

LECTURE 4: BUSINESS ARCHITECTURE ASPECTS: THE QUALITY MOVEMENT (TQM, ISO 900X, SIX SIGMA & LEAN MANAGEMENT

Lecture Contents

- Quality: A Potted History
- Total Quality Management (TQM): Theory & Applications
 - TQM in a typical organization
 - TQM Case Studies: Cement Roadstone & Singapore Logistics Companies
- Management Styles: Theories X, Y, Z
- International Standard Organization (ISO) 900X
- Six Sigma: Theory and Case Study: *Virtua Health*
- A Bit About Lean Manufacturing
- TQM, Six Sigma & Lean Comparison
- Lean and Six Sigma
 - Case Studies 1: UK National Health Service
 - Case Studies 2: The Red Cross Hospital, Netherlands
 - Case Studies 3: Call Centre Optimization

Quality: What it is & Why it is Important

- *Fuzzy Definition:*
 - Customer Satisfaction
 - A perceptual/ subjective attribute & defined differently by different people....
 - Just a feeling...
 - Reputation: your shop-window to the world/
 - “Fitness for Purpose”
- *Example of importance of Quality: Medical Education:*
 - Increases patient safety through reduction of errors/ exceptions etc
 - Maximises benefit of training
 - Decreases likelihood of need to extend or redo training
 - Training tomorrow’s doctors and nurses properly today: “Could save a life...”

The Quality Movement: A Potted History

- In recent years, various methodologies have evolved to help organizations improve quality, speed and efficiency, and better serve their customers.
- Manufacturing businesses concentrated mainly on the ISO system,
- They also looked to *Lean Manufacturing*¹ for BP speed & waste elimination
- Other organizations focused on TQM based on quality theories of so-called Quality Gurus *William Edwards Deming, Joseph Juran, Kaoru Ishikawa.*
- Originated in US in 20’s, in the 1950s, quality control & management developed quickly and became a main theme of Japanese management.
- TQM showed growth in industry, public service etc in the 1980’s but popularity waned in 90’s, with growth of e.g (Lean) Six Sigma
- Frequently organizations gave up on TQM and opted for the Standardization route of *ISO 9000* (more later) etc.

¹ Originally known as the *Toyota Production System*

The Quality Movement:
 Total Quality Mgmt. (TQM)
 Aside on Mgmt. Styles
 ISO 9000
 Six Sigma & Lean Mgmt.

TQM Philosophy & Assumptions

- Organisations's primary aim is to stay in business - so that it can:
 - promote the stability of the community
 - generate products and services that are useful to customers
 - provide a setting for satisfaction & growth of organisation members
- Focus on preservation and health of the organisation
- Assumptions on quality, people, organisations & senior mgmt role:
 1. Quality is less costly to an organisation than poor workmanship
 2. Workers care about work quality, and will take initiatives to improve it
 3. Organisations are systems of highly interdependent parts.
 4. Cross-functional problems must be addressed collectively by representatives of all relevant functions
 5. Quality is ultimately & inescapably responsibility of senior management.

The Quality Movement:
 Total Quality Mgmt. (TQM)
 Aside on Mgmt. Styles
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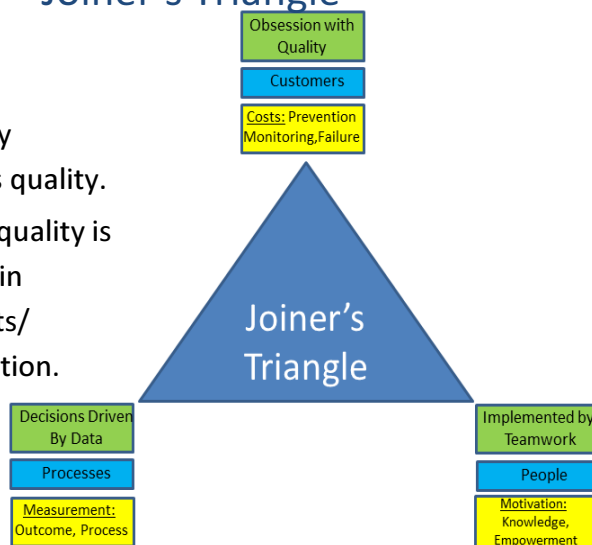
Total Quality Management (TQM):

Joiner's Triangle

- TQM:

- An Integrative philosophy of management to continuously improve products & process quality.
- Assumes product & process quality is responsibility of all involved in building/consuming products/ services offered by organization.

=> requires participation of management, workforce, suppliers, and customers



TQM: Fact-based Interventions & Solutions

- Explicit identification & measurement of customer requirements.
- Creation of supplier partnerships.
- Use of cross-functional teams to identify and solve problems.
- Use of scientific methods to monitor performance, and to identify points of high value for performance improvement.
 - Control chart - Identify & control causes of variability
 - Mgmt. by fact. Collect data, use statistics, test solutions by expt
 - Cost-of-quality analysis
- Use process-management heuristics to for team effectiveness:
 - Flowcharts
 - Brainstorming
 - Cause-and effect diagram
- Learning and continuous improvement.

TQM: Fact-based Interventions & Solutions (/2)

- Use short-term problem-solving teams to simplify & slim-down work practices
- Training in quality practices:
 - Interpersonal skills
 - Quality-improvement processes and problem-solving
 - Team leading and building
 - Statistical analysis (Pareto methods)
 - Supplier qualification
 - Benchmarking
- Top-down implementation.
- Developing relationships with suppliers.
- Obtaining data about customers:
 - Free-phone complaint lines
 - Market research & Focus groups

TQM in practice: A Typical Organization

- In an organization operating under the TQM philosophy there are should be a number of practices in evidence.
- We should be able to see:
 1. Measurement charts in work area -- status of BP is measured and results known to people who actually do the work.
 2. Improvement goals defined for BPs – the BPs change over time, part of a continuous improvement plan with well-defined goals.
 3. Worker control of BP - people who do the work control the process.
 4. Problems solved by
 - i. Cross functional teams not discipline-specific experts
 - ii. Structured problem solving - follow specific methods (problem solving paradigm) with well-defined steps.
 5. Customer satisfaction – Feedback of customer reactions to the people making the product thus forming part of the improvement process.

TQM in practice: A Typical Organization (/2)

- Thus in an organization with TQM in play, find
 - Work areas with charts describing the status of the processes
 - Responsibility for day-to-day quality resting with those making product.
 - Strong evidence of teams working on significant problems
 - Such problems might include road-blocks in critical processes (not what colour to paint the cafeteria),
 - Solution follows a problem solving model, and using quality tools, e.g. Pareto charts, fishbone diagrams, SPC, etc.
 - Workers who know what the customer concerns are and how the work process impacts those concerns.
- All of which amounts to a philosophy based on:
 1. listening to workers,
 2. controlling and reducing variation,
 3. empowering the workforce.

Total Quality Management (TQM): Problems with Philosophy

- *TQM problems*
 - Guidelines too abstract: only gifted leaders can deploy successfully
 - Business magazines and newspapers reported failure of TQM efforts hence low success probability deterred many orgs from trying TQM.
 - Reduced use of scientific methods
 - Relating reward systems to achievement of quality goals
 - Lack of focus on strategic planning and core competencies.
 - Obsolete, outdated organizational cultures.
- *Other Options*
 - Instead, many organizations opted for ISO9000 (promises not world-class performance levels, but “standard” ones)
 - ISO9000 gives clear criteria & ensures meeting these will result in recognition.

TQM Case Study: Cement Roadstone



- *TQM Background at Roadstone*
 - Roadstone is a leading manufacturer/supplier of building materials in Ireland.
 - It is strongly committed to energy efficiency & environmental sustainability.
 - Strategy: develop IS393 cert'd energy-mgmt systems to drive energy efficiency.
- *The Tar Plant process*
 - Blends aggregate, binder & additives under heating producing homogenous mix.
 - *Comprises:* cold-feed system, bitumen supplier, dryer, mixing tower, emission-controller
 - *Problems:*
 - too many rejects of treated aggregate at exit
 - excessive energy, CO2 and energy related cost due to this wastage

TQM Case Study: Cement Roadstone (/2)



- **TQM Method:** plan, do, check, act
 - Continuous-improvement by measurement & analysis to assess main problem cause(s).
 - Action plan utilized to correct the problem, while verification & standardisation steps ensure that the new method becomes the standard.
 - Data-analysis showed energy input in each aggregate ending up in bin, after dry-and-heat process.

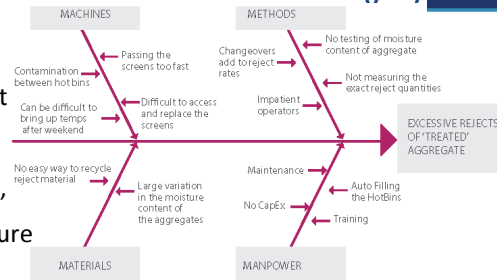
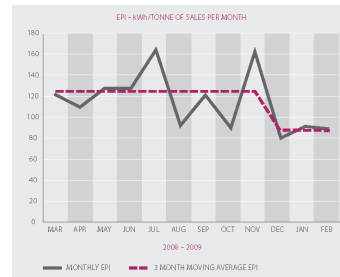


Figure 03. Fishbone (or Ishikawa) diagram used to identify possible causes of reject material at the hot bins.

- **Results**
 - Reject rate reduced by 76% from 11/'08 to 2/'09.
 - The energy, CO2 and energy-related cost savings associated reject rate reduction has reduced Heat [kW]/tonne of sales/month from 120 to 80



TQM Case Study: Singapore Survey of TQM Implementation

- **Background:**
 - Singapore has become one of the most important strategic SCM centres of Asia.
 - The island serves as regional HQ & distribution hub for many logistics companies
 - 2015: Port handled 31M 20-foot units, Changi airport handled 1.78M cargo-tons
 - Logistics industry continues to develop infrastructure facilities particularly IT-based platforms.
- **Lim et al's survey:**
 - Done by Lim et al, NUS, case study investigates the effects of technology and TQM on the performance of logistics companies in Singapore.
 - **Goal:** gain insights in how TQM affects operations, quality & technology processes in an organisation.
 - Empirical data is based on questionnaire responses from 40 TQM companies.

TQM Case Study: Singapore Survey of TQM Implementation (/2)

- **Results**

- TQM success hangs on tangible and intangible factors.
 - *Intangibles* include top mgmt. leadership, customer- and quality focus which act as baselines for quality improvement
 - *Tangibles* (HRM, strategic planning, IS & analysis) shape *actual performance metrics*
- TQM Pitfalls: No 'bolt-on' without cultural change but long-term path of change

- **Wider Implications**

- TQM is not only applicable to manufacturing (it's origins), but also to the services industry including logistics.
- Study finds greater performance level in operational, quality and technology performance in TQM logistics firms.
- Thus it is relevant and importance of TQM in service industries.

How Does BPR Differ from TQM?

- Increased focus on business processes was mostly due to TQM.
- TQM and BPR share a cross-functional orientation.
- **Pace of Change:**
 - Quality specialists concentrate on incremental change & gradual improvement of processes.
 - BPR advocates seek radical redesign & drastic improvement of BPs.
- **Time-Frame:**
 - TQM: Programs & initiatives over an open-ended period of time.
 - BPR: Discrete initiatives to improve BPs in a bounded time frame.

TQM V BPR in brief

	<u>Improvement</u>	<u>Innovation</u>
<i>Level of Change</i>	Incremental	Radical
<i>Starting Point</i>	Existing Process	Clean Slate
<i>Change Frequency</i>	One-time/Continuous	One-time
<i>Time Required</i>	Short	Long
<i>Participation</i>	Bottom-Up	Top-Down
<i>Typical Scope</i>	Narrow, within functions	Broad, cross-functional
<i>Risk</i>	Moderate	High
<i>Primary Enabler</i>	Statistical Control	ICT
<i>Type of Change</i>	Cultural	Cultural/Structural

An Aside on Management Styles/Theories

- Seen from previous lectures that systems can meet their technical requirements and still be deemed as failures
 - Relationships between BP actors & system supporting the BP are not properly considered in techno-centric approaches
 - Many systems are not utilized because they conflict with other aspects of the user's job
- Study by Lucas of over 2000 systems in 16 companies found:
 - “It is our contention that the major reason most info systems have failed is that we have ignored organisational behaviour problems in the design and operation of computer-based information systems.”
- So uniting social & technical aspects of systems means a break from a past where social, technical work aspects were artificially divided.

An Aside on Management Styles/ Theories (/2): 'Theory X' V 'Theory Y'

- Where do such problems in the design arise from?
 1. *Theory X (aka "Traditional/Mechanical View")*
 - Assumes doesn't really want to work. If (s)he has to, wants tightly specified boundaries, averse to control over activities
 - Change strategy based around this creates highly structured, precise job definitions, emphasizing order as necessary for efficiency
 - Sees workers as info consumers => sys problems = lack of right info!
 2. *Theory Y (aka "HR Theory")*
 - Assumes worker is responsible, self-achieving person, taking full control over environment
 - Change strategy based around this creates a flexible orgn emphasizing self-direction with opportunities for personal growth

An Aside on Management Styles/ Theories (/3): These 'Theories' V 'Theory Z'

- In practice, most organizations have elements of 'Theory X' & 'Theory Y'
- 'Theory Z' is a name for other motivation theories built on Theories X & Y.
- Theories X, Y and various versions of Z have been used in HRM, organizational behaviour, and organizational development.
 1. *Abraham H. Maslow's 'Theory Z'* suggests that:
 - People aim for a level of economic security, then for a life rich in values.
 - After this, work no longer remains work for them but is a passion and a hobby.
 2. *William Ouchi's 'Theory Z'* is focused on:
 - Raising employee-org loyalty thro job tenure & a strong focus on well-being.
 - Promoting stable employment, high productivity, and high job satisfaction.
 - Moderately specialized career path with slow evaluation & promotion
- Both advocate applying TQM for systematic, gradual process change

ISO Standards 9000

- Have seen that some organizations opt for standards route instead of TQM
- Q: What is meant by the *International Standard Organization (ISO)*?
- A: On their website the organization has this to say on themselves:
ISO is an independent, non-governmental international organization with a membership of 163 national standards bodies. Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges.
- ISO 9000 we typically mean a series of five standards issued by the International Standards Organization (ISO),
- The US member body is the American National Standards Institute (ANSI), a private company.
- Both ISO and ANSI issue standards in a wide variety of areas.

ISO Standards 9000 (/2)

- Have seen above that ISO 9000 comprises 5 standards, ISO 9000- ISO 9004.
- What they are:
 1. *ISO 9000* is a guide for selection and use telling how to use the system, select the standard, and tailor the model to particular applications.
 2. *ISO 9001 to ISO 9003* provide models for a supplier's quality system by defining the quality system components expected to be in place.
 3. *ISO 9004* provides guidance to the supplier to implement the quality system.
- In developing a contract with a supplier the buyer uses one of the ISO 9000 models to ensure the supplier has a quality system.
- This is typically imposed in a set of quality clauses on the purchase order.
- The supplier is then expected to implement and maintain a quality system that conforms to these requirements.
- Thro following the model supplier does what is needed to satisfy contract

ISO Standards 9000 (/3): ISO 9001

- **Basics of ISO 9001**
 - Sets out requirements for a quality management system based on continual improvement.
 - Doesn't say what aims of "quality" or "meeting customer needs" should be.
 - However, requires organizations to define these objectives themselves and continually improve their processes to reach them.
- **Advantages**
 - Designed to suit organizations of all types, sizes & sectors, it helps them to be more efficient & improve customer satisfaction.
 - As smaller companies don't have staff for to quality can still benefit from implementing ISO 9001 – ISO has many resources to assist them.

ISO Standards 9000 (/4): ISO 9001:2015

- **ISO 9001:2015**
- A new version of the standard, ISO 9001:2015, has just been launched, replacing the previous version (ISO 9001:2008).
- **Advantages over ISO 9001:2008**
 - Puts greater emphasis on leadership engagement
 - Helps address organizational risks and opportunities in a structured manner
 - Uses simplified language and a common structure and terms, which are particularly helpful to organizations using multiple management systems,
 - such as those for the environment, health & safety, or business continuity
 - Addresses supply chain management more effectively
 - Is more user-friendly for service and knowledge-based organizations

ISO 9001:2008 Case Studies: Landscapes & Contracts Ltd

- *Route to ISO9001:2008 at Landscapes & Contracts , Glasgow (Est'd 2001)*
 - Company promotes landscaping contracts pledging to meet targets on time
 - *The Challenge*
 1. Gain certification in 9 month period
 2. Obtain Grant Assistance
 3. Increase share of new markets
 4. Reduce resource time required to complete and submit tenders and PQPs
 5. Better satisfy the expectations of customers
 - *The Results*
 1. ISO 9001 certification awarded in 9 months
 2. Grant assistance secured
 3. Enhanced management control of projects
 4. Improved customer satisfaction
 5. Improved operational efficiency

ISO 9001:2008 Case Studies: Landscapes & Contracts Ltd (/2)

- *Background*
 - Increasing pressure on Building & Construction to maintain quality, environmental and health & safety management systems to ISO Standards.
 - With these, they gain business value (improved performance, good practice & BP consistency)
 - But also important that they position the company to win new business or enter new markets and cut down the resource time required to complete PQPs.
- *Why ISO 9001?*
 - Company already had *Investors in People* accreditation and are *Constructionline** Approved to a maximum individual contract value of £2m,
 - Next step was promote Internationally recognised ISO 9001 into the business model.
- *Company Findings*
 - While it's hard work, it really does improve business and ways of working .
 - If business is in a growth period, make the growth much easier to navigate because there is a solid, BP-driven foundation to build on.

*UK Govt-run H&S standards scheme for public contracts

Six Sigma

- **What it is:**
- Business improvement approach that seeks to find and eliminate causes of defects and errors in processes.
- Focusing on outputs that are critical to customers, it sets stretch objectives for improvement.
- Termed *Six Sigma* based on a statistical measure that equates 3.4 or fewer errors or defects per million opportunities.
- Thus in the statistical sense, Six Sigma is only relevant if millions or billions of events or products are to be measured
- Motorola pioneered the concept of Six Sigma.
- Bill Smith, a reliability engineer credited with conceiving idea of Six Sigma.
- General Electric (specifically CEO Jack Welch) extensively promoted it.

Six Sigma (/2)

Core philosophy based on key concepts:

- Think about key BPs/customer demands with focus on strategic aims.
- Focus on corporate sponsors responsible for championing projects.
- Emphasize quantifiable measures such as defects per million opportunities (*dpmo*)
- Ensure appropriate metrics is identified to maintain accountability.
- Provide extensive training in advanced statistical methods.
- Create highly qualified process improvement experts - "belts".

Sigma Level	Defects per Billion	% of Defects to Remove to Move from Prior Level
6	2	99.7%
5	573	99.1%
4	63,342	97.8%
3	2,700,000	94.1%
2	45,500,000	85.7%
1	317,000,000	n/a

Six Sigma (/3)

- **Common Six Sigma Methodologies**
 - Two most common used to achieve Six Sigma goals; Define, Measure, Analyze, Improve and Control (DMAIC) and Define for Six Sigma (DFFS)
 - DMAIC, a five phase closed-loop problem solving pattern that eliminates unproductive steps, and applies technology for continuous improvement.
 - It is generally used on BPs failing to meet customer requirements.
- **Six Sigma Procedure - DMAIC:**
 - *Defining* & understanding those critical requirements, key factors and expectations of the customer which affect the process output.
 - *Measuring* the BP and relevant data mainly through Six Sigma metrics.
 - *Analyzing* causes of defects, sources of variation with statistical QC tools
 - *Improving* BPs by deriving most vital source of variation in analysis phase.
 - *Controlling* and monitoring the process variations using a statistical process strategy to sustain the gains and improvements.

Six Sigma Case Study: Virtua Health

- **Background to Six Sigma at Virtua Health Healthcare System**
 - Virtua Health Comprises four hospitals & has HQ in Marlton, NJ
 - CEO decision to work with GE to deploy SS & in 2001 VH began road to SS
- **Initiation of Six Sigma**
 - Key workers, potential future leaders in Virtua, chosen for Black Belt roles
 - These included a physician, nurses & some with HR and finance backgrounds.
 - These left their full-time jobs and were trained in SS at GE
 - Decision to implement SS in this way cost Virtua US\$1.4M initially.
- **Six Sigma Progress**
 - Through its >8 year deployment, Virtua has spread SS with various methods
 - increased Yellow Belt training, competency exams & mini DMAIC (Define, Measure, Analyze, Improve, Control) projects.

Six Sigma Case Study: Virtua Health (/2)

- **Key Success Factors** to implementing & sustaining the programme
 - Yellow Belts working on well-scoped (<3 month) projects under their control
 - Training curriculum is adjusted to this new initiative
 - Excellent communication between the Yellow Belt and the mentor
 - Significant support from the Six Sigma Department
- **Challenges** Some lessons learned are:
 - Data Analysis is a challenge and discrete data may be easier for Yellow Belts.
 - Plan on supporting newly trained Yellow Belt managers lack in ICT knowledge
 - Organizational priorities in a clinical environment can cause delays.
 - Time commitment from Six Sigma department/mentors is labour intensive
- **Results** in one project on Congestive Heart Failure Length of Stay (LoS):
 - LoS down from 6.4 - 4 days (<Medicare's 4.2) saving \$116k pa staff, room costs
 - Rollout across all four hospitals in Virtua Healthcare

TQM V Six Sigma

Contrasts between traditional TQM and Six Sigma (SS) -

1. TQM driven by quality idealism; Six Sigma by real gains for major SH group.
2. TQM developed by technical personnel, largely to empower workers/ teams; Six Sigma developed by CEOs, owned by business leader champions
3. TQM is process based; Six Sigma projects are truly cross-functional.
4. TQM trains just for simple improvements tools & quality concepts (e.g. Deming's *plan, do, check, act* (PDCA) methodology); Six Sigma has more rigor with advanced stats to meet business metrics
5. TQM has little emphasis on financial accountability; Six Sigma requires verifiable return on investment and focus on bottom line.
6. In TQM, quality is full-time job & career path is in the quality profession; Six Sigma job is temporary and just a stepping-stone – not a career decision.

An Aside on Lean Management

- **Definition:**
 - Lean Management* looks to remove time, effort or money lost by identifying each BP step then revising & removing steps not adding value.
 - Supports continuous improvement, a long-term, systematic approach to work to achieve incremental changes in processes to improve efficiency and quality.
 - Uses “Kaizen events” – Small changes by workers, managers-guided - intensive, week-long sessions to quickly identify improvement opportunities
 - Strength lies in set of standard solutions to common problems, customer focus
- **Guiding principles:**
 1. Defining value from the standpoint of the end customer.
 2. Identifying each step in BPs & eliminating those steps that do not create value.
 3. Making the value-creating steps occur in tight sequence.
 4. Iterating through (1-3) continuously until all waste has been eliminated.

Recap on TQM, Six Sigma & Lean

- **Total Quality Management:**
 - **Advantages & Strengths of TQM**
 - TQM organizations are typically flatter and Leaner than non-TQM companies
 - TQM has worked in Japan, and benchmarking and training opportunities abound.
 - TQM organizations are more customer-oriented than non-TQM companies.
 - TQM stresses worker participation, adaptable to manufacturing/service industries
 - **Weaknesses of TQM**
 - TQM projects focus on optimizing each BP while ignoring effect on other BPs
 - TQM does not focus on bottom-line results like other systems do (e.g. Six Sigma).
 - Managers don't like yielding power & delegation is necessary for system success.
 - Training is very necessary for workers but can be seen as cost, not investment
 - TQM needs teams which can fail in organizations without sufficient training.
 - Goals must be carefully established & shared so all work to a common outcome.

Recap on TQM, Six Sigma & Lean (/2)

- **Six Sigma:**

- **Advantages of Six Sigma**

- Projects have defined accounts to track money saved.
- Six Sigma can be used in either manufacturing or service industries.
- As Six Sigma driven by profit gains, upper management more likely to support it.
- Six Sigma isn't viewed as a quality system, but a business system.
- As Wall Street loves it, business leaders can invest capital without fear of failure.
- Six Sigma projects are intended to prevent defects before they can be created.

- **Weaknesses of Six Sigma**

- High Training costs. Black Belt training costs >\$40k. Also can foster elitism.
- Black Belt is valuable to other organizations- can be cheaper to hire a Black Belt.
- Reported savings are viewed skeptically & predicted ones not be tracked closely.
- The statistics involved are difficult for many employees to understand.

Recap on TQM, Six Sigma & Lean (/3)

- **Lean:**

- **Four Key questions by which to choose an approach:**

1. Can the method be introduced to all types of business models?
2. Will the method give a good return on investment?
3. Is the method affordable?
4. Is the method easily understood and assimilated into the company's culture?

- **Benefits of Lean:**

- Lean is only methodology with which all four questions can be answered yes.
- All business models have waste, whether they are service or manufacturing
- Low training costs & easy to grasp concepts => Many improvements are cheap.
- Lean can be implemented on a small or grand scale – important for all sizes of BPs
- Departments e.g. accounting, shipping can utilize lean techniques without gurus.
- Business size isn't an issue, lean works well in a small business as a large one.

A Marriage Made in Heaven? Six Sigma & Lean Together

- **Synergy of Lean & Six Sigma (SS):**
 - Lean & Six Sigma have same aim: remove waste & increase productivity=> increase profits
 - But Lean focuses on each BP to see if it adds value: if not => it is eliminated.
 - But Lean methods aren't the answer either (can be short on details, organizational structures, and analytic tools for diagnosis).
 - Six Sigma's aim is improving production to reduce waste, improve the product or service and increase customer retention.
 - Looks at all BPs & attempts to improve the whole company with a top-down approach
- **Lean Six Sigma has been suggested:**
 - As the rapid improvement in an organization needs both.
 - As combination has potential to maximize SH value by getting the fastest rate of increase in customer satisfaction, cost, quality, BP speed & invested capital
 - Work together because Lean alone can't bring BP under statistical control & Six Sigma alone can't radically improve BP speed or reduce invested capital.

A Marriage Made in Heaven? Six Sigma & Lean Together (/2)

- **Synergy of Lean & Six Sigma:**
 - Have seen above that Six Sigma suited to healthcare sector due to its zero tolerance for mistakes & potential to reduce medical errors
 - Also, can apply lean tools to many healthcare processes, looking at critical issues e.g. medical errors, escalating costs and staffing shortages.
 - Thus Lean & Six Sigma can give to the healthcare industry as much as they have contributed to automotive in automotive industry.
 - LSS in healthcare looks at direct care delivery, admin support & financial admin
 - Aims to
 - improve clinical processes,
 - identify and eliminate waste from patient pathways,
 - enable staff to examine their own workplace,
 - increase quality, safety and efficiency

Six Sigma & Lean Together (/3): Case Studies 1: UK National Health Service

- **Description:**

- Pioneer healthcare organizations implementing Lean Six Sigma was NHS in UK
 - Lean Management has been the focus of attention for NHS with many of its principles included into the 'Productive Ward' initiative.
 - However, a study of motivations for using Lean Six Sigma in NHS highlighted:
 - difficulty in identifying customers and processes in healthcare settings and
 - importance of using clear and appropriate terminology,
- This emphasized scope for a more unified combination of BP improvement approaches.
- Others describe the different focus of Lean (reducing waste) and Six Sigma (identifying cause and effect) and arguing that organisations need both.

Six Sigma & Lean Together (/3): Case Studies 2: Red Cross Hospital, Netherlands

- **The Red Cross Hospital, in Beverwijk, Netherlands Case Study:**

- The Hospital has 384 beds and is medium-sized general hospital with staff of 966 & annual budget of €72.1M
- Management already had ISO 9002* & deployed teams to work on QI projects.
- Hospital began to use Six Sigma in 2002 Six Sigma Black Belt (BB) or Green Belt (GB) usually headed these teams.
- A major issue in the hospital was reducing operating theatre (OT) start times
- Problem: OT's supposed start time of 8am often delayed due to
 1. Patients not having been given prescribed drugs;
 2. Patients brought in late by referring department;
 3. Specialised staff e.g. Anaesthesiologists, surgeons late.

These and other issues led to 8.35am average start time in the measurement phase.

* Seen that ISO 9000 now unites ISO 9001-04

Six Sigma & Lean Together (/4):

Case Studies 2: Red Cross Hospital, Netherlands

- *The Red Cross Hospital, in Beverwijk, Netherlands Case Study (contd.):*
 - While finding these issues, the Green Belt team discovered that underlying problem was a poorly defined process. This made planning difficult.
 - Tools were needed to manage this operational process. Designing a new admissions process based on the following simple principles was the solution:
 - Patients must be present at the OT facility no later than 7:35 am.
 - Before arriving at the OT, patients must receive preoperative preparation.
 - The referring department and the anaesthesiologists must be informed about the planned OT treatment for the patient 1 day in advance of a procedure.
 - To control new BP, *visual management* (a lean tool*) was used. At a weekly meeting staff a graph were shown the OT start times for the previous week.
 - This control system used to monitor OT start times & provide valuable input on how to improve processes even further.

Six Sigma & Lean Together (/5):

Case Studies 2: Red Cross Hospital, Netherlands

- *The Red Cross Hospital, in Beverwijk, Netherlands Case Study (contd.):*
 - Red Cross Hospital showed the significant benefits of Lean Six Sigma.
 - Hospital Management adopted Lean Six Sigma and started a process for to select strategically aligned projects with strict project management.
 - Net result was a process for institutional systematic innovation that consistently delivers the intended end results.
 - Total of \$1.2M of savings was reported after three years of implementation
- *Lack of Uptake of Lean Six Sigma in Healthcare*
 - 2 healthcare specific hurdles impede its running: measurement & workforce psychology
 - For measurement, in healthcare it is often difficult to identify processes which can be measured in terms of defects (Lanham and Maxson-Cooper, 2003).
 - For workforce psychology can't use business jargon talking to healthcare professionals otherwise there can be a risk of rejection or acceptance with cynicism.

Six Sigma & Lean Together (/6): Case Studies 3: Call Centre Optimization

- **Lean Six Sigma in Call Centre Optimization**
 - Most important Call Centre BP – is an agent taking in-/ outbound calls ('000's per day)
 - Apt for LSS optimizing of call centre BPs, as a key Six Sigma principle is to apply improvement resources to the high-leverage opportunities=> no bigger than agent calls
 - New software can make major changes in the call handling BP and enable the application of Lean principles to call handling for breakthrough results for SHs.
- **Challenge: Improve Call Handling – Understanding *The Agent is the Process***
 - Improving agent call handling is hard: main issue is even for a single call type, there is not one process to improve.
 - Thus the agents *are* the BP and so org must improve at least as many BPs as agents
 - Though CRM software quality monitoring *can* reduce variation, it still exists.
 - Even best call centres operate at levels unacceptable in a manufacturing facility built around Lean manufacturing principles.

Six Sigma & Lean Together (/7): Case Studies 3: Call Centre Optimization

- **Lean Six Sigma in Call Centre Optimization (cont'd)**
 - Reducing agent variation requires three things:
 1. Agents have to have a process to follow (process standardization).
 2. They must follow that exact BP, allowing them to deliver quality service & easier work life.
 3. Mgmt must have access to *all-agents-and-calls* performance for continuous improvements
 - Further to reduce costs, needs to be without costly call recording or live call monitoring
 - These aren't as effective & sustainable as techniques (successful in manufacturing) – e.g. standardizing BPs, error proofing and complete transparency into performance.
- **First Essential Lean Step: Standardise the Process**
 - Problem: though endorsed by Training, likely not the one the best agents now follow
 - So firstly responses for a model BP* were pre-recorded & played back (by *Interactive Voice Response* software) at appropriate times during the call
 - Result: Just having standard BP done by many agents was a huge step forward!

Six Sigma & Lean Together (/8): Case Studies 3: Call Centre Optimization

- **Optimizing the Process: Use of Kaizen to Eliminating Waste:**
 1. By Eliminating Wait Times.
 - Lean emphasizes importance of continuous flow=> no value added with 'radio silence'
 2. By Eliminating Unnecessary Steps
 - Kaizen means critical eye on all BP steps & asking is that important to the customer?
 3. By Improving the Efficiency of Necessary Steps
 - On these steps, each was examined to put the information more efficiently.
 4. By Mistake Proofing (a key Lean Principle)
 - Having agent keep to ideal call form with legal requisites in right place & not backtrack.
 5. By Stopping the Line: (another Lean Principle)
 - On seeing an error, team-leader checks with agent what can be done to prevent it.
 6. Looking at Results
 - Checking with all SHs to ensure remedies not local or individually targeted.
- **Improved Employee and Customer Satisfaction**
 - Agents (esp. new ones) like the system because it allows them to get the process exactly right.
 - Customers don't complain - like getting the information they need clearly & quickly.

Summary

- Quality is important and not just in the abstract (Medical issues).
- Total Quality Mgmt (TQM) has a long (& not always successful) history
 - Fact-based, statistical approach/philosophy of TQM too abstract for some.
 - Tho often useful in manufacturing, TQM success hangs on tangible & intangible factors
 - TQM, BPR both have cross-functional orientation, differ in pace of change & timespan
- Management Styles
 - Theories X, Y, (both of) Z have been used in HRM, org'l behaviour & development
 - Both versions of Th Z advocate applying TQM for systematic, gradual process change
- Other process change approaches
 - Some organizations opt to go the ISO900X route instead of TQM
 - Standards facilitate buyer through imposing a set of quality clauses on the seller
 - More prevalent for organizations to look to (Lean) Six Sigma after tiring of TQM
 - Six Sigma seeks to find/ eliminate causes of defects/ errors in high value processes.
 - Lean is widely usable, transparent, good value & easily absorbed in corporate cultures.
 - LSS can yield SH value with fastest rises in customer satisfaction, quality & BP speed

References

1. Lucas, H. C. (1975) *Why Information Systems Fail*, Columbia University Press, New York.
2. Chiarini, A. and Bracci, E., 'Implementing Lean Six Sigma in healthcare: issues from Italy', *Public Money & Management* Vol. 33 , Iss. 5, 2013
3. Ruth Boaden, Harvey, G., Moxham, C., and Proudlove, N. (2008) , 'Quality Improvement: Theory and Practice in Healthcare', NHS Institute for Innovation and Improvement
4. Proudlove, N., Moxham, C. and Boaden, R. (2008) 'Lessons for Lean in Healthcare from using Six Sigma in the NHS', *Public Money and Management*, 28(1), 27-34.
5. De Koning, H., Verver, J. P. S., Van den Heuvel, J., Bisgaard, S. and Does, R. J. M. M. (2006), 'Lean Six Sigma in Healthcare', *Journal for Healthcare Quality*, 28(2), 4–11.
6. Van den Heuvel, J., Does, R.J.M.M. & Verver, J.P.S. (2005), 'Six Sigma in healthcare: lessons learned from a hospital', *Int Journal of Six Sigma & Competitive Advantage*, 1(4), 380-388.
7. Laureani, A., Brady, M. and Antony, J. (2013) 'Applications of lean six sigma in an Irish hospital. *Leadership in Health Services*', 26 (4). pp. 322-337
8. Adsit, D. 'Cutting-Edge Methods Help Target Real Call Center Waste' in 'The Futility of Call Center Coaching' www.isixsigma.com/operations/call-centers/futility-call-center-coaching