CONTINUOUS IMPROVEMENT IN QUALITY AND PRODUCTIVITY THROUGH INTEGRAL LEAN MANAGEMENT

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INTRODUCTION

The WTO agreements and schedules present challenges as well as opportunities to all economies, particularly in the developing and under developed countries. The challenges include reduction in tariff, Protectionist Policies of government, quotas system and other political and trade barriers. As such, Quality and Productivity improvement is a dire need for the post WTO era. Continuous improvement in productivity can be made either by increasing output, or decreasing inputs or doing both at the same time. Lean out all practices of a business to eliminate wastage, rework and fat that may exist in any form. Isolated lean efforts on a process or function may not serve the purpose. Integral Lean Management of order-to-delivery is the central theme to follow with Kaizen as its basis. This improvement exercise is not one time requirement to remain competitive in the challenging open trade house of post WTO era.

Industrialized countries of the world are reaping the benefits of continuously improved Quality and productivity through leaned out processes. They are better prepared for the incoming challenges. Pakistani businesses both in public and private sector are faced with the in-house challenges, besides WTO, of Low Productivity, moderate Quality and high cost of production due to wastage, rework, inefficient management system and government taxation policies. Muda is present in almost all processes and functions of every business (Feld, 2001).

Standing up to the challenges and to avail the opportunities requires to eliminate failures and wastages and to utilize resources efficiently. Improvement in Quality and Productivity through Integral Lean Management on continuous basis is a way of survival and growth for the business.

The following section contains a brief discussion on globalization through WTO, which presents challenges as well as opportunities to Pakistani businesses in the post WTO era of competition in the world’s business community.

GLOBALIZATION THROUGH WTO A very brief summary of the globalization scenario through WTO is presented as follows (Alamgir, 2001; Sajid, 2001 and Khan, 2003);

Factors Responsible for Globalization

- Policy shift in favour of deregulation and liberalization since 80’s
Support of IFIs to such policies

WTO establishment

Technological Advancement (Telecommunications, Computers, Information Technology)

Growth of Multinationals (mergers, acquisitions) Globalization is a Two-edged Weapon

Improving living conditions, better goods and services

Loss of jobs, increased gap between rich and poor, vulnerability to external shocks

**Offers Opportunities and Challenges**

Dynamic nations benefit from open market by exporting goods and services, technological advancement and human development

**World Trade Organization (WTO)** International body dealing with rules of trade among nations

Legal ground rules for international commerce contained in agreements

Established in 1995 replacing GATT

Membership (voluntary) **Purpose**

Expand trade

Help trade flows as freely as possible

Serve as forum for trade negotiations

Provide framework for dispute settlement

**Principles of Trading System**

Trade without discrimination

Freer and predictable

More competitive

More benefit to developing countries **Instruments of System**

Lowering of trade barriers through negotiations

Binding of tariffs

Trade without discrimination and National treatment

Safeguard mechanism to protect domestic industry (emergency clause, anti-dumping, counter-veiling)

Special treatment for less developed countries (differential, gradual assumption of obligations)
Trade Rounds
Main factor for trade liberalization

- Latest round at WTO headquarter, Geneva, in last week of July 2004. Main issues were:
  - USA & EC to reduce subsidies to their farmers.
  - Greater access for developing countries' products to the market of rich countries.

WTO Agreements

- General Agreement on Tariffs and Trade (GATT) 1994 and other Agreements concerning trade in goods
- General Agreement in Services (GATS)
- Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS)

Pakistan - Challenges and Opportunities

The globalization presents challenges to face and opportunities to avail. A brief summary is presented as follows:

- Founder member (23)
- Actively participated in GATT
- Associates with developing countries
- Participated in Uruguay Negotiations and Data Declaration.
- Signed WTO Agreements in 1994

Pakistan and GATT

Pakistan and Main WTO Areas

Trade in Goods (GATT)

- Non-agricultural products
- Agricultural products
- Textile and clothing
- Other Agreements (anti-dumping, TRIMS, etc.)

Trade in Services (GATS)

Trade Related Intellectual Property Rights (TRIPS)

- Bound Tariff Rates
- Pakistan bound about 150 products under GATT
- Under WTO Pakistan has bound 25% tariff lines
Current Rates (02-03)

<table>
<thead>
<tr>
<th>Sector Binding</th>
<th>Agriculture</th>
<th>100%</th>
<th>25%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Textile</td>
<td>20-50%</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>50%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Textile exports governed by quotas under MFA 1974

- Agreement on Textiles of 1994 envisages abolishing of quotas by 2005 in 3 stages
- New arrangement offers opportunities and challenges as under:
  - Open market
  - Competitive environment

**AGRICULTURE**

New Rules and Commitments

- Market access (trade restrictions)
- Domestic support (subsidies)
- Export subsidies
- Implementation in phases (6 years for developed and 10 years for developing countries)

**GENERAL AGREEMENT ON TRADE IN SERVICES (GATS)**

This includes 12 sectors with 155 sub-sectors

**Modes of Supply**

- Cross border (e.g. telecommunication)
- Movement of consumers (e.g. tourism)
- Commercial presence (e.g. bank branches, agencies)
- Presence of natural persons (temporary stay of foreign workers)

**Obligations / Commitments**

- General obligation - nondiscrimination treatment

**Specific Commitments**

- Market access
- Additional (beyond GATS)
- National treatment

**Pakistan and GATS**

**General Obligation**: Nondiscrimination with exception on:

- Banking and finance services and
- Telecommunication.

Specific commitments on 6 sectors relating to market access and national treatment,

**Intellectual Property Rights (TRIPS)**

**Areas covered**

- Copyrights
- Trademarks
- Geographical indications
- Industrial designs
- Patents
- Layout designs
Basic principles

- MFN (Non discrimination)
- Technology transfer
- National Treatment

Protection by

- Common ground rules
- Main international agreements

Dispute settlement

- Transitional arrangement (1, 5 and 11 years)

Documentation

- Research, collaboration between government, business organizations and research institutions.

CHALLENGES TO PAKISTANI INDUSTRY

The challenges to Pakistani industries are tremendous. The average rejection rate is 10-20 percent, compliant rate is 2 - 5 percent, and rework is in the range of 30 percent (Khan, 1997). This is much higher than any of the developed country like Japan and USA. This example can give an idea of how much gap exist for improvement to become world-class enterprise and to compete in the post WTO era. A few of the most important internal and external challenges faced by Pakistani industries, in general, can be summarized as follows (Sajid, 2001; Ahmad, 1996; Khan, 2003 and Moosa, 1999);

- **Quality** - Poor, unsatisfactory, unreliable and unpredictable.
- **Price / Cost** - High cost because of inefficient use of resources, inefficient management system, government taxation policies and high margin of profit.
- **Time** - Non-production time, delay time, long time in manufacturing, delivery, logistic and supply.
- **Efficiency** - Wastage and rework is more and conversion processes are inefficient.
- **Effectiveness** - Missing the target by time, Quality or quantity.
- **Productivity** - Lower than the neighbors in Asia and in the world. Its realization, measurement and improvement are lacking at micro and macro level.
- **Integral Management** - No holistic approach, non-supportive environment and non-configured management approaches are used. Resulting in failures of lean efforts.
- **Workforce** - Knowledge workforce is missing, Low skill and low educated Workforce is available.
WTO – Reduction in tariff, opening up of all protection measures and quota systems under World Trade Organization (WTO) agreements and schedules is a major challenge for today and in future to Pakistani industries.

The solutions to the above and many more challenges to industries in underdeveloped and developing countries lies in the transformation to Lean Enterprises through Integral Lean Management to continuously improve Quality and productivity.

PRODUCTIVITY AND PROTECTIONISM IN PAKISTAN

For a long period of time, Government of Pakistan had been relying on a protectionist trade policy based on import substitution and designed to aid newly established national industries. However, like other least developed countries (LDCs), prices and margins tend to grow for products in a closed economy, and the Quality and productivity tends to decline, the same thing has happened to Pakistan. These protectionist policies were unfavorable to productivity. During the 40 years of import substitution policy, industrial organization concentrated on varieties rather than volumes and achieved large profit margins.

Now in the changed situation, in the absence of protectionist regime, volume is required, with Quality and low production cost. Reduction in production cost is within the range of Pakistani managers but initiatives are required to increase productivity (Sajid, 1999 and 2001).

Quality and Productivity are the means by which industry and commerce can adjust to the new trade regime of WTO. After signing WTO in 1995, the Government of Pakistan was forced to adopt a new and less protectionist trade policy with greater competition for domestic suppliers, who were required to increase their efficiency, productivity and Quality to international level to survive. The Government of Pakistan is now bound to reduce trade tariff in a phased manner to allow more free access of international goods and commodities into Pakistani markets. This will further fiercer the competition.

Enhanced Quality reduces rejections, increases productivity, which lowers the cost of production and provides more leverage to compete internationally. In this situation, open and unchecked access to Pakistani market by the world’s most productive, efficient and far more competitive multinational companies is a serious threat to local business and industry, which is unable to compete and is likely to go out of business if some radical steps are not taken immediately (Sajid, 2001).

In order to meet most of the internal and external challenges and to avail the incoming opportunities, continuous improvement in Quality and productivity is required which can be achieved
by the application of Integral Lean Management. The following section contains discussion on Quality and productivity and its improvement through Integral Lean Management.

**PRODUCTIVITY DEFINED**

Successful companies create a surplus through productive operations. It is defined as output to input ratio within a time period with due consideration for Quality. It can be expressed as follows (Prokopenko, 1987 and Alamgir, 2001);

\[
\text{Productivity} = \frac{\text{outputs}}{\text{inputs}} * \text{(within a Time period and at a specific Quality level)}
\]

* It is not only this ratio, which plays an important role in productivity improvement, but also the key dependent variables are Time and Quality. Time is taken as a base for the comparison of production with no compromise on Quality level if Productivity is to be increased. Productivity is also affected by the external factors as well.

The formula indicates that productivity can be improved by;

? Increasing outputs with the same inputs
? Decreasing inputs but maintaining the same outputs, or
? Increasing outputs and decreasing inputs to change the ratio favorably (Weihrich and Knootz, 1993). As such productivity is a combination of both effectiveness (performance) and efficiencies (resources).

The input to productivity includes all contributing factors of hard and soft nature such as workforce, technology, human resource, finance, management, environment and many more that depend upon the required output. However, the output is limited to either production of goods or provision of services. Productivity is affected by micro, macro and global factors simultaneously.

Let us take the examples of only three input factors of workforce, finance and management to appreciate its contribution to productivity improvement (Alamgir, 2001).

**Workforce**

Improvement in the contribution of workforce to productivity is the result of a healthier, better educated, and better-nourished workforce. Three key variables for improved workers productivity are;

? Basic education appropriate for an effective workforce.
? Diet of the workforce.
? Social overhead that makes workforce available, such as transportation and sanitation.

Training, motivation, team building as well as improved education, may be among the many techniques that will contribute to increased workforce productivity. Improvements in workforce productivity are possible; however, they are expected to be increasingly difficult and expensive.
Finance

Inflation and taxes increase the cost of finance, making financial investment increasingly expensive. When the capital invested per employee drops, a drop in productivity is expected. Using workforce rather than finances may reduce unemployment in the short run, but it also makes economies less productive and therefore lowers the wages in the long run. The trade off between finances and workforce is continually in flux. Additionally, the higher the interest rate, the more projects requiring capital are “squeezed out”. They are not pursued because the potential return on investment for a given risk has been reduced. Managers adjust their investment plans to changes in finance.

Management

Management is a factor of production and an economic resource. Management is responsible for ensuring that workforce and capital are used effectively to increase productivity. Management accounts for over half of the annual increase in productivity. It includes improvements made through

Figure 1 Factors Influencing Productivity
the application of technology and the utilization of knowledge (Robbins and Coulter, 1996).

**FACTORS INFLUENCING PRODUCTIVITY**

There are other factors as well, which affect productivity. Alan Lawler had identified the following eight factors that have the greatest bearing on productivity as shown in Figure 1. These eight factors have to be viewed as a whole and are interdependent (Alamgir, 2001). A number of concepts, tools and techniques are available to enhance Quality and Productivity. These are shown in Table 2 and 3 in the later part of the paper.

**IMPORTANCE OF PRODUCTIVITY**

Productivity is the key to world competitiveness. This fact is evident from the world competitiveness formula given in Table 1, which forms the basis for assessing countries in the world competitiveness report. This formula defines competitiveness as the ability to increase market share, profit and the growth in value added, and to stay competitive for a long duration. The world competitiveness formula provides a framework for countries and companies to focus their attention on the factors that will make a difference to their competitiveness (Alamgir, 2001 and Sajid, 1999).

<table>
<thead>
<tr>
<th>COMPETITIVE ASSETS</th>
<th>COMPETITIVE PROCESSES</th>
<th>WORLD COMPETITIVENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Infrastructure</td>
<td>* Quality</td>
<td>* Market Share</td>
</tr>
<tr>
<td>* Finance</td>
<td>* Speed</td>
<td>* Profit</td>
</tr>
<tr>
<td>* Technology</td>
<td>* Customization</td>
<td>* Growth</td>
</tr>
<tr>
<td>* People</td>
<td>* Service</td>
<td>* Duration</td>
</tr>
</tbody>
</table>

![Formula](https://via.placeholder.com/150)

in Quality and Productivity of goods produced and services provided as follows; -

**Goods**

Use of productivity measures aids managers in determining how well they are performing. The multifactor-productivity measures provide better information about the trade offs among factors, but substantial measurement problems remain unsolved. Some of these measurement problems are as follows (Evans and Lindsay, 1999 and Zairi, 1999);

- **Quality may change** while the quantity of inputs and outputs remains constant.
- **External elements** may cause an increase or decrease in productivity for which the system under study may not be directly responsible.
- **Precise units of measure** may be lacking.

**Services**
Productivity measurement is particularly difficult in the service sector, where the end product is hard to define. For example, the quality of haircut, the outcome of a court case, or service at a retail store are ignored in the economic data. In some cases, adjustments are made for the quality of the product sold, but not the Quality of the sales performance or a broader product selection. Productivity measurements are in specific inputs and outputs, while a free economy is producing worth what people want. People may want customized products along with convenience, speed, and safety. Traditional measures of inputs and outputs may be a very poor measure of these factors (Besterfield et al., 1999 and Zairi, 1999).

Low productivity improvement in the service sector is also attributable to the growth of low productivity activities in the service sector. These include activities not previously a part of the measured economy, such as childcare, food preparation, house cleaning, and laundry service. These activities have moved out of the home and into the measured economy.

The productivity challenge is difficult. A country cannot be a world-class competitor with second-class inputs. Poorly educated labor, inadequate capital, and out dated technology are second-class inputs. High productivity and enhanced Quality outputs require good inputs as well.

Productivity through organized Quality strategy is the means to initiate continuous improvement at every level, in every department and with every process. Thereby enhancing the firms competitive position and profit level through the Dr. Deming’s Chain reaction as shown in Figure 2 (Sajid, 2001).

![Deming Chain Reaction of Productivity](Image)

**Figure 2. Deming Chain Reaction of Productivity**

One of the latest approaches to improve Quality and productivity is the use of Integral Lean Management. Muda is to be eliminated. Kaizen to be adopted as way of working life. The following sections contain a detail discussion on Lean and its Integral Management concept.

**THE LEAN CONCEPT**

Lean is a key to eliminate waste and rework. One thing is certain. If a task does not, or will not “Add Value” to what a company is creating, it should be eliminated. Muda (waste) is worthy only of
elimination. It is unseemly and useless fat in an organization. Lean transformation is a leading indicator of profound change in today’s business culture (Feld, 1999).

Lean is to slim down all wastages. Efficient utility of all resources, including the vital one of time, human resource, material, finances and management is required. Karl (2003) has issued two definitions of “Lean” as:

? It is a systematic approach of eliminating waste through continuous improvement;
? It is a total business process – not just manufacturing. The measurement is from once an order is taken to receipt of payment”.

To make waste easier to identify, Taiichi Ohno (Baudin, 2002) classified it in seven categories as follows;

? Overproduction.
? Waiting.
? Transportation.
? Processing.
? Excessive Inventory.
? Unnecessary Motion.
? Making Defective Products.

Every manager of Pakistani enterprises, both in public and private sector, is urged to identify, locate, analyze and lean out these sources of waste to improve Quality and Productivity.

THE LEAN PRODUCER

Henderson and Larco (2002, P. 66) have asserted, “All functional areas of a business need to have programs based on lean concepts. Lean Thinking and Techniques must be used throughout an organization. This means a flat hierarchy functioning through empowered teams. It means the walls between departments have come down. Wherever it may exist, waste must be banished. ‘Value-Added’ activities must be made to flow in an uninterrupted pattern. Areas of the business such as Sales, Human Resource, Product Engineering, and Process Engineering need to mesh. They must work in concert to create value for customers. Indeed, relationships are needed to be built with suppliers with the same goals in mind”.

Lean application can result in success if properly implemented. The ten rules of Lean Production can be summarized as follows (Khan, 2003);

? Create a culture of continuous improvement
? Eliminate waste
? Minimize inventory
Maximize flow
Pull production from customer demand
Meet customer requirements and expectations.
Do it right the first time
Empower workforce.
Design for rapid changeover
Partnership with suppliers

Managers at underdeveloped and developing economies are urged to practice these rules in their businesses for improvement of Quality and Productivity.

LEAN CONCEPTS AND APPROACHES

Over the time, a number of Lean Concepts and Approaches have been developed and others are in the process of finalization. A sample list of such Lean Concepts and Approaches is presented in Table 2 (Prasad 1996 and Khan, 2003).

<table>
<thead>
<tr>
<th>S. NO</th>
<th>Lean Concepts / Approach</th>
<th>S. NO</th>
<th>Lean Concepts / Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lean Supply Chain Management</td>
<td>12.</td>
<td>Lean Time</td>
</tr>
<tr>
<td>2.</td>
<td>Lean Manufacturing</td>
<td>13.</td>
<td>Lean Production</td>
</tr>
<tr>
<td>3.</td>
<td>Lean Organization (Flat Org)</td>
<td>14.</td>
<td>Lean Training</td>
</tr>
<tr>
<td>4.</td>
<td>Lean Staff</td>
<td>15.</td>
<td>Lean Design</td>
</tr>
<tr>
<td>5.</td>
<td>Lean Structure</td>
<td>16.</td>
<td>Lean Transformation</td>
</tr>
<tr>
<td>6.</td>
<td>Lean Thinking</td>
<td>17.</td>
<td>Lean Life</td>
</tr>
<tr>
<td>7.</td>
<td>Lean Logistic (Distribution)</td>
<td>18.</td>
<td>Lean Management System</td>
</tr>
<tr>
<td>8.</td>
<td>Lean Accounting Management</td>
<td>19.</td>
<td>Lean Inventory</td>
</tr>
<tr>
<td>9.</td>
<td>Lean Motion</td>
<td>20.</td>
<td>Lean Cost Accounting</td>
</tr>
<tr>
<td>11.</td>
<td>Kaizen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. The Lean Concepts/Approaches

LEAN TOOLS / TECHNIQUES

All these Lean Concepts are theoretical and conceptual. These are abstract knowledge based. Their practical implementation requires transformation. As such, Lean tools and techniques have been developed for the purpose of transformation of these ‘Lean Concepts’ into ‘Lean Practices’. The ultimate aim is to improve Quality and Productivity to better prepare for the post WTO challenges. A sample list of these transformation tools and techniques is presented in Table 3 (Naqi, 1997 and Khan, 2004).

<table>
<thead>
<tr>
<th>S. NO</th>
<th>Lean Tools / Techniques</th>
<th>S. NO</th>
<th>Lean Tool / Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Automation</td>
<td>12.</td>
<td>CIM</td>
</tr>
<tr>
<td>2.</td>
<td>Cellular Technology</td>
<td>13.</td>
<td>MRP</td>
</tr>
<tr>
<td>3.</td>
<td>TQM</td>
<td>14.</td>
<td>JIT Supply</td>
</tr>
<tr>
<td>4.</td>
<td>5 – S</td>
<td>15.</td>
<td>JIT Manufacturing</td>
</tr>
</tbody>
</table>
THE LEAN TRANSFORMATION STRATEGY

The strategy for transformation is shown in Figure 2 (Prasad, 1996 and Khan 2004). This diagram shows how lean philosophies can be put into practical use.

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Table-3 Lean Tools / Techniques

| 5.  | TPM     |
| 6.  | MRP-II  |
| 7.  | PERT    |
| 8.  | CPM     |
| 9.  | CAD     |
| 10. | CAM     |
| 11. | FMS     |
| 16. | PPC     |
| 17. | LP      |
| 18. | VAM     |
| 19. | DFM (Design for Manufacturing) |
| 20. | JIT Logistics |
| 21. | Six Sigma |

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INTEGRAL LEAN MANAGEMENT

Businesses can benefit from the application of excellent tools and techniques of lean management only if holistic approach is used, supportive environment is provided and configured management is checked, rather than isolated and stand-alone application with out caring for pre-requisites.

The Order-To-Delivery concept represents a complete business system. It starts from receipt of an order from customer (needs) and end at the delivery of product or service to the customer (satisfaction). However, some information is collected even afterwards for improvement. Time is consumed in each function (can be called a cell) as well as in transport link between functions. Such a business system is shown in Figure 3.

![Figure 3. Integral Lean Management](image)

The overall reasons of application failure of Lean Concepts, Lean Tools and Techniques in the integral perspective can be summarized as follows;
- Concepts are used in isolation.
- Link / logistic among functions is not leaned.
- Pre-condition are not met.
- Integrated and Holistic view is missing.
- Configuration is not matched
LEAN IMPLEMENTATION PROGRAMME

Meyers and Stewart (2002, P. 20-22) have asserted, “Womack and Jones provide a five-year time frame for developing the lean organization. It requires very concentrated efforts and fundamental organizational change, the ability to analyze all of the activities and functions in the organization and eliminate Muda, and the leadership to support and encourage appropriate change”. Summarized implementation programme is as follows:

Getting Started - First Six Months

? Step 1: Find a change agent.
? Step 2: Get lean knowledge.
? Step 3: Find a lever for change.
? Step 4: Map the value streams.
? Step 5: Select an important and visible activity.
? Step 6: Expand the scope.

Creating the New Organization. Upto Year Two

? Step 1: Reorganize by product families.
? Step 2: Create a lean promotion function.
? Step 3: Devise a policy for excess people.
? Step 4: Devise a growth strategy.
? Step 5: Remove the anchor draggers.

Installing Business System: Upto Year Four

? Step 1: Introduce lean accounting.
? Step 3: Make everything transparent.
? Step 4: Teach lean thinking.
? Step 5: Right size the tools.

Completing The Transformation: Upto Year Five

? Step 1: Convince suppliers and customers to become lean.
? Step 2: Develop a global strategy.
? Step 3: Convert from top down to bottom up initiatives.

However, a short implementation schedule has also been presented by Feld (P. 9, 2001).

KEY FACTORS RESPONSIBLE FOR FAILURE AND SUCCESS OF LEAN MANAGEMENT
**Failure Reasons:** Followings are considered as the main reasons of application failure of Integral Lean Management.

- Top management lacks strategic understanding of Lean Enterprise
- Lack of specific Lean Enterprise skills, knowledge, culture, ego.
- Organization inertia
- Management reluctance to empower people
- Fear of change, loss of organizational power
- “No invented here” syndrome
- Internal system and hurdles, specifically
  - MRPII Systems
  - Inflexible Accounting methods
  - Severely disjointed plant operations

**Success Reasons:**

*Henderson and Larco (2002)* have asserted the following as major reasons for success of lean management application;

- Management must have a strategic vision of where the organization is moving towards and will become.
- There must be strong line management leadership committed to change.
- Expert training and support likely will be needed in order to get started.
- Aggressive lean enterprise performance targets and tracking.
- Patience.

**ADVANTAGES OF INTEGRAL LEAN MANAGEMENT**

Improved Quality and Productivity shall result in increased profit, more market share, better dividend, Quality of working life, more re-investment, generate more employment opportunities, better living standard, more taxes paid and increase in GDP.

Toyota cars and trucks are known for Quality and dependability, which no doubt has been a major factor in that company’s success in the world market. It is not a coincidence that Toyota pioneered the techniques of Lean management but a deliberate strategic plan.

For example, American automobile manufacturers have been slow to adopt lean enterprise, and the consequences are apparent in the sales history of its largest automaker. During the time that Toyota built a positive reputation and attendant market share, the share enjoyed by General Motors cars and trucks declined dramatically. GM’s portion of the business has plummeted from almost 60%
in the early 1960s to a figure of 28.4% in year 2002. This is the lowest since 1926 when GM had only 26% of the market (Henderson and Larco, 2002).

Lean Enterprises have gained strategic advantages as shown in Table 4 (Henderson and Larco, 2002 – P. 21).

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Actual</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing lead time</td>
<td></td>
<td></td>
<td>&lt; 1 day</td>
</tr>
<tr>
<td>Delivered Quality</td>
<td></td>
<td>3 PPM</td>
<td></td>
</tr>
<tr>
<td>Delivery Performance</td>
<td></td>
<td>99%+</td>
<td></td>
</tr>
<tr>
<td>Inventory Turns</td>
<td></td>
<td>&gt; 50</td>
<td></td>
</tr>
<tr>
<td>Conversion Cost (materials to finished goods)</td>
<td></td>
<td>25 - 40%</td>
<td>less than mass producers</td>
</tr>
<tr>
<td>New product development</td>
<td></td>
<td>&lt; 6 months</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4. Advantage of Lean Management**

Examples of a few companies, which gained benefits through adoption of Lean Manufacturing, will further highlight the importance of Lean Management. The results are shown in Table 5, 6 and 7 (Feld, p. 172, 182 and 193, 2001).

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Actual</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery</td>
<td>40%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Lead-Time</td>
<td>8 weeks</td>
<td>3 weeks</td>
<td>2 weeks</td>
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<tr>
<td>Inventory turns</td>
<td>5</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Space</td>
<td>7450 ft²</td>
<td>6800 ft²</td>
<td>-</td>
</tr>
<tr>
<td>Head count</td>
<td>21</td>
<td>17</td>
<td>14</td>
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</tbody>
</table>

**Table 5. Benefits Achieved by Tyco Chain through Lean Manufacturing**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Actual</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-time delivery</td>
<td>50%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>Manufacturing lead-time</td>
<td>6-13 days</td>
<td>3 -6 days</td>
<td>5 days</td>
</tr>
<tr>
<td>Inventory level (raw materials)</td>
<td>$ 220K</td>
<td>$ 140k</td>
<td>$ 180k</td>
</tr>
</tbody>
</table>
Setup reduction | 88 minutes | 20 minutes | 44 minutes
Space utilization | 49, 600 ft² | 48, 900 ft² | 48, 000 ft²

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Actual</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts per manhour</td>
<td>6.4</td>
<td>8.5</td>
<td>12.0</td>
</tr>
<tr>
<td>Production output</td>
<td>53%</td>
<td>71%</td>
<td>100%</td>
</tr>
<tr>
<td>Daily scheduled hours</td>
<td>66</td>
<td>49</td>
<td>40</td>
</tr>
<tr>
<td>Defects per million</td>
<td>6758</td>
<td>2646</td>
<td>700</td>
</tr>
<tr>
<td>On-time delivery</td>
<td>55%</td>
<td>88%</td>
<td>95%</td>
</tr>
</tbody>
</table>

Table 6. Benefits Achieved by Bet-Ron through Lean Manufacturing

Table 7. Benefits Achieved by Houston through Lean Manufacturing

CONCLUSION
Integral Lean Management is a feasible solution to the challenges of post WTO era for underdeveloped and developing economies. Its application is required on continuous basis to reduce Muda and enhance Quality and productivity.

Adoption of Kaizen philosophy in working life of all processes and functions of an enterprise to eliminate fat is the need of the hour.

Managers of Pakistani industries need to comprehend, implement and become competent in the use of Integral Lean Management concepts, tools and techniques to enhance Quality and Productivity on continuous basis. This shall assure reduction in production cost, elimination of waste, on-time delivery and desired Quantity at lower price to prepare businesses for the post WTO scenario.

REFERENCES


Karl, S. @ aol.com (July 2003)


**BIODATA**

Col Dr Nawar Khan is a professional Mechanical Engineer. He has graduated from the University of Engineering and Technology Peshawar in 1981. He did his MSc Mechanical Engineering (Specialized in Production Engineering) from the University of Engineering and Technology Lahore in 1995. Dr Khan has completed his Ph.D under split Ph.D program of MoST from the University of Engineering and Technology Lahore and De Montfort University, Leicester UK in 1999.

His field of specialization is Total Quality Management (TQM), particularly the ‘QUALITY AWARDS’. He is author of a number of nationals and international research publications. He is also a Certified Quality Assurance Lead Auditor of ISO 9001:2000 Quality Management System. He is fellow of Institute of Engineering, Pakistan (IEP) and lifetime member of Pakistan Engineering Council. Presently, he is serving as Associate Professor at the College of Electrical and Mechanical Engineering (EME), National University of Sciences and Technology (NUST), Rawalpindi, Pakistan.

**WORLD TRADE ORGANIZATION (WTO)?**

WTO is the only global international organization dealing with the rules of trade between nations. At its heart are the WTO agreements, negotiated and signed by the bulk of the world’s trading nations and ratified in their parliaments. The goal is to help producers of goods and services, exporters, and importers conduct their business. However, this also present challenges to the developing and underdeveloped economies.

**FUNCTIONS**

The WTO’s overriding objective is to help trade flow smoothly, freely, fairly and predictably. This includes:

- Administering WTO trade agreements
- Forum for trade negotiations
- Handling trade disputes
- Monitoring national trade policies
- Assisting developing countries in trade policy issues, through technical assistance and training program.
Cooperating with other international organizations

THE MULTILATERAL TRADING SYSTEM – PAST, PRESENT AND FUTURE

A very brief summary of the scenario is presented here. The WTO came into being in 1995. One of the youngest of the international organizations, the WTO is the successor to the General Agreement on Tariffs and Trade (GATT) established in the wake of the Second World War.

So while the WTO is still young, the multilateral trading system that was originally set up under GATT is well over 50 years old.

The past 50 years have seen an exceptional growth in world trade. Merchandise exports grew on average by 6% annually. Total trade is more than 22 times the level of 1950. GATT and the WTO have helped to create a strong and prosperous trading system contributing to unprecedented growth.

The system was developed through a series of trade negotiations, or rounds, held under GATT. The first rounds dealt mainly with tariff reductions but later negotiations included other areas such as anti dumping and non tariff measures. The last round – the 1986-94 Uruguay Round – led to the WTO’s creation.

The negotiations did not end there. Some continued after the end of the Uruguay Round. In February 1997 agreement was reached on telecommunications services, with 69 governments agreeing to wide ranging liberalization measures that went beyond those agreed in the Uruguay Round.

In the same year 40 governments successfully concluded negotiations for tariff-free trade in information technology products, and 70 members concluded a financial services deal covering more than 95% of trade in banking insurance, securities and financial information.

In 2000, new talks started on agriculture and services. These have now been incorporated into a broader agenda launched at the fourth WTO Ministerial Conference in Doha, Qatar in November 2001.

The agenda adds negotiations and other work on non agricultural tariffs, trade and environment, WTO rules such as anti dumping and subsidies, investment, competition policy, trade facilitation, transparency in government procurement, intellectual property, and a range of issues raised by developing countries as difficulties they face in implementing the present WTO agreements.

THE WTO AGREEMENTS

How can you ensure that trade is as fair as possible and as free as is practical? By negotiating rules and abiding by them.
The WTO’s rules and the agreements - are the result of negotiations between the members. The current set were the outcome of the 1986-94 Uruguay Round negotiations, which included a major revision of the original General Agreement on Tariffs and Trade (GATT).

GATT is now the WTO’s principal rulebook for trade in goods. The Uruguay Round also created new rules for dealing with trade in services, relevant aspects of intellectual property, dispute settlement, and trade policy reviews. The complete set runs to some 30,000 pages consisting of about 30 agreements and separate commitments (called schedules) made by individual members in specific areas such as lower customs duty rates and services market opening.

Through these agreements WTO members operate a non discriminatory trading system that spells out their rights and their obligations. Each country receives guarantees that its exports will be treated fairly and consistently in other countries markets. Each promises to do the same for imports into its own market. The system also gives developing countries some flexibility in implementing their commitments.

**GOODS**

It all began with trade in goods. From 1947 to 1994, GATT was the forum for negotiating lower customs duty rates and other trade barriers, the text of the General Agreement spelt out important rules particularly non-discrimination.

Since 1995, the updated GATT has become the WTO’s umbrella agreement for trade in goods. It has annexes dealing with specific sectors such as agriculture and textiles, and with specific issues such as state trading, product standards, subsidies and actions taken against dumping.

**SERVICES**

Banks, insurance firms, telecommunications companies, tour operators, hotel chains and transport companies looking to do business abroad can now enjoy the same principles of freer and fairer trade that originally only applied to trade in goods.

These principles appear in the new General Agreement on Trade in Services (GATS). WTO members have also made individual commitments under GATS stating which of their services sectors they are willing to open to foreign competition, and how open those markets are.

**INTELLECTUAL PROPERTY**

The WTO’s intellectual property agreement amounts to rules for trade and investment in ideas and creativity. The rules state how copyrights, patents, trademarks, geographical names used to identify products, industrial designs, integrated circuit layout designs and undisclosed information such as trade secrets – “intellectual property” – should be protected when trade is involved.
DISPUTE SETTLEMENT

The WTO’s procedure for resolving trade quarrels under the Dispute Settlement Understanding is vital for enforcing the rules and therefore for ensuring that trade flows smoothly. Countries bring disputes to the WTO if they think their rights under the agreements are being infringed. Judgments by specially appointed independent experts are based on interpretations of the agreements and individual countries commitments.

The system encourages countries to settle their differences through consultation. Failing that, they can follow a carefully mapped out, stage-by-stage procedure that includes the possibility of a ruling by a panel of experts, and the chance to appeal the ruling on legal grounds. Confidence in the system is borne out by the number of cases brought to the WTO – almost 250 cases in seven years compared to some 300 disputes dealt with during the entire life of GATT (1947 – 1994).

POLICY REVIEW

The Trade Policy Review mechanism’s purpose is to improve transparency, to create a greater understanding of the policies that countries are adopting, and to assess their impact. Many members also see the reviews as constructive feedback on their policies.

All WTO members must undergo periodic scrutiny, each review containing reports by the country concerned and the WTO secretariat.

DEVELOPING COUNTRIES

DEVELOPMENT AND TRADE

Over three quarters of WTO members are developing or least developed countries. All WTO agreements contain special provision for them, including longer time periods to implement agreements and commitments, measures to increase their trading opportunities and support to help them build the infrastructure for WTO work, handle disputes and implement technical standards.

The 2001 Ministerial Conference in Doha set out tasks, including negotiation for a wide range of issues concerning developing countries. Some people call the new negotiations the Doha Development Round.

Before that in 1997, a high level meeting on trade initiatives and technical assistance for least developed countries resulted in an “integrated framework” involving six intergovernmental agencies, to help least developed countries increase their ability to trade, and some additional preferential market access agreements.

A WTO committee on trade and development, assisted by a sub-committee on least developed countries, looks at developing countries special needs. Its responsibility includes
implementation of the agreements, technical cooperation, and the increased participation of
developing countries in the global trading system.

**TECHNICAL ASSISTANCE AND TRAINING**

The WTO organizes around 100 technical cooperation missions to developing countries annually. It holds on average three trade policy courses each year in Geneva for government officials. Regional seminars are held regularly in all regions of the world with a special emphasis on African countries. Training courses are also organized in Geneva for officials from countries in transition from central planning to market economics.

The WTO set up reference centers in over 100 trade ministries and regional organizations in capitals of developing and least developed countries, providing computers and internet access to enable ministry officials to keep abreast of events in the WTO in Geneva through online access to the WTO's immense database of official documents and other material. Efforts are also being made to help countries that do not have permanent representatives in Geneva.