improve Efficiencies:

The JIT model reduces the costs of procuring, managing and storing excess raw materials and inventory. This results in a higher inventory turnover which in turn prevents inventory from sitting in your warehouse for too long and becoming obsolete. You can also receive and store deliveries in the smallest possible quantities, virtually eliminating excess raw material inventories. Local sourcing ensures that your suppliers are located near your

company's production facilities, enabling timely deliveries and reducing the need for safety stock.

Increase Productivity:

JIT inventory management increases productivity by reducing the time and resources required for manufacturing. This ensures faster production and shorter production runs. You can also implement product changes quickly as there is less raw material stock. Product damage is also reduced because of having lower inventory levels.

Optimize Production:

JIT inventory management can eliminate bottlenecks and delays across the entire production cycle, by reducing product defects and automating processes. Shorter production cycles enable on-time deliveries and increase customer satisfaction. JIT production scheduling ensures that jobs are scheduled exactly when they are needed, meaning that your production runs start and end just in time for shipping.

Reduce Costs:

As it requires very low inventory levels, JIT inventory reduces the working capital required for inventory purchases as well as storage costs. Your business can purchase raw material only when needed, so any available cash can be better utilized by the company. Labor costs are also lower as fewer factory workers are required in JIT manufacturing as compared to full-time production.

Improve Quality:

JIT inventory management involves having fewer items moving on the shop floor at any given time. This allows your management to focus on optimizing processes and building high-quality products. High-quality products with fewer defects improve customer satisfaction and reduce wastage. In the JIT manufacturing model, suppliers guarantee quality, so the deliveries go directly to production and avoid any delays due to inspection.

TQM:

Total quality management (TQM) is the continual process of detecting and reducing or eliminating errors in manufacturing, streamlining supply chain management, improving the customer experience, and ensuring that employees are up to speed with training. Total quality management aims to hold all parties involved in the production process accountable for the overall quality of the final product or service.

TQM was developed by William Deming, a management consultant whose work had a great impact on Japanese manufacturing. While TQM shares much in common with the Six Sigma improvement process, it is not the same as Six Sigma. TQM focuses on ensuring that internal guidelines and process standards reduce errors, while Six Sigma looks to reduce defects.

Primary elements of TQM:

TQM can be summarized as a management system for a customer-focused organization that involves all employees in continual improvement. It uses strategy, data, and effective communications to integrate the quality discipline into the culture and activities of the organization. Many of these concepts are present in modern quality management systems, the successor to TQM. Here are the 8 principles of total quality management:

1. Customer-focused: The customer ultimately determines the level of quality. No matter what an organization does to foster quality improvement—training employees, integrating quality into the design process, or upgrading computers or software—the customer determines whether the efforts were worthwhile.

2. Total employee involvement: All employees participate in working toward common goals. Total employee commitment can only be obtained after fear has been driven from the workplace, when empowerment has occurred, and when management has provided the proper environment. High-performance work systems integrate continuous improvement efforts with normal business operations. Self-managed work teams are one form of empowerment.

3. Process cantered: A fundamental part of TQM is a focus on process thinking. A process is a series of steps that take inputs from suppliers (internal or external) and transforms them into outputs that are delivered to customers (internal or external). The steps required to carry out the process are defined, and performance measures are continuously monitored in order to detect unexpected variation.

4. Integrated system: Although an organization may consist of many different functional specialties often organized into vertically structured departments, it is the horizontal processes interconnecting these functions that are the focus of TQM.

5. Strategic and systematic approach: A critical part of the management of quality is the strategic and systematic approach to achieving an organization's vision, mission, and goals. This process, called strategic planning or strategic management, includes the formulation of a strategic plan that integrates quality as a core component.

6. Continual improvement: A large aspect of TQM is continual process improvement. Continual improvement drives an organization to be both analytical and creative in finding ways to become more competitive and more effective at meeting stakeholder expectations.

7. Fact-based decision making: In order to know how well an organization is performing, data on performance measures are necessary. TQM requires that an organization continually collect and analyse data in order to improve decision making accuracy, achieve consensus, and allow prediction based on past history.

8. Communications: During times of organizational change, as well as part of day-to-day operation, effective communications play a large part in maintaining morale and in motivating employees at all levels. Communications involve strategies, method, and timeliness.

Origin of TQM:

TQM, in the form of statistical quality control, was invented by Walter A. Shewhart. It was initially implemented at Western Electric Company, in the form developed by Joseph Juran who had worked there with the method. TQM was demonstrated on a grand scale by Japanese industry through the intervention of W. Edwards Deming—who, in consequence, and thanks to his missionary labours in the U.S. and across the world, has come to be viewed as the "father" of quality control, quality circles, and the quality movement generally.

Walter Shewhart, then working at Bell Telephone Laboratories first devised a statistical control chart in 1923; it is still named after him. He published his method in 1931 as Economic Control of Quality of Manufactured Product. The method was first introduced at Western Electric Company's Hawthorn plant in 1926. Joseph Juran was one of the people

trained in the technique. In 1928 he wrote a pamphlet entitled Statistical Methods Appliedto Manufacturing Problems. This pamphlet was later incorporated into the AT&T Statistical Quality Control Handbook, still in print. In 1951 Juran published his very influential Quality Control Handbook.

W. Edwards Deming, trained as a mathematician and statistician, went to Japan at the behest of the U.S. State Department to help Japan in the preparation of the 1951 Japanese Census. The Japanese were already aware of Shewhart's methods of statistical quality control. They invited Deming to lecture on the subject. A series of lectures took place in 1950 under the auspices of the Japanese Union of Scientists and Engineers (JUSE). Deming had developed a critical view of production methods in the U.S. during the war, particularly methods of quality control. Management and engineers controlled the process; line workers played a small role. In his lectures on SQC Deming promoted his own ideas along with the technique, namely a much greater involvement of the ordinary worker in the quality process and the application of the new statistical tools. He found Japanese executive receptive to his ideas. Japan began a process of implementing what came to be known as TQM. They also invited Joseph Juran to lecture in 1954; Juran was also enthusiastically received.

Japanese application of the method had significant and undeniable results manifesting as dramatic increases in Japanese product quality—and Japanese success in exports. This led to the spread of the quality movement across the world. In the late 1970s and 1980s, U.S. producers scrambled to adopt quality and productivity techniques that might restore their competitiveness. Deming's approach to quality control came to be recognized in the United States, and Deming himself became a sought-after lecturer and author. Total Quality

Management, the phrase applied to quality initiatives proffered by Deming and other management gurus, became a staple of American enterprise by the late 1980s. But while the quality movement has continued to evolve beyond its beginnings, many of Deming's particular emphases, particularly those associated with management principles and employee relations, were not adopted in Deming's sense but continued as changing fads, including, for example, the movement to "empower" employees and to make "teams" central to all activities.

Characteristics of TQM:

The essential characteristics of an effective TQM system are:

1. Every company member, from the CEO to the lowest level employee, is focused on product or service quality. If management is not behind TQM, then it will fail.
2. Everyone must have the required training and be familiar with the necessary TQM techniques.
3. Anyone can suggest areas for improvement - as general operatives will be more familiar with their work station than anyone else is, valuable ideas for improvement at a production line level can, in many cases, come from line workers.
4. All departments are expected to focus on quality and productivity improvement and implement changes for their area.

5. In addition, all departments interact with each other to fix common problems in the product or process.

6. Collaboration on external issues (end-user defects for example) is expected from all departments.
7. Decisions made are based on the best solutions, not on hidden agendas or favouritism.
8. Quality becomes a governing part of operations, with decisions that impact on quality, rejected immediately, despite perceived cost-savings involved.

Steps involved in implementation of TQM:

1. Clarify Vision, Mission, and Values:

Employees need to know how what they do is tied to organizational strategy and objectives.

Employees should understand where the organization is headed (its vision), what it hopes to accomplish (mission), and the operational principles (values) that will steer its priorities and decision-making.

Develop a process to educate employees during new employee orientation and communicate the mission, vision, and values as a first step.

2. Identify Critical Success Factors (CSF):

Critical success factors help an organization focus on those things that help it meet objectives and move a little closer to achieving its mission.

These performance-based measures provide a gauge for determining how well the organization is meeting objectives.

Some examples of CSF:

- Financial Performance
- Customer Satisfaction
- Process Improvement
- Market Share
- Employee Satisfaction
- Product Quality

Every organization is different. Develop CSF that influence the success of your business.

3. Develop Measures and Metrics to Track CSF Data:

Once critical success factors are identified, there need to be measurements put in place to monitor and track progress.

This can be done through a reporting process that is used to collect specified data and share information with senior leaders.

For example, if a goal is to increase customer satisfaction survey scores, there should be a goal and a measure to demonstrate the achievement of that goal.

4. Identify Key Customer Groups:

Every organization has customers. Those that understand who the key customer groups are can create products and services based on customer requirements.

The mistake a lot of organizations make is not acknowledging employees as a key customer group.

Example Key Customer Groups:

- Employees
- Customers
- Suppliers

- Vendors
- Volunteers

Get to know each customer group by identifying their needs and expectations.

5. Solicit Customer Feedback:

The only way for an organization to know how well they are meeting customer requirements is by simply asking the question.

Create a structured process to solicit feedback from each customer group in an effort to identify what is important to them.

Organizations often make the mistake of thinking they know what is important to customers and ask the wrong survey questions.

The trick is to ask and not assume. Customer expectations are a moving target.

Try to remember that what a customer expects today is very different from what was expected five years ago. And what a customer expects today is very different from what they will expect five years from now.

Learn expectations by asking for feedback.

This type of feedback is obtained through customer focus groups.

6. Develop A Survey Tool:

Next, develop a customer satisfaction survey tool that is based on what is important to customers.

For example, customers might care more about quality than cost. However, if you are developing a product and trying to keep the cost down and skimping on the quality, you are creating a product that might not meet the needs of the customer.

Learn to strike a balance between the cost of creating products and a quality product that customers will value.

7. Survey Each Customer Group:

Create a customized survey for each customer group. This survey will help to establish baseline data on the customers' perception of current practice.

For instance, an employee satisfaction survey may provide insight into what benefits employees value that may lead to retention.

Now you will have a starting point for improvements and will be able to demonstrate progress as improvement plans are implemented.

8. Develop an Improvement Plan:

Once the baseline is established you should develop an improvement plan based on customer feedback from each group.

Improvement plans should be written in SMART goals format with assignments to specific staff for follow-through.

Goals May Include Some of the Following:

- Process improvement initiatives: such as customer call hold times
- Leadership Development: Walk-the-Talk
- Management Training/Development: How to manage employees in a quality environment
- Staff Training/Development: Customer Service
- Performance Management: Setting expectations, creating job descriptions that support the vision, and holding staff accountable.

9. Resurvey to See If Its Working:

Implement your improvement plan and give customers time to notice those changes.

After a period of time (12-18 months), resurvey key customers to see if scores have improved.

Customer needs and expectations change over time so being in-tune to changing needs and expectations is critical to long-term success.

10. Monitor CSF:

Monitor CSF monthly to ensure there is consistent progress toward goals. For instance, if customer feedback alerts you that employees may need some service standard training, collect monthly data to see if scores improve after initiating refresher classes.

This also allows for course correction should priorities and objectives change during the review period.

11. Incorporate Satisfaction Data into Marketing Plans:

Once you've achieved some positive results with your satisfaction data, use it as a marketing tool!

For instance, if you are trying to recruit top-tier employees, advertise your high employee satisfaction scores to demonstrate your commitment to employee satisfaction.

A lot of successful organizations miss the boat by not letting others know what they do well.

Customers want to know how an organization's internal processes work, especially if those processes help to deliver an outstanding product or service!

12. Maintain Current Technology:

Technology is how work gets done. Use technology to your advantage and commit to keeping up with changes.

Make sure technology is user-friendly and supports targeted improvements.

For example, a website should be easy to navigate, easy to find (SEO), and the content should be easy to understand.

Relationship between JIT and TQM:

The relationship among JIT and TQM was constructed based on the review and survey. First, state that Kaizen would help in developing JIT and TQM activities effectively. Proposes that 5S would be a foundation of JIT and TQM and implementation. Further, based on the pillars of TQM and JIT. Moreover, JIT would be a supporting activity of TQM implementation. State that a kanban system is an important part of JIT and Poka-Yoke is an element in quality control. Quality control is a pillar of TQM house. State that visual control is an important technique in machine maintenance. Further, state that Quality Control (QC) tools are basic tools of TQM.

Characteristics	JIT	TQM
Originality	Japan	US
Emphases	- Waste reduction including inventory - Continuous improvement - Customer responsiveness including flexibility	- Customer satisfaction - Employee involvement - Continuous improvement
Supporting factors	- Administrator deployment - Team employment - Employee involvement - JIT flow - Pull system	- Administrator deployment - Team employment - Education
Inclusion	- Line balancing - Setup time reduction - Batchsize reduction - Skill development - Consistency of quality control - Continuous work improvement - Pull system - Long-term supplier relationship - Preventive maintenance	- 7 traditional QC tools - 7 new QC tools - Statistical methods - Cross functional administration - Quality control circle activity
Usefulness	- Increase product quality - Decrease manufacturing defective - Increase customer responsiveness - Reduce inventory - Increase accuracy of demand forecast - Reduce manufacturing costs	- Increase customer satisfaction in quality - Decrease operations wastes

Similarities of JIT and TQM:

Characteristics	JIT	TQM
Objectives	- Inventory control - Lead time reduction - Defective rate reduction	- Cost down and quality improvement - Customer satisfaction increase
Accent	- Machine and operator management	- Operator management
Wastes	- 7 wastes	- Defects - Inventory
Employees	- Multi skilled workers - Employee involvement	- Educated workers - Employee involvement

Company profile:

History and Evolution of TOYOTA:

Toyota Motor Corporation was founded by Kiichiro Toyoda in the late 1930's. It was Sakichi Toyoda, father of Kiichiro Toyoda, who was aiding his father in his loom work, got an idea to improve the batten-equipped tall loom.

This led to an invention of first-hand loom in Japan and Sakichi Toyoda patent his hand loom design in May 1981 in Yokohama City. It was not over for Sakichi Toyoda, in his mind he was aiming to design a loom which runs by electricity.

After 17 years of his hardship, he came up with successful working design of electric loom in Japan. This was also the first power loom invented in Japan and he rightfully received the patents for his invention.

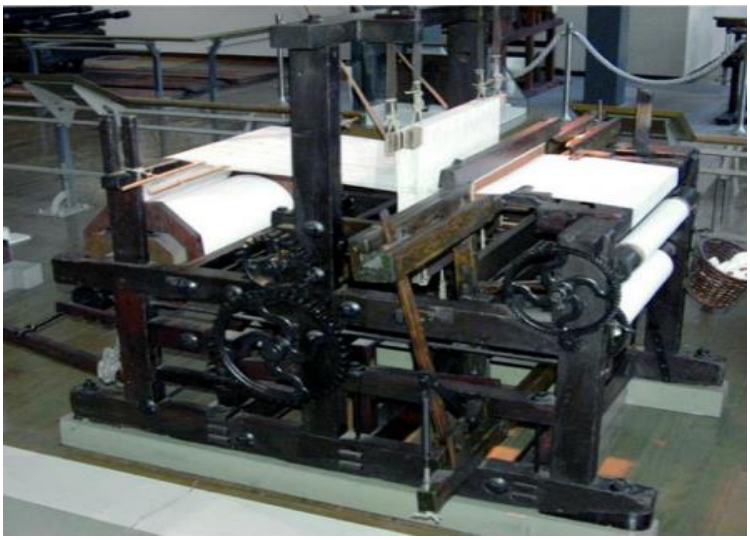

Figure 1 - First Toyoda Power Loom (Toyoda Power Loom, 2016)

Sakichi Toyoda was awarded with many patent rights, utility model rights and industrial property rights during his life time. When he died in 1932, his son Kiichiro Toyoda took over his father's reign.

Kiichiro Toyoda took his father's invention and works from being electric to automatic loom. Kiichiro Toyoda also invented various automatic looms and received patents for his invention in Japan.

Kiichiro Toyoda inventions were moving into automobiles at a fast pace and by May 1935, he had his first completed passenger car prototype, named as “Model A1”. The company name was finally changed to “Toyota” from “Toyoda” in October 1936. Kiichiro Toyoda’s works lead to further heights in the core establishment of Toyota.

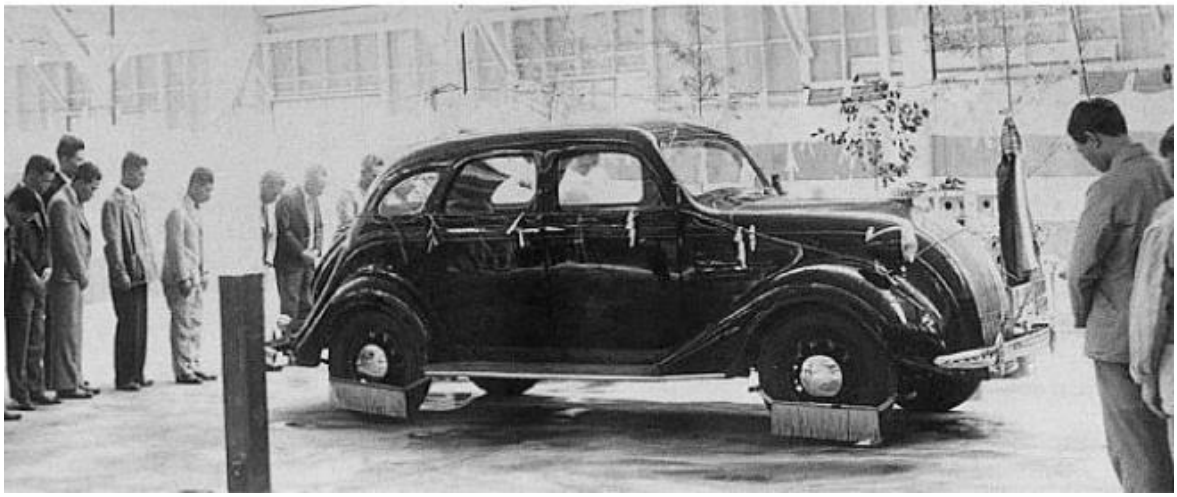

Figure 2 - First Passenger Car Prototype Model - A1(2016)

Today, Toyota has emerged into one of the biggest giants in automotive manufacturer. Its headquarters are in Toyota City, Aichi, Japan. It also has employee strength of 348,877 as of 31 March, 2016(Toyota Overview, 2016).

Just-in-Time System in TOYOTA:

In automotive industry, efficient production system is only possible by removal of following three distinguished problems.

The typical automotive industry will consist of mass production assembly type, which will involve assembly of each vehicle from several thousand parts which have also gone through numerous processes. So, removal of any obstacle in any of these processes will keep the proper functioning of the production system. Otherwise, it may create a huge mess in whole production system if any of these processes are having trouble.

Huge fluctuations as per the demand of a particular model. Whereas, the production house consists of numerous types and variations in other models. After every couple of years, the vehicle is completely remodelled. This also leads to change of various other small and big parts to complete a particular model.

In automotive industry, the ordinary production control system allows fulfill the schedules of production by holding work-in-progress inventory. It allows in absorbing troubles of processes and fluctuation in demand for all the processes. On the other hand, 22 such a system also creates excessive and unbalanced inventory within many processes, which are mostly not sold at the same time.

Moreover, such a situation in production house will lead to condition of excessive equipment's and more than required labour, which does not match up with Toyota's expectation.

Just-in-time production system helps in avoiding such situations, where problems related to unbalanced inventory and excessive equipment's and labour are due to troubles and demand fluctuations. In order to achieve this, all efforts are put in to develop a production system that will reduce the lead time from the moment materials are entered to the completion of vehicle.

Important Points in Just-in-Time of TOYOTA:

In just-in-time production method, the production lead time can be greatly reduced with due respect to maintain the conformity to changes by making sure that – all processes are producing only the necessary parts at the necessary time and have only minimum stock in order to hold all the processes together.

After checking the required number of inventory quantity and production lead time, this production system still needs to look into excessive labour and equipment's. This also leads to initiating the second most important concept of Toyota Production System, 23 which leads to maximum usage of labours potential. As per the above, following points are to be implemented in the production system:

1.Withdrawal by Subsequent Processes:

The first and the foremost important part of just-in-time production, to gather accurate knowledge related to timing and quantity required. Normally, every production system, but in case of Toyota Production System, follows the production schedule of a particular product in automotive plant which is based on the various parts schedules and instructions given to all the processes. The production of these parts as per their schedule, lead to the

implementation of preceding process of supplying the parts to its subsequent process. But this process could only make it worse and difficult to adapt the constant changes to meet the production targets. On the other hand, Toyota adopted the opposite of preceding process of supplying the parts to its subsequent process.

In just-in-time production, parts are being produced as per various processes in the exact required numbers and exact timeline for completing the assembly of a vehicle, which is regarded as the final product of Toyota. In such a scenario, it won't be wrong to say that the final assembly line will be able to judge the number of parts it requires and how much time it will take to finish the vehicle.

After connecting the above discussed processes and put into the chain fashion process, it would be right to say that whole production process of the company is engaged in just-in-time production without making unnecessary bulky production orders.

2. One Piece Production and Conveyance:

This is the second important part of just-in-time production. In this, all the processes must be able to fulfil the criteria of producing one part in their respective process, so that, they are only left with one piece as stock and the other part is moved to subsequent production processes to complete the vehicle.

Therefore, no process in the production is allowed to produce a greater number of parts and maintain surplus inventory between the processes. So, it was necessary to understand this by every process and keep their approach in such a way, that it only produces and conveys

a single piece of unit for the final assemble line. All in all, it meant no lot production and no lot conveyance.

Reduction of lot size by shortening the setup time, leads to improvement in production methods which also includes the elimination of inventory within the processes. By following this, it results in ordering of multipurpose vehicle equipment adhering to processing requirements for a single product line. Toyota successfully carried out all of these with its Toyota Production System and also with its large number of sub-contractors.

3. Levelling of Production:

To meet the requirements of this important point in just-in-time production, all the processes must have small lot of production and conveyance. If the situation arises and the huge quantity for the following processes is withdrawn. This will lead to have excessive stock within the company and with sub-contractors all the time. To make just-in-time succeed, priority should be given to final assembly line, so that it can level the production.

To meet the requirements of levelling of production in just-in-time, assistance from managerial positions is very much required. Firstly, the final assembly lines at Toyota are mixed product lines. Furthermore, the production per day is calculated by the average number of vehicles produced in the monthly schedule divided by the number of working days. Secondly, calculating the cycle time of different vehicles on daily basis in the production sequence, so that all the different vehicles appear according to their own cycle 26 time. Once the assembly line levels up with production, then the production of process of withdrawal and once piece production and conveyance are also levelled.

Another important point of levelled production is to satisfy the basic rule of just-in-time production, that is, to produce what is required to be sold without exceeding the limit. It also needs to adjust its production level as per the market changes and is able to produce as smoothly as possible. Once the monthly schedule for production is rolled out, Toyota still keeps on making the changes for different vehicles on daily basis orders. If the market situation changes, it will force Toyota to make further changes for monthly schedules, so that Toyota is able to lower down the drastic changes in demand.

5.Elimination of Waste from Over-Production:

Derecognizing the value of existing inventory is the most essential part of just-in-time production system. As per the classical production control system, availability of inventory is very much appreciated in order to combat the troubles and fluctuations of demand, and to smoothen the fluctuations in load of processes.

Whereas, Toyota sees this stock on hand, leading to collection of troubles and bad causes. Most of the unwanted stock on hand is caused by over-producing the particular item than the required amount, which is considered as the worst waste in Toyota Production System, leading to overall increase in the production cost.

There is a reason behind for terming over-producing as the worst waste in Toyota Production System because it hides away the actual causes of waste like trouble in various processes, unbalanced between the workers allotted to a particular process, workers being idle, excessive labour, insufficient preventive maintenance, etc. Now this prospect of waste

makes it harder for employees to display their actual potential and also leads to hamper the overall growth of the company.

Total Quality Management (TQM) in TOYOTA:

The Toyota Corporation case study report is based on the implementation of total quality management (TQM) meant to improve the overall performance and operations of this automobile company. TQM involves the application of quality management standards to all elements of the business.

It requires that the quality management standards be applied in all branches and at all levels in the organization. Characteristic of Toyota Corporation going through the total quality process is an unambiguous and clear.

Toyota has limited interdepartmental barriers, excellent customer and supplier relation, spares time to be spent on training and the recognition that quality is realized through offering excellent products as well as quality of the entire firm, including personnel, finance, sales, and other functions.

Whereas the TQM initiative is to succeed, the management has to foster the participation of Toyota Corporation workers in quality improvement and create quality culture by altering attitudes and perceptions towards quality.

This research report assesses the implementation of TQM, how Toyota manages quality in all organization management systems while focusing on manufacturing quality. The report evaluates the organization management elements required when

implementing TQM, identifies, and investigates the challenges facing Quality Managers or Executives in implementing Quality Management Systems.

Implementation of TQM in TOYOTA:

In order to implement TQM, Toyota corporations focused on the following phases:

- The company extended the management responsibility past the instantaneous services and products
- Toyota examined how consumers applied the products generated and this enabled the company to develop and the improve its commodities
- Toyota focused on the insubstantial impacts on the procedures as well as how such effects could be minimized through optimization
- Toyota focused on the kaizen (incessant processes development) in order to ensure that all procedures are measurable, repeatable, and visible.

TQM Practices in TOYOTA:

The commitment from business executives is one of the key TQM implementation principles that make an organization successful. In fact, the organization commitment presents in the senior organizational staff range from top to lower administration. These occur through self-

driven motives, motivation and employee empowerment. Total Quality Management becomes achievable at Toyota through setting up the mission and vision statements, objectives, and organizational goals.

In addition, the TQM is achievable via the course of active participation in the organizational follow up actions. These actions denote the entire activities needed and involved during the implementation of the set-out ideologies of the organization. From Toyota Corporation's report, TQM has been successful through the commitment of executive management and organizational workforce (Toyota Motor Corporation, 2012).

Through inventory and half the bottlenecks at half cost and time, the adopters of TMS (Toyota Management System) are authorized to manufacture twice above the normal production. To manage the quality in all organizational management system, the Toyota Production System incorporates different modernisms like strategy or kanri Hoshin use, overall value supervision, and just-in-time assembly.

The amalgamation of these innovations enables Toyota to have a strong competitive advantage despite the fact that Toyota never originated from all of them. The 1914 Henry Ford invention relied on just-in-time production model. The Ford system of production on a grand perspective warrants massive production, thus quality (Toyota Motor Corporation, 2012).

Conclusion of the Study of TOYOTA:

Toyota uses JIT manufacturing as a key to successful in the motor market in the world. Quick response to the market empowers and sustains competitive advantages of Toyota and other leading companies. Two main components of JIT philosophy are planning elimination of all waste and continuous improvement of productivity. Undeniable, the philosophy has been rooted in the working culture and belief of Toyota. These changes that JIT bring about to Toyota also happen to many leading companies in the world. However, there are still many problems and errors in JIT system. Therefore, JIT is studied to make development and improvement in the future. A firm who can hold the future of JIT in the industry can exceed its market share in global market.

Total Quality Management is a concept applied in automobile industry, including the Toyota Corporation. It focuses on continuous improvement across all branches and levels of an organization. Being part of Toyota, the concept defines the way in which the organization can create value for its customers and other stakeholders. Through TQM, Toyota Corporation has been able to create value, which eventually leads to operation efficiencies.

TQM is an important breakthrough in the sector of manufacturing. Since the dawn of competition, quality has become a necessity among manufacturing companies. It is an advantage to incorporate quality in all aspects of company activities. Moreover, its emphasis on the use JIT has further improved its production process. Toyota has also enhanced the JIT system with TQM. The collaboration of these two processes has allowed Toyota to become more than efficient. Toyota Motors has become an emulated firm because of its successful production strategies.

Literature review (1):

Flynn et al. (1995), used practitioner's and empirical literatures developed the quality management framework for manufacturing companies, including top management support, workforce management, quality information, supplier involvement, product design, process management, and customer involvement. Ahire et al. (1996), based on both conceptual literature and empirical and practitioner literature, developed the instrument for quality management, using top management commitment, supplier quality management, supplier quality management, supplier performance, customer focus, SPC usage, benchmarking, internal quality information usage. Recently, much of effort is to empirically examine the impact of quality management practice on quality performance and competitive advantages (Kaynat, 1998; Matsui, 2002). Sakakibara et al. (1993) developed an analytical framework and measurement instrument for JIT based on sixteen key JIT practices. Calen et al. (2000) suggested that JIT manufacturing at the plant level is associated with greater productivity in inventory usage, lower total and variable costs, but not fixed costs, and higher profits. Ahmad et al., (2004) examined the role of infrastructure practices in the effectiveness of JIT practices from three Perspective universal, contingency, and configurationally, and reported that synergy between JIT practices and infrastructure practices needs to be exploited to attain superior plant competitiveness. The relationship between TQM and JIT was examined in some empirical studies (Flynn et al., 1995; Sriparavastu and Gupta, 1997; Cua et al., 2001). These studies reported the compatibility and trade-off between TQM and JIT practices and their combination yields synergies that lead to higher level of performance. Flynn et al., (1995) found the significant impact of TQM and JIT on quality and JIT performances. Sriparavastu and Gupta, (1997) reported that most production systems can benefit from

certain aspects of JIT implementation without having TQM in place first. Cua et al., (2001) pointed out the evidence supporting the compatibility of the TQM and JIT practices and that manufacturing performance is associated with the level of implementation of both sociallyand technically-oriented practices of these programs.

Literature Review (2):

This section summarizes the concepts and recent literature on flexibility and flexibility's dimensions, importance of flexibility in manufacturing, JIT production practices and flexibility, Total quality management practices and flexibility, and the interaction effect of TQM and JIT on flexibility. Flexibility and Flexibility's Dimensions Manufacturing flexibility has been defined by many researchers, which presents as a mean to achieve manufacturing responsiveness. In the 1980s, based on the idea of Mandelbaum], several authors have viewed flexibility as the capability of a system to adapt to changing situations and uncertainty derived from the business environment. Later, flexibility tended to be broken down into specific categories for better understanding of this concept. Upton indicated that flexibility is about increasing product range as well as improving mobility and the uniform of performance when manufacturing different product types. Other than that, Olhager differentiated flexibility based on the time perspective. In the short run, flexibility is considered the firm's ability to cope with a fast-changing environment by utilizing available resources. However, in the long run, flexibility presents the ability to introduce new products to the market, use new resources, and develop a new production process within a production system. More recently, authors focus on flexibility performance to fulfil customers' requirements. Zhang et al. stated that flexibility is a sort of organizational capability to manage available resources, control production, and uncertainty to satisfy customers' needs. From the rationale that the quantity of products demanded and the nature of products required are varied constantly, Mishra proposed that manufacturing Sustainability, flexibility should be concentrated on volume and product mix. In general, it is common among research studies that flexibility or agility is how manufacturing firms react to changes

in customer demands. In addition, researchers advocated that flexibility is a complex and multi-dimensional concept that is difficult to measure. Toni and Tonchia showed that there are diverse ways to classify flexibility dimensions including horizontal classification, vertical classification, temporal classification, classification by objects of the variations, and mixed-logic classification. Upton classified flexibility into two broad dimensions that are internal flexibility and external flexibility. While the former is inner ability and resources such as machine and materials to meet customer's requirement, the latter is how it satisfies customers in an efficient way such as product and volume flexibility to improve firm's position in the market. Other than that, flexibility can be divided into three levels, which are basic level (includes machine, material, and operation flexibility), system level (including process and volume flexibility), and aggregated level (includes program, production, and market flexibility). Importance of Flexibility in Manufacturing Flexibility has been accepted widely in many studies as an element of firm's competitive advantage over the rivals in the market. Due to environmental uncertainty, highly competitive pressure and output variability, flexibility is crucial in organizational success in term of quickly responding to customer's demand as well as reacting innovatively to emerging challenges. Other than reactive capability, flexibility enables the firm to satisfy increasingly sophisticated customer's requirements without incurring quality defects, higher cost, long delivery time, and process disruptions. Volume and product mix flexibility enables firms to provide product's features that customers want, as well as supply proper product volume when demand fluctuates to eliminate excess inventory and time delays. Therefore, firms with a high level of flexibility and capability will achieve higher customer satisfaction. Overall, it is essential to improve flexibility to build up innovative capabilities and ensure firm's competitiveness. This paper focuses on manufacturing flexibility performance as firm's

ability to meet customers' needs regarding flexibility. According to Olhager, the dimension of flexibility that customers want in production are volume, product mix, and lead time flexibility. Volume flexibility refers to firm's ability to offer enough products with changing demand from customers. Product mix flexibility is the ability to change over quickly in the production system from a product to others, such as shifting in customers' requirements of product mix. In addition, lead time flexibility is how the manufacturers deliver the products to retailers or customers based on demand to ensure on-time product delivery to customers. Hence, flexibility performance in this paper is measured how the manufacturing firm satisfies customers' needs in manufacturing flexibility.

Research Methodology and analysis:

Need of the Study:

• To study just in time and TQM – Synergistic process in Toyota.

• To identify and correct the obstacles in just in time and TQM of Toyota.

• To explore and understand the corrective measures taken by Toyota to eradicate the obstacles in JIT and TQM process.

Objective of the Study:

• To study JIT – Just in time process and methods.

• To study TQM – total quality management process and methods.

• To study JIT and TQM Process, focuses on the synergy of joint implementation of TQM and JIT practices upon competitive performance in organization.

Research Design:

Research methodology is a way to systematically solve the research problem. In this we study the various steps that are generally adopted by the researcher in studying his/her research to know not only the research methods and techniques but also the methodology. Researchers also need to understand the assumptions underlying techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not. All this means that it is necessary for the researcher to design his methodology for his problems as the same may differ from problem to problem.

Problem Statement:

Most of the discussions in prior studies have centred on either JIT or TQM but an increasing number of researchers have begun to explore the issues relating to a joint implementation of JIT and TQM. Many previous studies have encountered difficulty in precisely listing the practices comprising JIT and TQM because of the extensive overlap between these approaches. The overlapping practices of JIT and TQM are more than coincidental and they may be mutually supportive. The companies implementing both JIT and TQM jointly outperform those implementing only one of these, or none. All major elements of JIT are embedded in a more comprehensive TQM campaign because TQM has a much broader focus on improving the overall effectiveness of an organization. Management should not treat JIT and TQM as being exclusive business strategies. Rather, management should take an integrated view of joint JIT-TQM implementation.

Hypothesis:

Analytical Framework:

Based on a literature review, the authors propose an analytical framework to study the relationship between JIT practices, TQM practices, and flexibility in manufacturing firms (as shown in Figure 1).

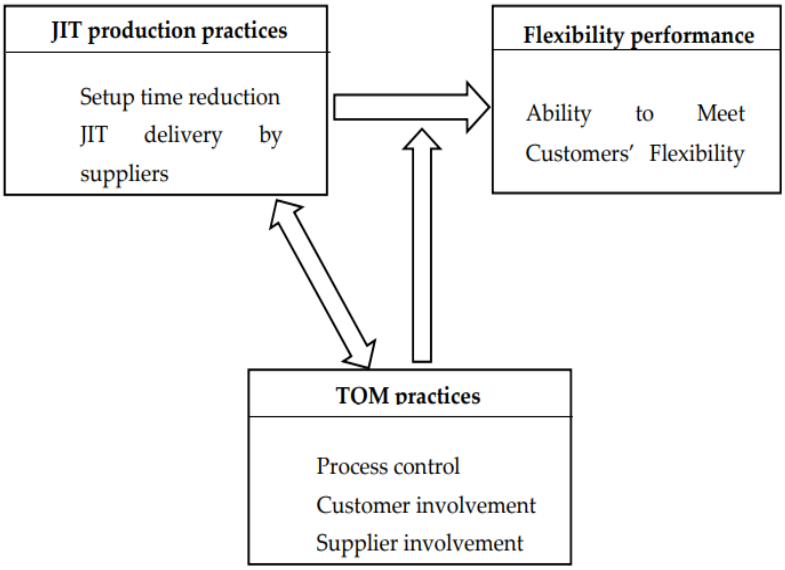

Figure 1. Framework of the study.

To study the moderating effect of TQM on the relationship between JIT production and flexibility, the authors focus on TQM practices that have been highlighted in the cited literature as process control, customer involvement, and supplier involvement. Process control is often regarded as the critical element of internal quality management, which is concerned with the utilization of tools and techniques such as statistical process control to

manage the manufacturing process and meet the needs of production. Furthermore, process control contains safety activities that ensure employee's protection, and there is no equipment breakdown. Supplier involvement is considered an upstream quality management practice, which assists firms in making certain the quality of raw materials and utilize suppliers' capabilities in quality improvement. Customer involvement has been viewed as important and a necessary practice because it helps increase customer's acceptance and customer satisfaction. Specifically, customer involvement helps firms detect quality problems through customer feedback, which also develops new product ideas by cooperating with customers. This study investigates such JIT production practices, which have been highlighted in JIT literature as Setup time reduction, JIT delivery by suppliers, and JIT link with customers. As described in the research of Matsui, setup time reduction is how the firms take measures to shorten time of preparation before production, as well as reduce lot sizes to enable JIT production. JIT delivery by suppliers and JIT links with customers ensure firms to receive and make frequent delivery, which also integrate suppliers and customers via the JIT system. In this study, we consider flexibility at an aggregate level, so that flexibility performance is measured as the ability of firms to satisfy customers' needs regarding flexibility.

Hypothesis development:

Many studies have confirmed the synergistic linkage of TQM and JIT practices because they share common objectives and are solid pillars of the manufacturing system. A company that applies both TQM and JIT practices was found to outperform another that applies only one or considers them separately. TQM practices such as process control makes sure the

production schedule is implemented as planned and it reduces process variation that is crucial for JIT implementation. During the manufacturing process, defects usually happen because the production is disrupted, and there is postponement in fulfilling orders. JIT keeps production in continuous flow, minimizes waste, and results in a lower defect rate. Cooperation with suppliers and customers in quality improvement enhance the mutual relationship of firms with external partners. Hence, this facilitates JIT delivery. As Vokurka et al. stated, JIT and TQM have a close relationship since they share the ultimate firm's target of achieving customer satisfaction. Eker and Pala found a positive effect of JIT practices on TQM practices. Based on the discussion above, the first hypotheses can be stated as follows.

H1: There is a positive linkage between process control implementation and the setup time reduction level.

TQM has been applied widely in companies as a philosophy to ensure product and service quality, productivity, and customer satisfaction. Many researchers have confirmed the positive effect of TQM practices on operational performance. For example, by using tools and measures to manage the production process, process control aims to create an effective production chain, which can respond quickly to environmental changes. This is a customer requirement. Implementation of process control facilitates production prevents postponement. Therefore, it increases the firm's agility. Furthermore, a close relationship with customers enables the ability of firms to accelerate the delivery process and be sensible of customers' needs to respond quickly in a cost-effective operation. Firms have to contend for changes in customer requests in case of new product reintroduction, product return, and product modification. To do that, it is crucial to have fast delivery and high- quality raw

materials from suppliers, as well as their contribution to quality improvement initiatives. Therefore, supplier involvement not only improves quality performance, but it also leverages the Sustainability firm's capability to cope with turbulent market demands. Thus, the relationship between TQM practices and flexibility can be hypothesized as follows.

H2: Process control implementation has a positive linkage with flexibility performance.

The traditional view of treating JIT and TQM as being exclusive has originated from the recognition of JIT and TQM as possible management strategies in that sequence. This has resulted in ineffective JIT implementation by many small and medium-sized companies. In this article, we have explained the genesis of the traditional view. Further, we examined the connections between JIT and TQM from conceptual, philosophical, and implementation perspectives. We posit a synergy between JIT and broader elements of TQM philosophy, and theorize that an integrated view of a joint JIT-TQM implementation where JIT is considered an integral part of the broader TQM campaign will benefit organizations much more than following the traditional view. This theoretical argument leads to two hypotheses which propose that the organizations which have implemented both JIT and TQM jointly will outperform the organizations that have implemented only one of these, or none. Through discussions with several organizations which have implemented these approaches, we have found a support for our thesis. However, these hypotheses need to be tested empirically to demonstrate a broader support for them.

This research has implications for researchers as well as practitioners. In future, research could be undertaken to analyse the synergistic effects of joint JIT-TQM implementation in more detail, and develop a theoretical support for recommending specific operational

strategies of joint implementation. Practitioners will benefit from the proposed integrated view of joint JIT-TQM in terms of more effective implementation of these strategies. At a broader level, this article analyses the fundamental relationships between two contemporary management strategies. Such an approach will help both academicians and practitioners by reducing the confusion stemming from inadequate insight into the interactions between these strategies. This, in turn, will aid in more effective implementation of different contemporary strategies for managing organizations effectively.

Measurement Test:

The collected data was first tested to ensure its reliability and validity.

- Reliability of the construct was tested by analysing the internal consistency between items with the criteria such as Cronbach's Alpha values having to be greater than 0.6, as suggested in the literature.

- Content validity makes sure all questionnaire items used to measure scales have a solid scientific foundation. In this paper, content validity was ensured by extensive literature review including theoretical and empirical research studies related to JIT, TQM, and flexibility performance.

- Construct validity is tested to make certain that questionnaire items are measuring the same scale. Factor analysis is performed to check whether each scale is one-dimensional. The test results indicate that all of the criteria are satisfied. Within-scale factor loadings should be greater than 0.4 (provided in Appendix A), Eigenvalues are required to be larger than 1, and the minimum percentage of variance is 50%).

Measurement test results are presented in Table 1 show that data is reliable and valid and can be used for further analysis.

Table 2: Measurement Test

Factor	Measurement Scale	Min	Max	Mean	SD	Cronbach's Alpha	Eigenvalues	Percentage of Variance
JIT practices	Setup time reduction	1.33	5.00	3.51	0.78	0.70	1.89	63.15
	JIT delivery by suppliers	1.00	5.00	3.47	0.95	0.75	2.01	67.07
	JIT link with customers	1.20	5.00	3.43	0.77	0.79	2.70	53.93
TQM practices	Process control	1.00	5.00	3.46	0.94	0.91	3.64	72.81
	Supplier involvement	2.00	5.00	4.14	0.62	0.72	1.91	63.73
	Customer involvement	1.50	5.00	3.92	0.70	0.82	2.62	65.60
Flexibility	Flexibility performance	1.50	5.00	3.82	0.69	0.85	2.77	69.31

Correlation Analysis:

Bivariate correlation with Pearson correlation coefficients is performed to test the relationship between measurement scales and the results are summarized in Table 2.

Table 2: Correlation analysis

		JIT Practices			TQM Practices			Flexibility Performance
		Setup Time Reduction	JIT Delivery by Suppliers	JIT Link with Customers	Process Control	Supplier Involvement	Customer Involvement	
JIT Practices	Setup time reduction	1	0.47 **	0.44 **	0.46 **	0.19 **	0.16 **	0.18 **
	JIT delivery by suppliers		1	0.46 **	0.39 **	0.37 **	0.25 **	0.21 **
	JIT link with customers			1	0.43 **	0.28 **	0.34 **	0.19 **
TQM Practices	Process control				1	0.28 **	0.25 **	0.19 **
	Supplier involvement					1	0.23 **	0.27 **
	Customer involvement						1	0.23 **

Table 2 shows the positive linkage among setup time reduction, JIT delivery by suppliers, and JIT link with customers. Internal QM (process control), upstream QM (supplier involvement), and downstream QM (customer involvement) are found to be significantly correlated with each other. Moreover, a significant relationship between JIT practices and TQM practices is confirmed. The most robust linkage is found between setup time reduction and process control, which exhibits a correlation coefficient of 0.46. Furthermore, the correlation result indicates that JIT and TQM practices have significant correlations with flexibility performance, in which supplier involvement and flexibility shows the strongest association.

Data Analysis:

This data contributes to the research field related to TQM, JIT production, and flexibility by providing empirical evidence of a relationship between TQM and JIT production practices and Sustainability flexibility performance. An analytical framework was proposed, which includes one practice of TQM, one practice of JIT, and one practice of flexibility performance as the firm's ability to meet customers' flexibility needs. The data sample was adapted from the hypothesis. A hypothesis was used to examine the data, as well as test the validation of hypotheses. This study emphasizes the strong correlation of TQM practices and JIT production practices as well as their significant impact on flexibility performance. Moreover, flexibility performance can be built through the joint effect of three pairs of TQM and JIT production practices: process control and setup time reduction, supplier involvement, and JIT delivery by suppliers, customer involvement, and JIT link with customers. The study concludes that implementation of JIT production under an organizational culture emphasized on TQM creates a strong foundation of firm's responsiveness to the market. It is suggested that plants should implement TQM practices and JIT production practices as two complementary concepts to achieve higher flexibility performance when compared to other plants, which apply only one of those two. Future research can collect more data and use various methods of the construct measurement to implement further analysis for deeper understanding of the relationship between TQM, JIT, and flexibility. Moreover, future works can also extend the analytical framework of this study to explore the relationship of more TQM and JIT practices on flexibility. It is also helpful to explore how flexibility can drive other firm performance factors such as innovation or financial performance.

Limitations:

1. The result of the study is based on the secondary data. Hence the secondary data collected from company web site may be biased.

2. The time allotted for the study is limited.

3. Limited access to data.

Findings:

- This study confirms the significant linkages between TQM practices and JIT production practices.

- This study indicates the positive linkage between JIT practices, TQM practices, and flexibility performance.

- The third finding is the moderating effects TQM practices on relationship between JIT production practices and flexibility performance.

Conclusion:

Most of the discussions in prior studies have cantered on either JIT or TQM but an increasing number of researchers have begun to explore the issues relating to a joint implementation of JIT and TQM. There are relationships and interactions between JIT and TQM practices and performance, and JIT and TQM function effectively in isolation, their combination yields synergies for further performance improvements. While the unique JIT and TQM practices added predictive power of the JIT and TQM related performance, the most significant factor turned out to be the common infrastructure practices (including information feedback, management support, plant environment, workforce management, and supplier relationship). The companies implementing both JIT and TQM jointly outperform those implementing only one of these, or none. All major elements of JIT are embedded in a more comprehensive TQM campaign because TQM has a much broader focus on improving the overall effectiveness of an organization. Management should not treat JIT and TQM as being exclusive business strategies. Rather, management should take an integrated view of joint JIT-TQM implementation.

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