

Implementation of Deming's Philosophy in a Construction Company: OPCO Limited – Wales Experience

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Abstract— This paper describes how a Wales based construction company improves its operations, achieves quality standards and manages the overall business improvement through the implementation of Deming's philosophy. The paper describes, initially how the principles are applied within the organization successfully (Deming's 14 points are 14 visions of the firm), how they helped in managing business processes and change, it also illustrates that there was room for development in the background due to lack of continuous improvement.

This study clearly demonstrates how OPCO are moving away from turbulence productively by reengineering business processes and managing change continually with the help of Deming's philosophy. Such methods are applicable and transferable to not only organizations operating within a similar cultural environment, but for any organization striving for quality, process and overall development, which is described in the paper.

Index Terms—Business Process Reengineering, Continuous Improvement, Construction Industry, Deming 14 points, Innovation, Performance Management, Quality Management.

1 INTRODUCTION

BUSINESS is not about buying and selling, it is about building people and societies to lead a better ethical life. Over past, business practices, strategies and technologies have changed drastically. According to Ann et al, [1] cited in Reddy [10], in 60's business practices and strategies were mainly based on quantity (producing more), in 70's it was all about producing cheaper products, in 80's it was all about quality (this is when Deming's work started to be acknowledged in academics), in 90's it was all about reducing lead time to provide quick services. But now all the business strategies are based on customer service, producing customized products with best rate, quicker delivery and so on. Basically, to stay in today's market game; we need to focus on each and every element that affects our business. This is the only way to survive, but there is something more than survival, which is to achieve and maintain competitive advantage. This can be achieved by implementing Deming's philosophy. Deming's theory helps a company to have strong (quality) business processes, which in turn helps to increase their speed of operations by battling internal and external uncertainties, peaking return on investment by reducing lead time, cost and resource wastage.

1.1 Research Background

Like any other industry, Construction industry's behavior is also shifting rapidly (business practices, technologies and so on) [9]. The importance of implementing best business practices (Deming's philosophy) is a must in our present construction business panorama, but how can we reach our destination. According to Farooqui & Ahmed [3], many researchers focused on applying Deming's philosophy at manufacturing industries, but there are very few researchers who applied it in construction industry particularly in Japan and United States [8]. This principle [3] does not readily apply to construction because of its complex nature. Every job, client needs, design specification, resources management and project varies from one another. PHCC education foundation [4] argues, "This impression is wrong and whatever project it is the core business processes are same and so are the methods and techniques".

1.2 Research Aim & Scope

The overall aim of this research is to; state the process of implementation of Deming's principles at opco (Wales based Construction Company) and to identify how Deming's 14 principles helped opco from exhibiting best business practices across the core business discipline of project management, commercial control and estimating.

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1.3 Company Background

Formed in July 2001 OPCO is a UK based multi disciplinary contractor that specializes in the designing and construction of high value buildings for national and international clients. OPCO have developed an enviable reputation for the delivery of quality high rise residential, commercial buildings, industrial, process engineering facilities, public sector works and leisure complexes by having strong site, commercial and design management providing assurance to clients that their projects will be delivered within agreed project timelines and budgets with high quality standards and safety.

Opco's aim is to be distinctive. This means being different from its competitors - and, in key respects, better than its competitors. It is very important to give clients reason for choosing OPCO in the first place, and the reasons to keep coming back. Delivering on time, to budget and at the right level of quality is not enough to achieve competitive edge. These goals are important, but every contractor in this industry aspires to them. In order to be distinctive, and better, OPCO deeply concentrates on four key areas of its business, namely people, communication, process and technology.

A crucial part of Opco's distinctiveness is the implementation of Deming's 14 points into its corporate culture right from the start which are also Opco's 14 visions and working hard to continuously improve its business processes and systems to withstand the internal and external uncertainties. This always helped the company to increase its quality and productivity by reducing non value added activities in the business to a great extent. The employees of OPCO have special responsibility. The Responsibility includes the obligation to follow the set of guiding principles described below (14 visions of OPCO):-

1. Create a constant sense of purpose towards improving the service we provide to our clients.
2. Take on responsibility for managing growth and change.
3. Ensure quality is built in - do not rely on inspection to achieve quality.
4. Don't award business on the basis of lowest price. Look at total value and move towards single suppliers, building long-term relationships of loyalty and trust.
5. Work hard to improve systems and processes as this will improve productivity and quality.
6. Coach and train people on the job.
7. Recognize that leadership is about helping others to do a better job.
8. Drive out fear and blame. Create a climate where everyone can work effectively.
9. Break down barriers between functions.
10. Do not use slogans which exhort the workforce to achieve zero defects or new levels of productivity. High defects or low productivity levels are usually

the fault of the system not the workers therefore improve the system.

11. Don't manage by numbers or targets. Use true leadership to inspire people instead.
12. Remove barriers that rob people of the right to job satisfaction through achievement.
13. Ensure everyone has a plan for their personal development.
14. Encourage everyone in the business to work towards transforming the company. It is everyone's job.

To achieve these defining characteristics, employees at OPCO at all levels recognized increase in organizational performance can be achieved by continuously managing business process efficiently. According to Tribus [7], "It is fundamental to Deming's teaching".

2 LITERATURE REVIEW

Deming's 14 principles are straight forward and resourceful, if implemented in a systematic way. These principles can be applied to any size and kind of industry, but it's mostly applied in the manufacturing industry. Very few studies provide evidences of successful implementation in construction industry.

According to Deming [2], "The 14 principles are as follows:

1. Create consistency of purpose towards improvement of products and services, with the aim to become competitive and to stay in business and to provide jobs.
2. Adopt the philosophy.
3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
6. Institute training on jobs.
7. Institute leadership. The aim of supervision should be to help people and machines and gadgets to do better job.
8. Drive out fear, so that everyone may work effectively for the company.
9. Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with product or service

10. Eliminate slogan, exhortations, and targets for the work force asking for zero defects and productivity.
11. Eliminate work standards, management by objectives, numbers, and numerical goals.
12. Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisor must be changed from sheer numbers to quality. Remove barriers that rob people in management and in engineering of their right to pride of workmanship.
13. Institute a vigorous program of education and self improvement.
14. Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.

According to Deming [2], "The 7 deadly management diseases are as follows:

1. Lack of consistency of purpose.
2. Emphasis on short-term profits.
3. Evaluation of merit rating and performance.
4. Mobility of management: job hopping.
5. Management by use of visible figures only.
6. Excessive medical costs.
7. Excessive cost of liabilities.

3 RESEARCH METHODOLOGY

In order to complete this paper, following research methodology is adopted:

- Critical literature review.
- Online research.
- Interviews.
- Group discussion.
- Analysis of findings.
- Proposed implementation plan and
- Conclusion.

Choosing the right research strategy is very important to complete the research (implementation of Deming's philosophy) in time scale and quality. According to the literature available, *Action Research* is most suitable for this particular research type. According to Yadam [11], many researchers defined and looked at action research in different ways. But the standard definition was given by Stefan & Goran [6], "Action Research means a research practice and a business practice integrating to achieve a common goal". The following diagram illustrates the process of action research in simple format (researcher and business practitioner come together and achieve common goals).



Fig 1: Action Research Method in Simple.

The data for this research was gathered through various sources. This action research is conducted through interviews, group discussions and analysis of organization internal documents (Data Triangulation).

4 DEMING PHILOSOPHY AT OPCO LIMITED

- a. Create a constant sense of purpose towards improving the service we provide to our clients:

Initially, there are three phases for problems (past, present and future). Problems created by our past mistakes (strategy, decision making, planning and implementation) troubling our present activities (operations, production) effecting the overall organizational performance in future (losing client base, reduced return on investment and job cuts). Opco has realized this fact from the start and designed clear vision statements (extracted from Deming's 14 points) and developed clear plans for continuous improvement. The employees have a very good understanding of the company's policies and character. In order to stay competitive in the present and future to avoid mistakes, opco regularly reengineers all the core business processes, implement, monitor, measure performance and redesign processes, if necessary. It's a continuous process; there is no end to it. Also, opco invests whenever necessary on training and implement new technologies into the business and encourages its research and development (strategy and technology) members to explore new horizons.

- b. *Take on responsibility for managing growth and change:*
Deming's claims that many companies do not or can not perform well in the long run because their managers not knowing what to do, when they are asked to challenge an uncertainty or problem. Members at opco know the difference between leader and manager well. Employee participation is encouraged throughout the organization. This helps employees to freely discuss any kind of problems, raise questions and suggest solutions. This practice results in sharing knowledge and experience and can solve any complex problems across the business.
- c. *Ensure quality is built in - do not rely on inspection to achieve quality:*
Construction companies usually inspect most of their construction activities after the completion of the work [3]. Some companies employ quality control inspectors or teams to take care of quality issues throughout the project, but even then fail to avoid these issues due to the complex nature and uniqueness of each project. To overcome this opco implemented mobile computing technology at site level. This technology strengthened supply chain relations, operations management and gained loyalty and trust from clients. Soon this technology will be used to capture data at all levels in the business, which will be latter fed into the statistical software to check the performance of all the business processes and organizational growth.
- d. *Don't award business on the basis of lowest price. Look at total value and move towards single suppliers, building long-term relationships of loyalty and trust:*
Building a strong relationship and trust, are not easily achievable. It takes lot of time, patience in choosing the right supplier and maintaining strong relationship. Opco works with small group of local suppliers in a process of continual project management and product improvement. This process requires the managing directors of all our supply chain partners meet on a monthly basis to discuss the latest project KPIs, the areas of targeted training and the areas of productivity improvement and cost reduction. All sub-contractors employed by Opco are part of SSIP - Safety Schemes in Procurement. This meets the legal requirements for Stage 1 Competency Assessment under The Construction (Design and Management) Regulations. The scheme is endorsed by the HSE and is widely recognized throughout the industry. Should sub-contractors not be part of the scheme, opco have joining instructions and can help them through the process. Sub-contractors only go onto our approved database once they are SSIP's accredited. Better the supplier, better quality products produced and easier client retention.
- e. *Work hard to improve systems and processes as this will improve productivity and quality:*
Many companies step back to implement quality control in all areas in business, because of initial investment. But what they do not realize are the long term benefits. But investing quality control will eventually lower the cost of the non value added activities through out the business, resulting in improved operating profits and overall organizational performance. Opco monitors, measures and redesign their systems and processes regularly with the help of latest technology (mobile computing systems & web based software's) and concepts.
- f. *Coach and train people on the job:*
Training is very important part of the development of business. According to Farooqui & Ahmed [3], "In spite of knowing the importance of training, only 65% of the companies are actively participating". Opco is committed to the training and development of its entire workforce so that they will gain the necessary skills to reach their full potential. This will assist in enabling opco to achieve its aims and objectives that are to provide specialized, high quality service to our clients through a well trained and supported working team. By increasing the skills and knowledge of our people we will develop confident, highly qualified personnel working as an effective and efficient team. As part of Opco's continuing commitment to training and development, employees are asked to provide feedback on the value and effectiveness of the training and development they undertake. This information will be used to assess and improve the training process.
- g. *Recognize that leadership is about helping others to do a better job:*
According to Tribus [7], "Manager do not initiate change to the corporate culture, it is top management responsibility because they recognize the company had a survival problem". Deming [2], cited in Rienzo [5] argues, "The major threat in business - results from not lack of effort, they result instead from not knowing what to do." Knowing all these issue opco top management stays alert to counter threats in the industry.
- h. *Drive out fear and blame. Create a climate where everyone can work effectively:*
It is very difficult to judge psychological feelings of a person. An employee might fear losing job, uncertainties to try new latest work methods and so on. We can't help sometimes but there is a chance to suppress this behavior. By providing good training, encouraging employee participation will build confidence and hence people can overcome inferior complex and phobias or fears.

i. *Break down barriers between functions:*

Most of the companies in today's competitive world have good relations between their departments. Because, they recognized the value of team working from the past experiences and lesson learnt from other company practices. It is very true that if one function does not cooperate with the other then there is a great danger for the delay in product design, production and hence ends up with bad performance.

j. *Do not use slogans which exhort the workforce to achieve zero defects or new levels of productivity. High defects or low productivity levels are usually the fault of the system not the workers therefore improve the system:*

This is considered to be a very controversial point, it has two faces. One can argue both ways. Whatever companies do, the management must remember these actions should not give adverse reactions on the organizational performance. The management responsibility is to check if the processes and systems are working well with the help of statistical concepts and are up to date. Respect, training and encouragement can build confidence, trust and long lasting relationship between the employee and the employer.

k. *Don't manage by numbers or targets. Use true leadership to inspire people instead:*

Mostly companies are motivated by numbers and targets. Because, some believe it acts like a guide line or benchmark for the employees to perform well to reach their targets. People, who oppose this, argue that by following this method one might reach his/her target but might not achieve the quality standards. Then eventually the whole system goes wrong. But what is right and wrong? Opco use numbers and targets where necessary and avoid where unnecessary. But opco sets reasonable and achievable numbers and targets (measurement of business process through statistical models) with mutual understanding between both parties to peak performance. This can be achieved, if the top management is strong and committed to achieve quality and development through latest business practices.

l. *Remove barriers that rob people of the right to job satisfaction through achievement:*

Many companies, are driven by sales, encourage appraisal pay system, this may trigger negative vibes psychologically between employees and effect the inter personal; inter department and overall organizational performance. Deming [2], stated "companies should not implement or follow appraisal system and manage by objectives." Respect, training and encouragement can build confidence, trust and long lasting relationship between the employee and the employer.

m. *Ensure everyone has a plan for their personal development:*

It is company policy that each member of staff will go through a Personal Development Review after 6 months of employment and every year afterwards or at the completion of a project (whichever should be first). This is a detailed Plan of action for their development through the company. They will complete the plan in the first instance and then sit with their line manager and discuss the plan in greater detail. This will help with their development through the company, and assist in their progression. The Personal Development Plan will then be fed through to the human resource manager who will arrange for the training to be carried out either internally or externally. Training records are kept on each individual member of staff and regularly updated to ensure that training is renewed when needed. The plan is then reviewed in 6 months to make sure all targets are being met both by the company and the employee the plan will then be closed off and the employee will have a complete new review in the following 18 months of their employment. Each new member of staff is teamed up with an existing member of staff in the coaching programmed. This was designed to help new staff members settle into the business with a one to one coach/mentor. They will meet with their coach/mentor regularly to ensure they are settling into the company and help them with any help they need. Opco also hold a training day on the last Friday of each month, this is held internally and attendance is compulsory for the staff members identified for that training day. This will not only assist new members of staff with the procedures of the company, but will help existing staff members enhance their performance by gaining necessary knowledge on disciplines throughout the business.

n. *Encourage everyone in the business to work towards transforming the company. It is everyone's job:*

According to Huda, cited in Farooqui & Ahmed [3] declared, "Quality flows from top to bottom of the organizational hierarchy." It means top management is the creators, sustainers and destroyers of the policies, processes and systems in an organization. It is not possible to achieve good performance without top management full commitment. Top management must plan a strategy, which can initiate employees thinking ability towards quality and process oriented. In order to achieve long term stability, opco regularly reengineers its business process with contrast to the current quality business practices and technologies.

Finally, if any of these principles are neglected, it might eventually affect the whole Deming's philosophy implementation process and will face high chances for failure.

5 PROPOSED IMPLEMENTATION PLAN

This section, gives a clear understanding on how to implement Deming’s philosophy companywide efficiently. Firstly, it is very important to conduct gap analysis. Top management must answer following questions:

- What is our strength & weakness? (input)
- Where are we at present? , if bad (output)
- Why are we in this position? (analysis)
- Where we desire to be in future? (vision)
- How do we reach this target? (planning)
- Who will take responsibility? (Top - Management)

The following figure clearly shows, what are the necessary elements required and how the information flows across the company. Always the top management must carefully analyze the situation and plan on how to implement these philosophies (strategic change management) onto the corporate culture [5]. Flow of information (communication) must be very clear and smooth across the company. This process starts with top management training, once they acquired desired qualities training for middle management commences. Meanwhile, the top management makes the necessary arrangements (tools, processes, equipment) for the middle level management to perform their job as soon as they finish their training. Then the middle management will take the responsibility for lower and non management training and development.

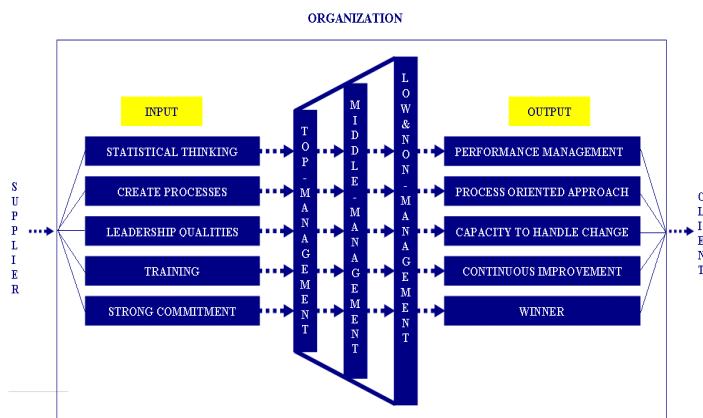


Fig2: Implementation Flow - Companywide.

Following are the statistical tools required for successful implementation and maintenance [5]:

- **Flow Diagrams:** To understand process.
- **Control Charts:** To monitor the process performance.
- **Scattered Diagram:** To check process behavior.
- **Histogram and Pareto Charts:** To monitor defect frequency rate.
- **Cause and Effect Diagram:** To understand the relation between business components.

Over time, Quality (competitive advantage) and Process Oriented Approach becomes part of the business.

The following process, gives a clear illustration on how to implementation Deming’s philosophy across organization successfully.

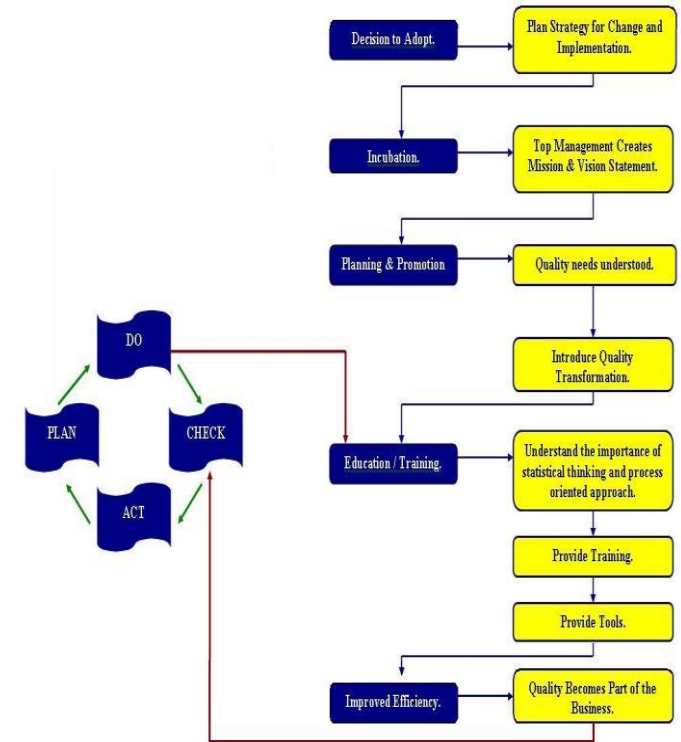


Fig 3: Deming’s Philosophy - Implementation Process.

Usually, companies tend to implement quality practices into the business, but do not care to check their behavior (performance) regularly. This will eventually lead to disaster. It is very important to continuously monitor and change strategies as needed. The above process is very efficient because it is not one off process. It is linked with Deming’s cycle, which makes the whole process continuous.

6 CONCLUSION

Quality is not readily available (initial, high setup cost and takes time), one need to have patience and strong commitment to succeed at integrating quality into the business. It is the top management responsibility to implement and sustain quality systems in the business. They should take client and supplier relations very serious as they are the pillars for business. As they are the leaders, employees tend to follow their foot steps. Training and personality development is very important for the

employees to perform their job efficiently. It is very important to understand the difference between leader and a manager. Companies must aim (training) at creating future leaders. Developing clear and strong business processes is the secret for successful quality implementation. In order to test the process effectiveness regularly, statistical process control methods should be implemented. This method helps in measuring organizational performance. To carry out above mentioned methods, it is very important to invest and implement in the latest technology to reduce lead-time and communication gaps. Finally, good management with commitment; quality training for overall increase in employee efficiency; strong business processes and statistical process control methods for performance measurement; latest technology to support all the above are very important to gain competitive advantage and success in long run.

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Top Management	Commitment. Responsibility. Leadership skills.
Plan	Strategy. Change Management. Finances.
People	Personality Development. Training & Tools. Team Work & Participation.
Process	Clear & Flexible. Practical & Realistic. Statistical Control. Performance Measurement.
Communication	Back Bone. Build Relationship. Sensitive.
Technology	Research & Implement. Increase Standards. Gain Competitive Edge (Advantage).
Patience	Initial Time Consumption. Initial Spending. Long-Term Success. Continuous Improvement.

Fig 4: Management Qualities for Success.

Management must consider the following elements, for developing, implementing and monitoring quality systems (Deming's philosophy) across the organization.