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# **ACHIEVING BUSINESS PROCESS IMPROVEMENT THROUGH KNOWLEDGE MANAGEMENT**

A case study with ABB Marine and Cranes, Finland



Bachelor's thesis

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*Kayode Ashogbon*

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**Author**

Kayode Ashogbon

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ABSTRACT

Today's business environment is continually being shaped by the global competitive landscape that has resulted into an aggressive approach by managers to reduce costs and lead-time while satisfying the needs of the customers through continuous improvement initiatives. Organisational leaders are striving to adapt to the change by utilising several tools and techniques that provide seamless integration into the firms' strategic goals. One of the mostly used methods to achieving continuous improvement is the knowledge management.

This thesis report is a project implementation for ABB Marine Oy. It focuses on how the organisation can achieve tremendous process gains through standardised work processes and knowledge management approach. The project objectives were to standardise the VME's existing project templates to ensure harmonisation and easy accessibility via e-library.

A qualitative approach was used to draw insights from the underlying principles of knowledge management, the lean concept, reengineering and Six Sigma as business process improvement methodologies. The hybrid synergies that exist between these methodologies and knowledge management were further discussed.

**Keywords** Business process improvement, knowledge management, Lean Six Sigma, continuous improvement

**Pages** 39 p. + appendices 2 p.

## **ABBREVIATIONS**

BPI- Business Process Improvement

BPR- Business Process Reengineering

BU- Business Unit

CI- Continuous improvement

CoP- Community of Practice

DC- Document Controller

DE- Drives Engineer

ECM- Enterprise Content Management

IC- Intellectual Capital

KM- Knowledge Management

KPI- Key Performance indicator

LE- Lead Engineer

OECD- Organisation for Economic Co-operation and Development

PDCA- Plan Do Check Act

PM- Project Manager

QoS- Quality of Service

SE- Software Engineer

TPS- Toyota Production System

VME- ABB Marine Engineering Department

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## INTRODUCTION

The twenty-first century global market and business environment is characterised by stern competition shaped by technological advancements, consumer requirements, volatile financial market and trade liberalisation. The liberalised-economy unleashed the competitive forces and vastly changed the business scenario that has resulted in hyper competition (Agarwal 2010). This competition is focused on the available limited resources, customers and as well as the market leadership, in their sector of operations. “In the face of dramatic turbulence in the environment, an enterprise’s ability to adapt, respond, and align itself with the business need is critical for its survival and success” (Delen & Dalal 2008, 237). To stay relevant and productive, organisations are taking giant strides that ensure they are competing favourably on the global front. Every day, managers are forced to take radical decisions with innovative strategies that will pave way for their respective organisations in an unpredictable corporate world. One of the ways organisations are gearing up for the global competitive challenges is through the Knowledge Management (KM) and Business Process Improvement (BPI) principles. Many scholarly notes have linked organisational knowledge with the firm’s competitive ability. Hence, an organisation’s knowledge if properly harnessed could be a source of competitive advantage in an ever evolving business environment. “Knowledge is becoming one of the main assets for organizations that seek a competitive advantage in a dynamic market place” (Polyaninova 2011, 1). Grant’s view of the knowledge-based theory of a firm pointed out that organisational knowledge is a resource with at least the same level of importance as capital (Will & Raymond 2008, 4). In this vein, many businesses are taking a closer look at their operations and processes through the eye of knowledge management by finding the best approach that will minimise cost and lead time with much less resources, while increasing the quality of goods and services. By fostering consumer satisfaction and productivity, the global competitive market is, however, shaping the way organisations do business.

### 1.1 Background to the thesis project

Due to a strong drive from leadership to improve quality, reduce engineering lead-time and improve cost efficiency with ABB, the need to improve the engineering process so as to achieve the required aim is unavoidable. A closer look into the business process reveals a common practise that individual employees of the ABB Marine and Cranes Project Engineering department have found their own best practices in performing their everyday tasks, with individual standards and methodology. With such a lack of uniform organisational standards, there definitely exist certain losses in the process that need to be eliminated to improve customer satisfaction through process standardisation and optimisation. In addition, project management and other working templates are of non-uniform layouts that best represent the organisation. Hence, apart from the technical aspects everyday operations are not standardised or harmonised for competence transfers.

The aim of the thesis implementation was to standardise the department’s existing templates by harmonising existing templates, creating new working templates and uploading them unto an e-library easily to accessible users. It also focuses on training users on its applicability. The main goal of the overall project

was to ensure a smooth competence transfer between employees and other company sites. This helps to improve the organisation's knowledge by making it easy for new employees to quickly gain the knowledge they require for their job functions and the standardisation of operations across the BU.

This thesis work discusses how organisations can achieve process transformation through the implementation of knowledge management tools and techniques. By making clear how the case organisation achieved this process transformation, it also proposes and suggests its applicability to other business sectors.

### 1.2 Commissioning organisation

ABB is a global leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact (The ABB Group 2012). With a global presence in more than a hundred countries and headquartered in Zurich, Switzerland, ABB's employees are developing new products and services with the latest technological advancements that meet the needs of their customers. The ABB group was formed in 1988 through the merger of Swedish ASEA Company and the Swiss's Brown, Boveri & Cie (BBC). The company was rated 273 in the Fortune's global 500 ranking of the world's largest corporations in 2011 with over \$37,990 million and \$3,168 million as revenue and profit respectively (Fortune's Global 500 2012).

The implementation of this thesis work was conducted with the Project and Engineering department of the Marine and Cranes division, Helsinki Finland. ABB Marine Systems develop electrification and automation solutions for the marine industry and a leading manufacturer of electric power and propulsion systems for ships. The unit spearhead product is electric Azipod® propulsion system saves up to 20 percent fuel compared to conventional propellers. As a global maritime organization, it is providing innovative, reliable, safe and environmentally-friendly solutions and qualified services to reduce operational costs and ensure optimum vessel lifecycle for its wide range of customers (ABB Marine 2012). With a wide range of products and services, ABB Marine offers shipyards and ship owners' system deliveries in areas such as power generation and distribution, electrical propulsion and total solutions (ABB Marine Brochure 2009). The marine division offer products ranging from motors, generators, switchboards, transformers and drives. As one of its services, ABB Marine and Cranes offer after sales and lifecycle services to its customers.

### 1.3 Thesis structure

This thesis is divided into five major chapters; Introduction, Theoretical framework, KM and BPM synergy, Project overview and Implementation and Concluding remarks.

Chapter one introduces a general overview to the thesis topic, its implementation and the case organization. By introducing the selected topic, it gives the background for the thesis topic.



Chapter two discusses the theoretical framework of the thesis. It elaborates the concepts of *Business Process Improvement* and *Knowledge Management* and how they are seen as great sources of competitiveness. It also elaborates on the links and the connection between them. The theoretical standpoints of BPI and KM are further discussed.

Chapter three explains the synergy that exists between KM and BPI tools in process improvement initiatives. The BPI tools focused on are Six Sigma and Lean. It further illustrates the role of KM in process improvement by explaining the KM-Six Sigma and KM-Lean synergy. Important factors to put into consideration are also explained to ensure a sustainable project implementation.

Chapter four discusses the project overview and implementation. It explicitly highlights each stage of the project implementation processes and what it entails.

Chapter five presents the project conclusion and makes recommendations to the case organization. It focuses on the sustainability of the process improvement project and identifies critical areas to be considered that may impede the attainment of the set goals. It also gives practical steps that will ensure the seamless flow of the process if implemented.

## 2 THEORETICAL FRAMEWORK

The saying “the only thing that is constant is change” is also true for corporations and business entities. Organisations either willingly change their business approach or they are compelled to do so, if they want to remain competitive. In their book; *Reengineering the corporation*, Hammer and Champy (1993, 32) stated that executives of organisations want their organization flexible enough to adjust quickly to changing market conditions, lean enough to beat any competitor’s price, innovative enough to keep its products and services technologically fresh, and dedicated enough to deliver maximum quality and customer service. Hence, old processes must be done away with and the new be embraced.

During the last two decades, the concept of Business Process Improvement (BPI) has received increasing pedagogical attention. Many writers and scholars have approached it in different manners but few have been able to see it through the eye of Knowledge Management (KM). In this chapter, the connections that exist between BPI and KM are further demystified. It explains how organisations can experience transformation through BPI and KM applications.

### 2.1 Business Process Improvement (BPI)

The concept of BPI was first named so by James Harrington (1991) which he described as a systematic methodology developed to help an organization make significant advances in the way its business processes operate (Harrington 1991, 20-21). Although related to Hammer and Champy’s model (1993) of Business Process Reengineering (BPR), they are much more different with a closer look. Unlike BPI, reengineering is a radical process reinvention that can achieve quantum leaps in performance which discards the old way of doing things to re-establish a new process starting all over from the very beginning. However, BPI

is about improvements that lead to marginal increments. The similarity in the two concepts is that they focus on the customers' needs hence enhancing quality of goods and service.

### 2.1.1 What is a business process?

To start with, it is important to define what is meant by a *process*. Every activity performed with the aim of achieving a purposeful end result happens in stages and processes. They all start from somewhere and end somewhere, and often with several other sub-activities in between that ensure the expected outcomes are achieved. Figure 1 explains a simple process analogy that is aimed at transforming resources (materials, technology and manpower) with a level of control and value-added activities (measurement and operation) into a desired output.

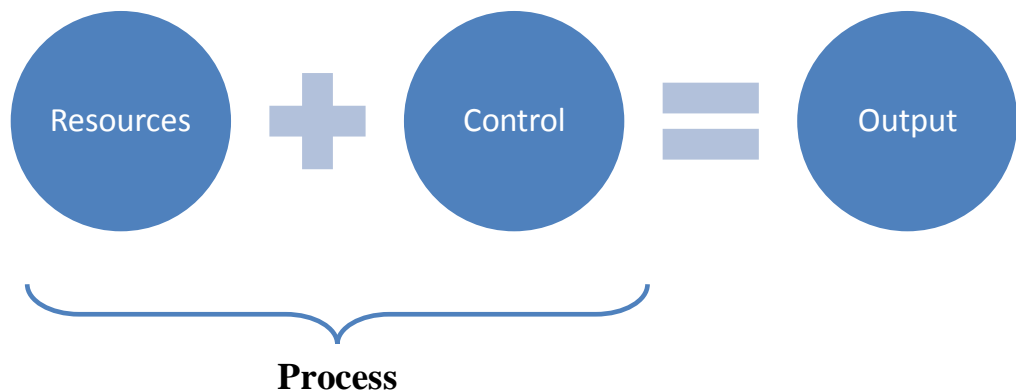


Figure 1 Simple process analogy

Hence, a process is therefore a sequence of tasks or a set of actions interconnected together, usually having sub-tasks with a level of control, aimed at fulfilling an objective. Davenport defines a process as “a specific ordering of work activities across time and place, with a beginning, an end and a clearly identified inputs and outputs: a structure for action” (Davenport 1993, 5).

To separate a company's processes from any other forms of processes, the word *business* has been added to form the term *business process* (Andersen 2007, 32). As applied to organisations, a business process however, is a set of activities an organisation performs to create and add value to customers. It is a series of events that bring together people, technology and information in a way that create valuable outputs (Mentor 2010). It can also be defined as a logical, related, sequential (connected) set of activities that takes an input from a supplier, adds value to it, and produces an output to a customer (Harrington, Esseling & van Nimwegen 1997, 1). A business process consists of two or more dependent or standalone business activities that must be completed and are sequentially interconnected and having an input/start and an output/end, which adds value to a

customer and add value to an organisation's bottom line. However, any missing link may result in malformation of the end result.

Figure 2 illustrates an example of a process flow using a process flow chart.

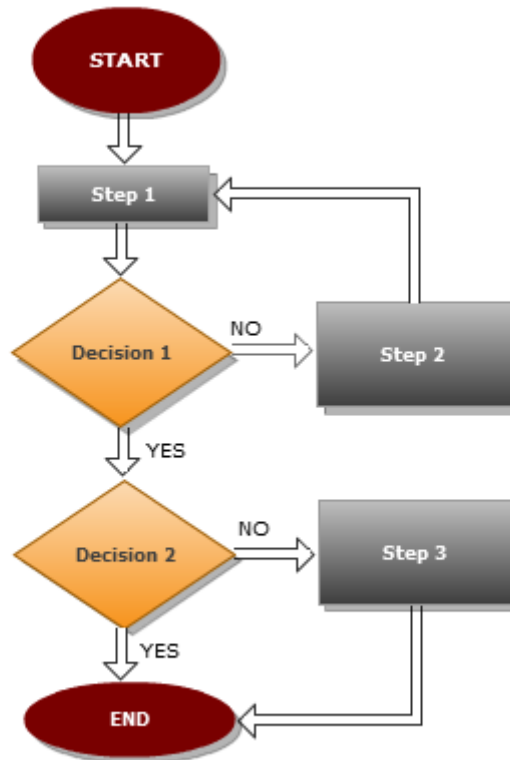


Figure 2 An example of a process using a process flow chart

### 2.1.2 The need for Continuous Improvement (CI)

No process is a perfect one. Every process can be further improved and developed to make it even more efficient, effective and flexible in its operation. There is a regular need to constantly and critically observe a business process to ensure it stays in conformation to the corporate expectation. Susan Page (2010) describes CI as a term derived from the total quality movement, which means monitoring a business process and making adjustments that is continually improved over time. Overall, process improvement simply means adding value to an existing process and maintaining its standard in a continual sequential flow. It entails every activity that is carried out to ensure a process is more efficient, more effective and achieving the intended end result. It aims to take a process from its As-Is to the To-Be state, with significant measurable improvement and performance that help achieve the proposed objective(s). Bhuiyan & Baghel (2005) argued that CI takes into cognisance the involvement of everyone working together in an organisation to make incremental improvements or radical changes; the latter of which is as a result of implementing an innovative idea or new technology. Often, major improvements take place over time as a result of numerous successful incremental improvements.

The impact of a CI program can only be determined by evaluating the impact of the value of the step change measured after the process improvement implementation is achieved. Measuring a process change helps an organisation to ascertain the extent of improvement its BPI program has achieved. In other words, clear objectives and measurable metrics have to be set before delving into improving a process and the change must be measured after an improvement activity.

CI is aimed at satisfying the needs of the customers through process optimisation by eliminating non-value added activities within the workflow. Neglecting CI is a risk that every organisation should avoid. Andersen (2007) emphasised that the performance level of most processes shows a tendency to decrease over time unless forces are exerted to maintain it. A business process can easily become bloated, leading to an ineffective, inefficient, and inflexible process. Improving business processes enables organisations to stay competitive, by increasing customer responsiveness, employee productivity and the company's return on investment (Susan 2010, 17). Hence, there is a continuous need geared at improving a business process and it is the responsibility of managers and process owners to ensure that processes are devoid of waste, unnecessary steps, multiple handovers and other wasteful characteristics (Davis 2009). Organisations that implement process improvements do so for many different reasons. But all is geared towards minimising inefficiencies, while maximising customer satisfaction and competitive advantage in the global market.

### 2.1.3 The Deming (PDCA) Cycle

CI follows a non-stop action that employees and managers must be committed to. It is a mindset that must be engrafted into the culture of the organisation, by suggesting and establishing that improvement is a lifelong activity pertinent to achieving its strategic goals. One benefit that CI has proven to have achieved is that it has helped stabilise and sustain business processes so that they consistently deliver expected goals.

W. Edwards Deming in the 1950's recommended that business processes be placed in a continuous feedback loop so that managers can identify and change the parts of the process that need improvements (Averson 1998). He went ahead to develop a model popularly known today as the Deming Cycle (as shown in Figure 3), which was first developed in the 1930's by Walter Shewhart. The Deming cycle is a four-staged Plan-Do-Check-Act continuous loop model that offers a systematic approach to process improvement.

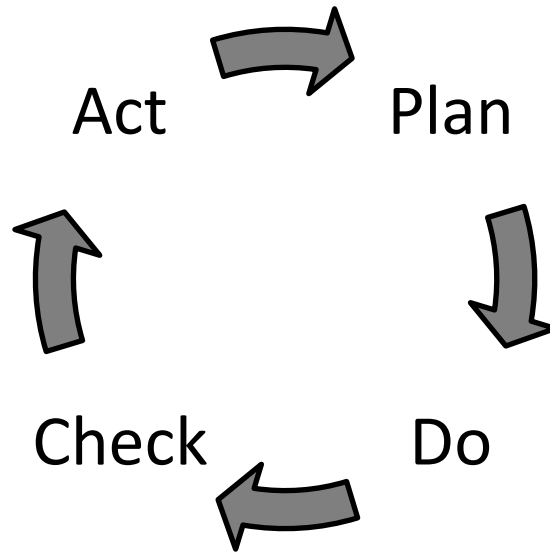


Figure 3 The Deming (PDCA) Cycle

- **Plan:** Every improvement is preceded by identifying the need for the initiative vis-à-vis the intended business justification. The goal of this stage is to identify what needs to be done and what approach to follow. This involves proper evaluation of the improvement initiative. It is best practice to form a multidisciplinary team.
- **Do:** Improvement initiatives at this stage must be carried out, having itemised what needs to be done and what procedure to follow.
- **Check:** In this phase, a constant assessment of the process is done here. Measures are carried out to ensure that the achieved result correspond to the planned results. Various performance evaluation activities are put into operation here.
- **Act:** The ‘act’ stage is the natural inflow from the check phase. The process is modified based on the outcome of the results of the checks performed. If the expected result is not achieved, a new cycle is begun again, but with a different Plan.

Table 1 PDCA outline in Lean Implementation (Straus Forest 2006)

1: Plan	2: Do	3: Check	4: Act
<p>Align goals, strategy, and actions</p> <p><b>Step 1: Policy deployment</b> In this step, tools and methods guide leaders in aligning strategy, goals, and actions. This alignment minimizes waste and increases the impact of business activities.</p> <p><b>Step 2: Action plans</b> Once the actions have been identified in the policy deployment step, action plans are designed, assigned, and implemented. Various Lean tools and methods are used.</p> <p><b>Step 3: Value Stream Mapping</b> A value stream map represents the flow of materials and information through a business system. There are three tangible, detailed end products of a value stream map exercise:</p> <ol style="list-style-type: none"> <li>1. Current state map: the as-is process</li> <li>2. Future state map: the improved process</li> <li>3. Implementation plan: how to get from the current state to the future state</li> </ol>	<p>Implement according to plan</p> <p><b>Kaizen workshops</b> Kaizen workshops are focused process improvement workshops that take place over the course of three to five days. Process improvements in the range of 50% are typical in kaizen workshops. Most of the improvements that are developed by the kaizen workshop team are implemented immediately for immediate return.</p> <p><b>Projects</b> Projects are improvement activities that cannot be achieved within the time scope of a kaizen workshop. An example of this might be implementing a new computing system.</p> <p><b>Go-do's</b> Go-do's are simple improvement activities that do not warrant a kaizen workshop or project.</p>	<p>Measure and organise progress</p> <p>Systematically measuring and analyzing progress is one of the most important aspects of sustaining and improving on changes. Without this discipline, the changes will not be maintained and sustained.</p> <p>There are two categories of measures:</p> <ul style="list-style-type: none"> <li>• Process metrics</li> <li>• Management metrics</li> </ul> <p>Process metrics let employees and managers know the status of a particular process at any particular time. These are the measures that guide behaviour at a local level, and that help everyone understand how a process is doing. An example of a process metric is the cycle time for an order to be entered into the system.</p> <p>Management metrics help managers make business decisions. These metrics include lead-time from order to delivery or resource utilization (output per employee).</p> <p>Both classes of metrics are tracked and analyzed in a Lean organization.</p> <p>Another aspect to consider is alignment of lean measures with business strategy. It is commonly understood that measures shape behaviour. It is important to ensure that the measures (and the behaviours they encourage) are aligned with the business strategy.</p>	<p>Standardize and sustain changes</p> <p>In this phase, two important things happen:</p> <ol style="list-style-type: none"> <li>1. Process improvements are adjusted and standardized based on the measures and analysis</li> <li>2. Changes are sustained and improved</li> </ol> <p>Very few improvements run perfectly out of the chute. Because modern business systems are so complex, there are unanticipated consequences that require a response. This is a normal occurrence, and those that plan for it are more likely to succeed in their efforts to sustain change.</p> <p>Measurements and analysis help make the inevitable adjustments to the process more effective. Whenever possible, it is advisable to make decisions that have some connection to data.</p> <p>Sustaining and improving these changes requires commitment from leadership. Leaders keep continuous improvement on the agenda, make it a priority, and help remove obstacles preventing progress</p>

Table 1 provides a summary explanations of the PDCA cycle applicable in Lean implementation.

The benefits of CI are only evident after the Act phase, while the PDCA cycle is repeated several times, all over again. Although there are several other modern variants, they are however found on its basis and principle of the Deming Cycle.

### 2.1.4 BPI Methodologies

There are several methodologies used today to achieve BPI. Depending on the business sector involved, a firm may therefore decide the use of any process improvement tool suitable for it. Today, Lean, Six Sigma and BPR are the widely used methodologies. This is because they can fit into all type of organisations, whether service, manufacturing or governmental and they have been proven to exceed expectations. However, the choice of an effective BPI program should be such that it reflects a long-term commitment by the company and must be integrated into its strategic goal and mission statements. Any BPI methodology chosen should also reflect the company's business model, thus being integrated into the daily operations and culture (Willianson n.d.).

The key principles of Lean, Six Sigma, BPR and Lean-Six Sigma, as BPI methodologies are further discussed below.

#### 2.1.4.1. Lean Thinking

Lean thinking is a generalisation of the term *Lean manufacturing* or *Lean production*. The evolution and origin of Lean dated from the early nineteen century by Henry Ford but was later improved by the Japanese automobile company during the implementation of the Toyota Production System (TPS) that revolutionise Toyota, from the post world war II era. Womack, Jones and Roos (1990) coined the phrase lean thinking in their book *The Machine That Changed the World*. Today, the term extends the thinking beyond the TPS put forward by Taiichi Ohno (Rogers 2011).

The idea behind lean thinking is the total eradication of wastes and the enhancement of value creation activities that meets the requirements of the end users through continuous improvement activities. Taiichi Ohno identifies waste (known as “muda” in Japanese) as any form of activity, products or inputs that consumes resources (such as time, money, energy, etc.) but which the customer is not willing to pay for. The Lean manufacturing wastes is represented in Figure 4 and categorised as:

- Defects – production of defective parts or out of limit product from customer’s requirements
- Overproduction - producing more product than needed
- Waiting - idle operator or idle machine times that gulp resources such as energy, overhead costs, materials, etc.
- Non-utilisation – non utilisation of human or machine resources and assets
- Transportation - any material movement that does not directly support value added operations;

- Inventory - any supply in excess of required to produce the product;
- Motion - movement of people or machines which does not add value;
- Extra Processing - any process that is not required by the customer and of which the customer will not pay for.

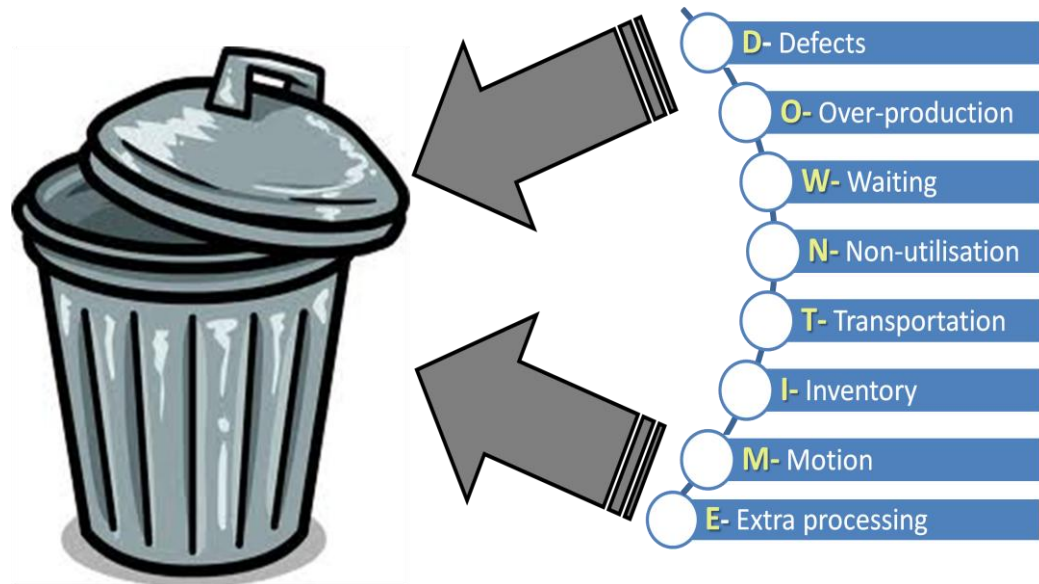


Figure 4 Lean wastes

In any system, not all wastes are avoidable, a significant amount of wasted are unavoidable. The focus of Lean is to systematically eliminate the avoidable wastes (type 1 muda) and reduce the unavoidable (type 2 muda) ones.

Lean has been defined as “a systematic approach to identifying and eliminating waste through CI by following the product at the pull of the customer in pursuit of perfection” (NIST 2000 cited by Bhuiyan & Baghel 2005). The five principles of lean as explained by Radnor (2010) and Anderson et al., (2006) and represented in Figure 5 are:

- Specify the *value* desired by the customer. It is also useful to identify who the real customer is and better understand their requirements.
- Identify the *value stream* for each product providing that value and challenge all of the wasted steps. The value stream represents all processes and activities within the organisation that brings the product or service to the end customers.
- Create a continuous *flow* for the product within the production and supply chain. Standardising processes around best practice allows them to run more smoothly, freeing up time for creativity and innovation. Any process that does not add value to the customer should be modified or eliminated.
- Introduce *pull* between all steps where continuous flow is impossible. This focuses upon the demand from the customer and triggers events backwards through the value chain. In this way inventory and human activity is linked to customer needs.



- Manage towards *perfection* so that non-value adding activity will be removed from the value chain and the number of steps and the amount of time and information needed to serve the customer continually falls.

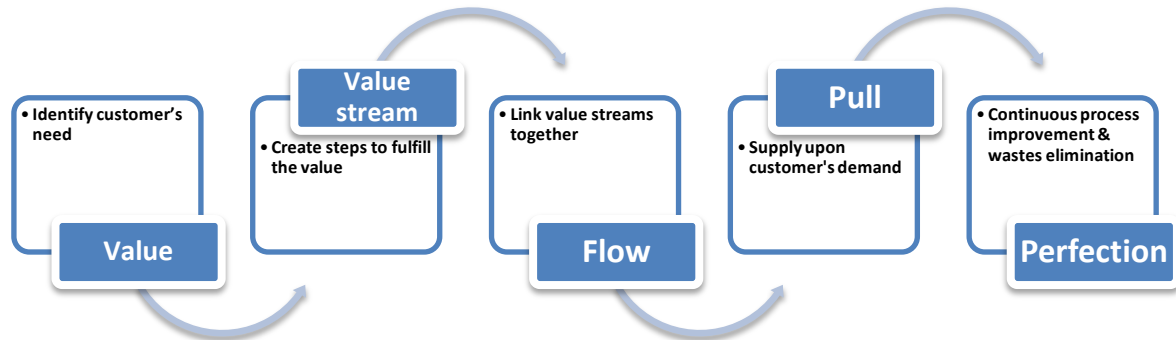


Figure 5 The 5 core principles of Lean

#### 2.1.4.2. Six Sigma

Motorola was first to introduce Six Sigma in 1986 but was launched in 1987 as a means of process quality using statistical process control (Bhuiyan & Baghel 2005). It is aimed at analysing and improving quality, reducing defects, cost and variations in processes. By using statistical methods to identify sources of variations, defects can be eliminated and the process can be better run.

Six Sigma initiatives are designed to realise less than 3.44 (i.e. 0.00000344%) defects or errors per million opportunities through statistical techniques (Harrington 2005 cited in Radnor 2010). Although it was first applied to manufacturing, it has found profound use today in engineering, project management, service and administrative functions, etc.

To achieve process improvement, Six Sigma makes use of the DMAIC methodology cycle (see figure 6) (Anderson et al. 2006):

- **Define:** Clarify the goal and value of the Six Sigma project through problem identification and setting up of the team that will best resolve the problem. Create a map of the process that should be improved.
- **Measure:** Determine the baseline capability level. Identify the key factors that have the most influence on the process, and decide upon how to measure them. Develop the right data gathering methods.
- **Analyse:** Analyse the collected data to determine variations and defects that need improvements.
- **Improve:** Design and implement the most effective solution. Cost-benefit analyses should be used to identify and implement the best solution approach.
- **Control:** Verify if the implementation was successful, monitor the process and ensure the improvement is sustained.

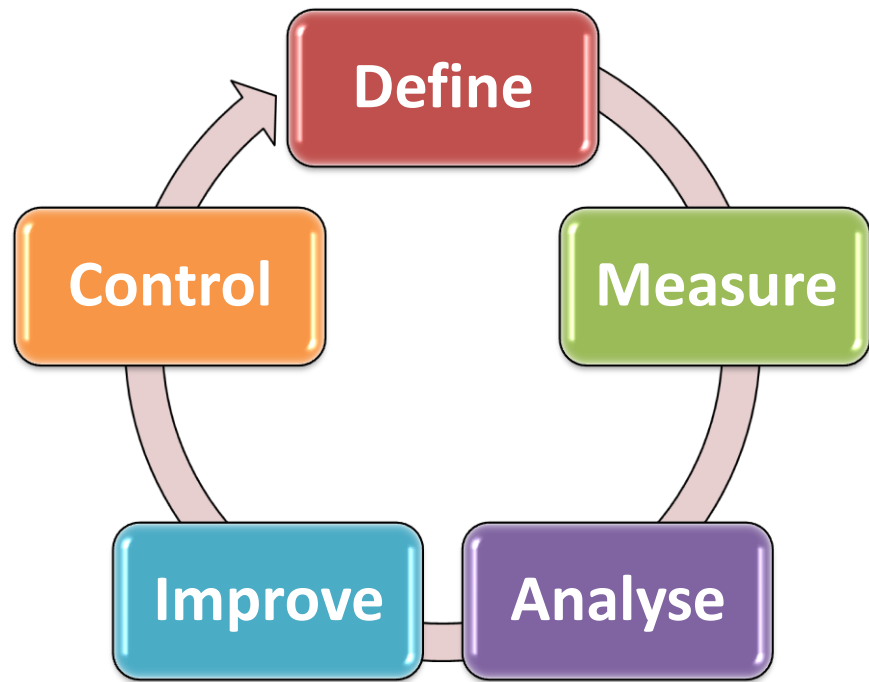


Figure 6 The DMAIC methodology cycle

Six Sigma projects when properly implemented, often results in groundbreaking process improvements.

#### 2.1.4.3. Lean Six Sigma

Recent developments have brought about hybrid solutions that has resulted in the integration of Lean and Six Sigma methodologies and adopted by many organisations today. This is essential so that the weaknesses of one can be overcome by the other and their individual strengths can be leveraged. This has hence resulted in a combined CI program that is far more reaching than any one individually (Bhuiyan & Baghel 2005). Since Lean and Six Sigma methodologies have been proven to be effective CI methodologies, their hybrid have been used to both achieve competitiveness and customer satisfaction, by combining their individual benefits.

#### 2.1.4.4. Business Process Reengineering (BPR)

BPR is “the fundamental rethinking and redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed” (Hammer & Champy 1993). In terms of improvement, it is a more aggressive approach aimed at attaining drastic and not marginal improvement that can cause organisational turnarounds. It involves the elimination of a process and a restarting all over again, going back to the drawing board and building systems from the scratch. Unlike any CI programme, the processes are not merely improved, they are restructured and re-drawn.

A summary comparisons of BPI methodologies of Six Sigma, Lean and BPR is illustrated in Table 2

Table 2 Comparisons of Six Sigma, Lean and BPR (Buavaraporn 2010)

Methodologies	Six Sigma	Lean	BPR
<b>Origin of methodologies</b>	<ul style="list-style-type: none"> <li>The quality evolution in Japan and Motorola</li> </ul>	<ul style="list-style-type: none"> <li>The quality evolution in Japan and Toyota production system</li> </ul>	<ul style="list-style-type: none"> <li>The quality evolution in Japan</li> </ul>
<b>Underlying theory</b>	<ul style="list-style-type: none"> <li>Reduce variation/ no defects</li> </ul>	<ul style="list-style-type: none"> <li>Remove Waste/ non-value added in the process</li> <li>Customer value driven</li> </ul>	<ul style="list-style-type: none"> <li>Business transformation</li> <li>Discontinuous thinking</li> <li>Radically redesigning the end-to-end business process to add value to customers</li> </ul>
<b>Focus</b>	<ul style="list-style-type: none"> <li>Problem focused, considering the CTQ</li> <li>To solve the problems in the operations processes, in response to customers' requirements</li> </ul>	<ul style="list-style-type: none"> <li>Flow focused, aiming to eliminate waste in the process for driving the perfection to customer</li> </ul>	<ul style="list-style-type: none"> <li>End-to-end business process (cross functional)</li> </ul>
<b>Improvement approach/principles</b>	<ul style="list-style-type: none"> <li>The main improvement approach follows the DMAIC methods consisting of five phases; Define, measure, analyse, improve, and control</li> <li>Design For Six Sigma (DFSS) including: Define, Measure, Analyse, Design, and verify</li> </ul>	<ul style="list-style-type: none"> <li>Identify customer value</li> <li>Value stream analysis</li> <li>Flow</li> <li>Pull</li> <li>Perfection</li> </ul>	<ul style="list-style-type: none"> <li>Rethink business process in a cross-functional manner</li> <li>Radically rethinking and redesigning the process</li> <li>Have those who use the output of the process perform the process</li> <li>Put the decision point where the work is performed, build control to the process</li> </ul>
<b>Tools/ techniques</b>	<ul style="list-style-type: none"> <li>Statistical process control</li> <li>Process Map</li> <li>Measurement system</li> <li>FMEA</li> <li>DOE</li> <li>Root cause analysis</li> <li>ANOVA</li> <li>Cause and effect diagram</li> <li>Pareto analysis</li> <li>Histogram</li> <li>Benchmarking</li> <li>Brainstorming</li> </ul>	<ul style="list-style-type: none"> <li>Kanban</li> <li>Pull scheduling</li> <li>Kaizen</li> <li>5S</li> <li>Value-Stream Mapping</li> <li>Time-Value diagram</li> <li>Single piece flow process</li> <li>TPM</li> <li>SMED</li> </ul>	<ul style="list-style-type: none"> <li>Process mapping/flow charting</li> <li>Benchmarking</li> <li>Just-in-Time</li> <li>Activity Based Costing (ABC)</li> <li>Supporting IT</li> <li>Simulation modeling</li> </ul>

## 2.2 Knowledge Management Practices

In today's information age, knowledge is increasingly transforming every nook and crannies of organisations and economies, in every way. Akin to BPI, KM is an evolving topic that has had a lot of attention in the last decade. The KM pedagogy is owed to the increasing transformation of the world of work from industrial based economy to knowledge based economy that is hinged on a firm's ability to develop and managed its knowledge resources for competitiveness. Since an organisation cannot be any successful more than what it knows, organisational knowledge is the distinguishing factor that separate successful and unsuccessful organisation from one another. Hence, managers are craving for information that will enhance their decision making, thereby steering their organisations to greater heights.

Competitive advantage has been attributed to a company's successful management of knowledge. For example, Serrat's (2002) view of knowledge is "a strategic asset and a critical source of competitive advantage". Emerald Guide (2005) also quoted David Smith, a senior manager at Unilever that "KM is the only long-term, sustainable source of competitive advantage". Today, many organisations are investing so many resources that enhance productivity and customer satisfaction into KM systems within their organisations.

### 2.2.1 What is knowledge management?

The study of KM explains the importance of knowledge and its ability to achieving competitiveness, as it relates to organisations and business enterprises. KM develops systems and processes to acquire and share intellectual assets. “KM seeks to accumulate intellectual capital that will create unique core competencies and lead to superior results” (Bain Insights 2010). Although there is no universally acceptable definition of KM, a good definition of KM must indicate that KM captures, stores, shares and make knowledge accessible, together with the valuing of intellectual assets (Frost 2010; Dalkir 2005, 3). According to the OECD policy brief on the significance of knowledge management in the business sector (2004), “knowledge management is defined as how organisations track, measure, share and make use of intangible assets”. In addition, Brelade and Harman (2003) also stated that organisations, depending on their operations and business sectors define KM in relation to its relevance to their business sector.

### 2.2.2 Explicit and tacit knowledge

“Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experience and information. It often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms” (Davenport & Prusak 2000, 5). It is generally divided into two broad types namely: explicit knowledge and tacit knowledge.

- Explicit knowledge (know-what)

Explicit knowledge is the codified or documented knowledge. They are the knowledge that has been documented in the form of books, reports, manuals, encyclopaedia, documents, etc. This type of knowledge can be easily identified because of its physicality and its tangibility.

- Tacit knowledge (know-how)

Made popular by Michael Polanyi in 1958, tacit knowledge explains the knowledge embedded within the workers and not those documented (explicit). Also known as *implicit* knowledge, this type of knowledge can be gained through cognitive process i.e. thoughts, experience, senses, etc. Tacit knowledge is lost through employee retrenchment, retirement, outsourcing, etc.



Figure 7 The Iceberg analogy Explicit and Tacit knowledge (CDS 2003)

The iceberg analogy represented in Figure 7 explains that explicit knowledge is easily seen and physical in nature as opposed to tacit knowledge. It is what pops up in people as what they know. A greater proportion of knowledge (tacit knowledge) cannot be seen, quantified or easily expressed because they are embedded within individuals and are much more than what can be documented. Tacit knowledge presents a vast source of opportunity area that is yet to be explored and it is the most critical knowledge in an organisation. An organisation which develops a culture of open communication in an atmosphere of trust is on a competitive edge. Leadership must therefore create an enabling channel and culture through which seamless information flow between tacit and explicit knowledge can be achieved.

### 2.2.3 Intellectual capital

Intellectual Capital (IC) is an asset that an organisation owns that helps it stand out in achieving competitive advantage in the face of uptight competitions. *BusinessDictionary.com* gives a more robust definition of Intellectual Capital (IC) as a “collective knowledge (whether or not documented) of the individuals in an organization or society”. Also, Stewart (1997) defined IC as “organised knowledge that can be used to produce wealth.” It could therefore be deduced that employees or people, as the case may be, are a rich source of organisational intellectual capital. When employees are therefore well managed, knowledge can be adequately harnessed and channelled to improving the organisation. A quote credited to, Richard Redwood Deupree a former CEO of Procter and Gamble, recognised employees as the source of knowledge when he said “If you took away all of our factories and all our money, but left us our people, we would rebuild the entire organization in 10 years. If you left all our possessions and took only our people, we will be completely destroyed” (experiencePG n.d.). Hence, IC is the knowledge that can be converted into profits and the aim of IC is to extract values both from tacit and explicit knowledge, thereby earning profit for the firm. Such values are data, employee skills and experience, technology, ideas, knowledge, creativity, innovations, etc. Successful organisations have therefore been able to align their IC with their vision and strategic goals. (Sullivan 1998).

#### 2.2.4 Why is knowledge management important?

It has hereto been established that a firm's intellectual capital is of immense benefit, if it must survive economic downturns. This is because the world has evolved from an industrial economy, where the basic consumptions were material-based e.g. assembly lines hierarchical control and shifting to a more global, decentralised, information-driven economy that is impregnated with information (Borghoff & Pareschi 2010, 3). Powell and Snellman (2004) asserted that organisations are increasingly drifting towards knowledge economy by relying more on intellectual capabilities than on physical inputs and production and services based on knowledge-intensive activities. They define *knowledge economy* as “production and services based on knowledge-intensive activities that contribute to an accelerated pace of technological and scientific advance as well as equally rapid obsolescence”.

Another reason for the importance of KM is the aging workforce and retiring of experienced personnel. The KM challenge here is that organisations must create a KM strategy that efficiently transfers tacit and explicit knowledge to young employees and new hires. An organisation must however be geared up in order to stay competitive in this information age.

Lisa Quast (2012) further identifies the importance of KM by identifying three key reasons why managing knowledge is a key to business success, viz:

- It facilitates decision-making capabilities by providing managers the information and data needed to make better, more informed high-quality decisions that is beneficial to their organisation.
- KM builds a learning organisation by making learning routine with CI through critical reviewing of tasks and assignments, and identifying successes and failures. By doing this, a firm can build its knowledge and improve its business processes.
- It stimulates cultural change by encouraging managers to share ideas and insights, which often lead to innovations.

With KM implementation, employee training needs can be identified and adequately enhanced. By analysing the knowledge gaps of the workforce, managers can develop training programs that suits each employee job needs and targeted towards the company's corporate goals. It also extracts tacit knowledge by devising means and methods employees can correlate in the working environment, which can increase the value-generating capacity of firms. This can be achieved by creating a corporate culture that encourages collaboration and communication through establishing communities of practice (CoP) where team sharing and communication can be encouraged, and enabling systems that facilitates it.

#### 2.2.5 Organisational knowledge

Knowledge is human innate. It resides in the organisational talents: employees, customers, stakeholders. Every successful organisation has some sort of 'knowledge' that sets it apart from its competitors. An organisation's knowledge base is

the total available knowledge that it can leverage on to provide competitive advantage. The role of managers is to identify what knowledge is needed by their organisation and strategise on its optimum use thereby achieving breakthrough innovation and great returns on investment. This can be achieved by creating seamless knowledge flows through communication processes enhanced by human interaction.

There are two main views on the relationship between KM and technology among authors and practitioners. While some agree to the fact that organisational behaviour and individual socialisation level determines the flow of knowledge, others however believe that technology is the solution to an organisation KM needs. However, a seamless conjunction between the human viewpoint and technology (as shown in figure 8) leads to successful KM implementation (dataware Technologies n.d.; Borghoff & Parcschi 1997). Technology have revolutionise the way knowledge is shared and codified with the use of computers and networking facilities which are great vehicles that make vast repertoires of knowledge accessible to multi-users at the same time. Utilising computer-based technology, software and network systems, there has been a further enhancement to the discovery, capture, dissemination, analysis, storage and application of knowledge. Technology is hence the vehicle and instrument to ensuring that KM aims and objectives are attained. Computer-based technology has over the years transformed the way in which individuals and organizations accomplish knowledge work by amplifying, complementing, leveraging, and (in some cases) improving on innate human knowledge handling capabilities. Although efforts at managing knowledge certainly preceded the invention of computers, it has been computer-based technology that has ushered in the modern era of knowledge management (Holsapple 2005).

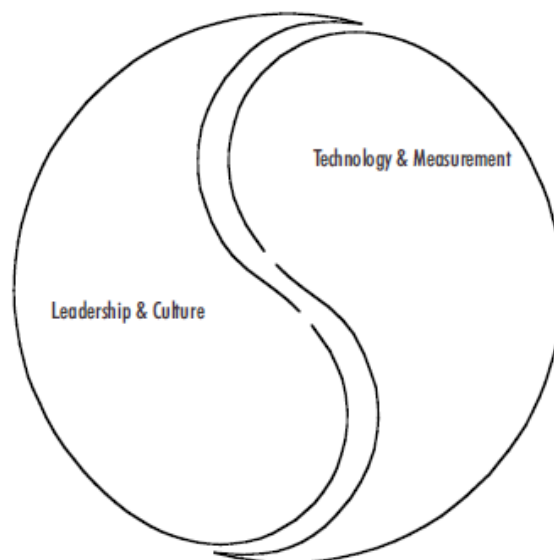


Figure 8 The hard and the soft skills of KM programmes (dataware Technologies n.d., 6)

### 3 KM AND BPI SYNERGY

The concept of KM and BPI applies to every organisation, no matter what business entity it belongs so long there exist a process and a customer's need to ful-

fil. These concepts have found wide applications in the healthcare, manufacturing, construction, logistics, financial services and more recently in the public enterprises.

There are different ways to implement process improvement initiatives, and this depends on the business sector an organisation belongs to. Each industry usually utilise different approaches and methodology to achieving process improvement benefits. The approach of KM to BPI implementation provides an insight into the fact that every organisation possesses a form of knowledge when properly utilised can drive improvement and high rate of performance. Independently, KM and BPI methodologies have been proven to proffer result oriented solutions to many organisations with problem-solving and process optimisation techniques. Together, they offer a synergy that leverages on their individual strengths and weaknesses, thereby providing radical process and organisational transformation.

To explain the synergy between KM and BPI, the BPI methodology considered will be limited to *Six Sigma* and *Lean* methodologies, since they are the most popular and frequently used.

### 3.1 KM-Six Sigma synergy

KM and Six Sigma are powerful corporate methodology to optimising business systems. KM is all about how an organisation acquire, store and share knowledge that contribute to business goals while Six Sigma implementation aims to reduce variations through statistical processes. Below are some ways KM synergises with Six Sigma processes (Leavitt 2002):

- KM helps to sustain the gains of Six Sigma by developing networks and community of practice (CoP) that will aid the sharing, transfer and reapplication of best practices by developing KM systems that will facilitate team participation. Through CoPs, Six Sigma findings can be stabilised hence, the sustainability of improvement gains are made possible.
- Six Sigma is not just a principle but a culture. KM synergises with Six Sigma by enabling a learning culture through training, knowledge creation and dissemination thereby creating systems that help shorten the Six Sigma learning cycle.
- KM also helps eliminate the duplication of the Six Sigma efforts through benchmarking, by making previous Six Sigma project documentation standards readily available for reapplication.
- Since Six Sigma is an analytical methodology, the results of the various measurements made can be adequately shared with the teams and leadership with the application of KM. With the strategic goals in view, KM systems helps connect the results to the bottom line thus, boosting better decision making and planning.

### 3.2 KM-Lean synergy

The Lean principles advocates the elimination of all non-value added activities and wastes, while focusing on satisfying the needs of the customers. Like, KM-



Six Sigma synergy, the relationships that exist in the KM-Lean are explicated below:

- KM systems facilitate continuous learning thus realising the state of perfection Lean advocates.
- CoPs are KM methodology that enables team sharing of knowledge. CoPs facilitate Lean knowledge sharing through benchmarking of current best approach hence, reducing human and material wastes in Lean programmes.
- KM and Lean are customer focused. While KM identifies the needs of the customers, Lean satisfy them through its continuous improvement cycle.

### 3.3 BPI–KM roles

Process improvement is a team effort that can only be achieved through a concerted effort and commitment engrafted into the organisational culture and strategy and carried out by everyone within the organisation. Individuals in an organisation must have a clear responsibility to play in achieving the improvement initiative. Every individual's role must be well explicated in line with the organisation's strategic vision and resources must be released to ensuring successful attainment of the goal. The roles are: leadership, process owners and process performer roles.

#### 3.3.1 Leadership role

Leaders are catalysts for change and providers of needed high-level commitment and support. The role of leadership is very essential in ensuring that a firm's goals are achieved in a sustainable way by setting the course of action for the entire organisation. Leaders don't just set the rules; they also ensure their full support is shown by creating the right organisational culture that helps achieve the organisation's strategic goals. Leaders lead by modelling their behaviours and actions through deeds and not just words (Wong 2005). They can help foster an organisational culture that boosts employee morale and total employee involvement in CI programmes. An effective BPI program should reflect a long-term commitment by the company and must be integrated into its strategic goal and mission statements. This requires vertical support and an understanding of the corporate commitment (HPS leadership Best Practices n.d.).

To further elucidate on the role of leadership, Kotter (2001) gave a clearer insight in the Harvard Business Review on its criticality as opposed to management in "*What Leaders Really Do*". According to him, high quality leaders are needed where change is required. Hence, they have a very vital role in ensuring their organisation smoothly transition through change created by the BPI programme. He highlights the primary roles of leadership (see figure 9) viz:

- Setting a direction for the organisation by developing a corporate strategic vision and strategies to achieve them.
- Aligning people to flow towards the corporate goal by constant and consistent communication, and helping them with answers to problems being experienced.

- Motivating and inspiring people by involving them in decision processes and rewarding their efforts through an effective reward and recognition programme.

When leaders are involved in process improvement programmes, employee morale is strengthened; this in turn is capable of creating a positive buzz that spread like wild fire, igniting groundbreaking flame of success. Organisations which proactively seek to create a culture of leadership are those set for the challenges of the ever-increasingly dynamic work environment.

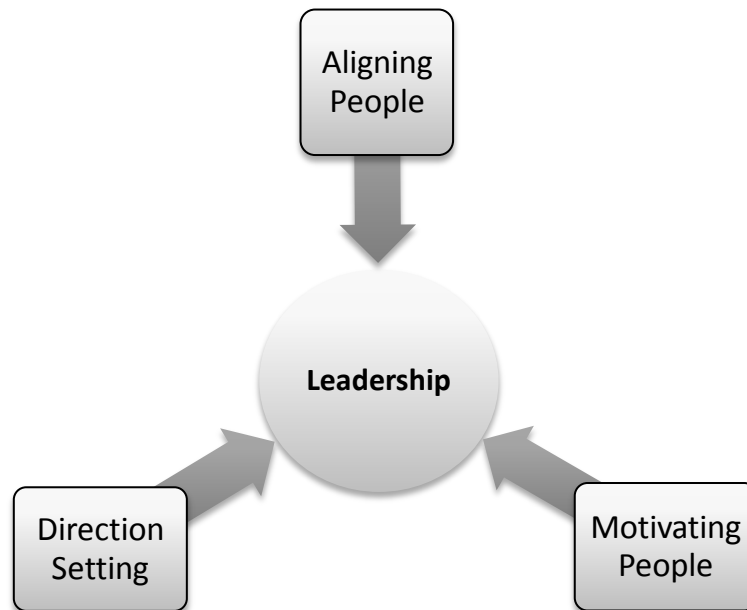


Figure 9 Three roles of leadership in BPI (John Kotter 2001)

### 3.3.2 Process owner's role

Leadership appoints a process owner to man the BPI programme before its commencement. This is to ensure the process outcomes are sustained and improved overtime in a healthy way. The process owner is fully concerned with ensuring the successful realization and completion of a process from beginning to end. Their focus is on the process and not the personnel. The roles of the process owner are (Smith & Flarey 1999; Becker et al. 2003):

- To lead, support and take full responsibility of process initiatives
- To design, implement, document and evaluate the process and also train process performers on its implementation.
- To create a broad-based cross functional process improvement team to develop the process
- To ensure the process is high performing in relation to fulfilling business goals by setting measurable performance metrics as to what targets to expect from the initiatives and evaluating it.
- To communicate the health of the process to the stakeholders as the first point of contact on the project initiative.
- To monitor and support the process implementation programme

The role of the process owner is a critical one that requires strong leadership characteristics that will drive compliance with dedication to the process improvement initiative. “In the absence of strong process owners, the old organisational structure will soon reassert themselves” (Hammer & Stanton 1999)

### 3.3.3 Employee / process performers’ role

Employees and not technology are the energy that drives every organisation. A firm is as buoyant and powerful as the innovation, initiatives and dedication its workforce provides. Employees are the brain behind change, innovation, growth and sustainability. They are in direct contact with the operation and first point in contact with the customers. Hence, they have great impact on the level of success the organisation can attain.

It is the responsibilities of managers to harness this vast repository of resources to achieve corporate competitiveness. The process improvement initiative, designed by the process owner is handed out to the performers. The role of the process performers can be achieved through:

- empowering employees to control and improve their work environment
- endowing them with leadership capability and accountability
- involving them in decision making activities that influences their work environments
- training and promoting organisational knowledge flow and learning culture.
- initiating reward and recognition programmes that encourages excellent performance

By developing the right organisational culture where employees feel a sense of belonging, an organisation can immediately begin to reap the proceeds of process improvements.

## 4 PROJECT OVERVIEW AND IMPLEMENTATION

The project aims to identify VME’s current project engineering document templates, suggest new contents, build a template library and train its users. The project objective is to standardise the use of the engineering templates which is geared towards shortening engineering lead time, reducing rework, improving quality and cost efficiency.

Currently in VME, available templates that support engineering processes are not standardised. Individuals have created their work templates to facilitate their work processes. This varying work practices has led to non-standardised work practices and has in-turn increased rework and reduced work efficiency.

However, there is a continued pressure to shorten engineering lead time, reduce rework and improve engineering quality stems from tougher competition in the market and necessity to improve VME engineering cost efficiency.

The summary of the project objectives are introduced in table 3 while table 4 explains the project scope and deliverables.

Table 3 Project objectives

Project objectives	Description / reference
<b>Strategic goals:</b>	
Shorten VME engineering lead time and reduce rework	<ul style="list-style-type: none"> <li>– Creation and usage of standard work templates</li> <li>– Engineering quality can be improved by templates of standardized configurations and harmonized workflows</li> </ul>
Improve workplace knowledge management	<ul style="list-style-type: none"> <li>– Improve work quality</li> <li>– Standardise work process and documentation</li> <li>– Enhance organizational knowledge</li> </ul>
<b>Quality objectives:</b>	
Improve engineering process quality	<ul style="list-style-type: none"> <li>– Standardized workflow which leads to Less faults → better quality</li> <li>– Less revisions</li> </ul>

Table 4 Project scope and deliverable

Deliverables	Acceptance Criteria
<b>Planning</b>	
Project plan	<ul style="list-style-type: none"> <li>- Project plan complete</li> <li>- Must be connected to the project's strategic goals</li> </ul>
<b>Project implementation (Phase I)</b>	
Identification and collection of templates	<ul style="list-style-type: none"> <li>- All existing templates identified</li> <li>- New templates identified</li> <li>- Actions from G1 review implemented</li> </ul>
<b>Project Implementation (Phase II)</b>	
Creation of templates	<ul style="list-style-type: none"> <li>- Modifications approved based on need</li> <li>- All templates are standardised and aligns with organisational needs</li> </ul>
<b>Project Implementation (Phase III)</b>	
Template library	<ul style="list-style-type: none"> <li>- All templates uploaded</li> <li>- Template library ready and standardised</li> <li>- Actions from G2 review implemented</li> </ul>
<b>Project Close-out</b>	
User Training	<ul style="list-style-type: none"> <li>- Easy to understand training materials created</li> <li>- Training organised for users</li> </ul>
Review project completion	<ul style="list-style-type: none"> <li>- Feedback given</li> <li>- Close-out review done</li> <li>- Lesson learnt documented</li> </ul>
Project hand over	<ul style="list-style-type: none"> <li>- All deliverables accepted</li> <li>- Project closure accepted</li> </ul>

#### 4.1 Project implementation phases

The implementation is such that there is a system in place that applies to project templates used across VME which ensures they are mapped out and standardised to ensure uniformity and encourage training and development. To achieve this aim, there is a need to create a documentation e-library that stores working project templates accessible to the VME organisation. The project was carried out in four phases (see figure 10).

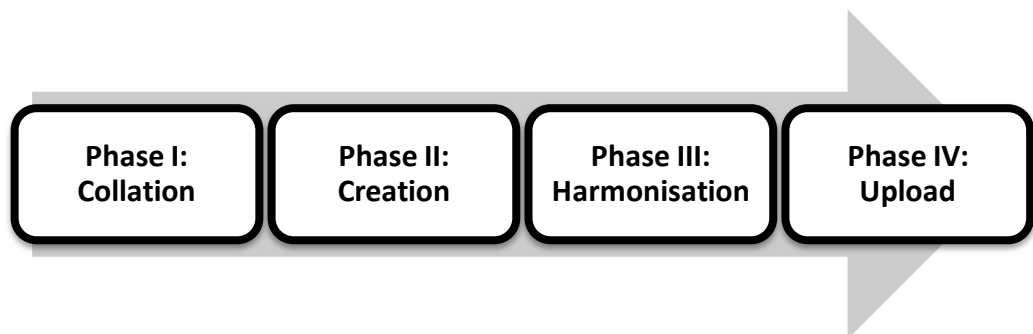


Figure 10 ABB 4-phase Project

4.1.1 Existing template collation

To determine the project documentation baseline, a collection of all existing working templates is essential. These templates are those currently in use by their various users across VME. The current assessment process involves collation and compilation of all templates currently in use by process performers such as experienced lead engineers (LE), Software Engineer (SE), Drives Engineer (DE) and Project Managers (PM). The flow chart for this process is presented in Figure 11.

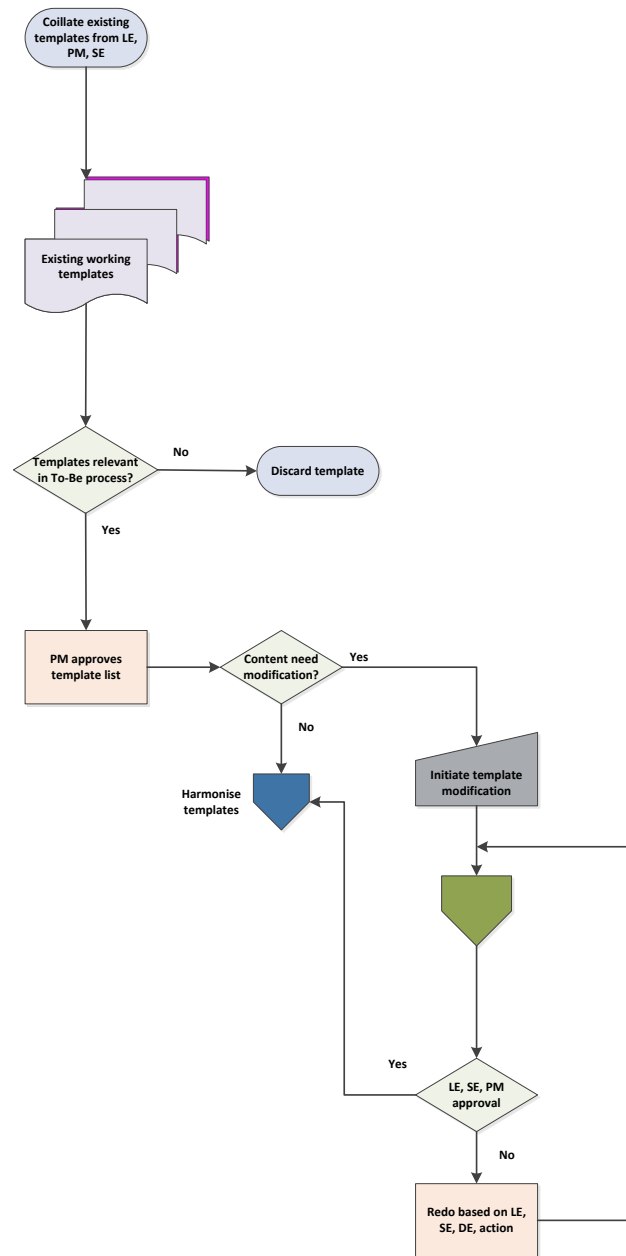


Figure 11 Template library Phase I process flow

Although these templates are in use by the different users, they vary in format and functionality. The relevance of the templates is checked in alignment with the new defined business process through review meetings with the process performers on their functionality and necessity. The discussions are centred on whether to retain, modify or discard the available templates. Another option is to

collate templates with similar functionality and content and find a possibility of merging them into one. If after thorough consideration with the stakeholders and a template is regarded as not needed, it is discarded.

#### 4.1.2 New template creation

The need for new working templates that improve the business process is of utmost importance. As illustrated in figure 12, these templates development are recommended by the PM, LE, DE and SE. Their intended functionalities and requirements are also stated to ensure set target are achieved. Once the templates have been created they undergo reviews and validation processes to ensure they meet their set goals for content and functionality. A simulation and validation of the templates is necessary to ensure that they will always deliver the expected outcomes at all times and carried out by the process performers (PM, DE, LE and SE).

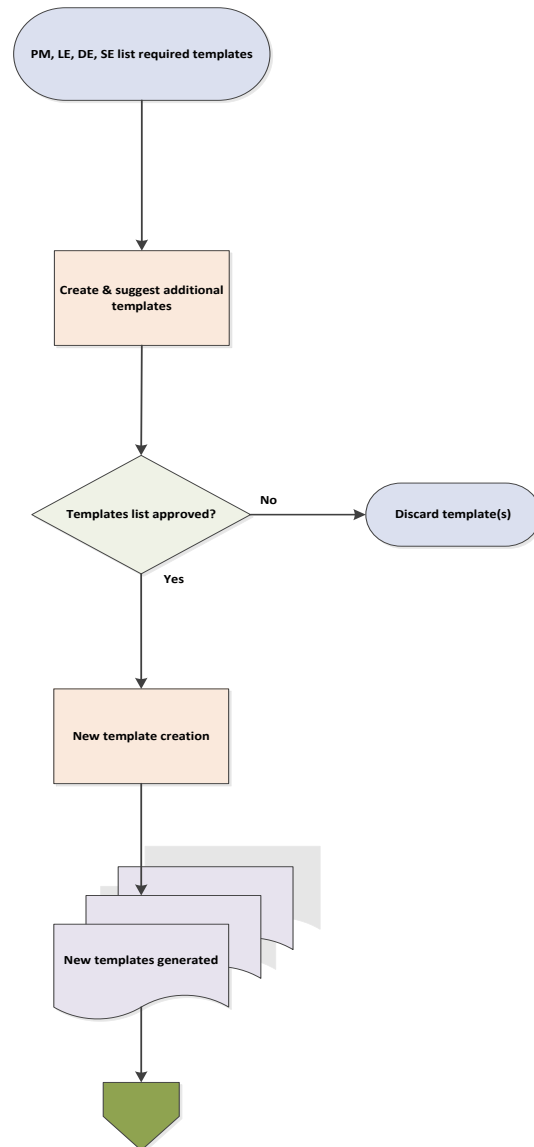


Figure 12 Template library Phase II process flow

4.1.3 Template harmonisation

The document standardisation process ensures the format and structure of the templates are of uniform standards. The standards are defined in accordance to ABB ECM corporate standard for document standardisation and illustrated in figure 13.

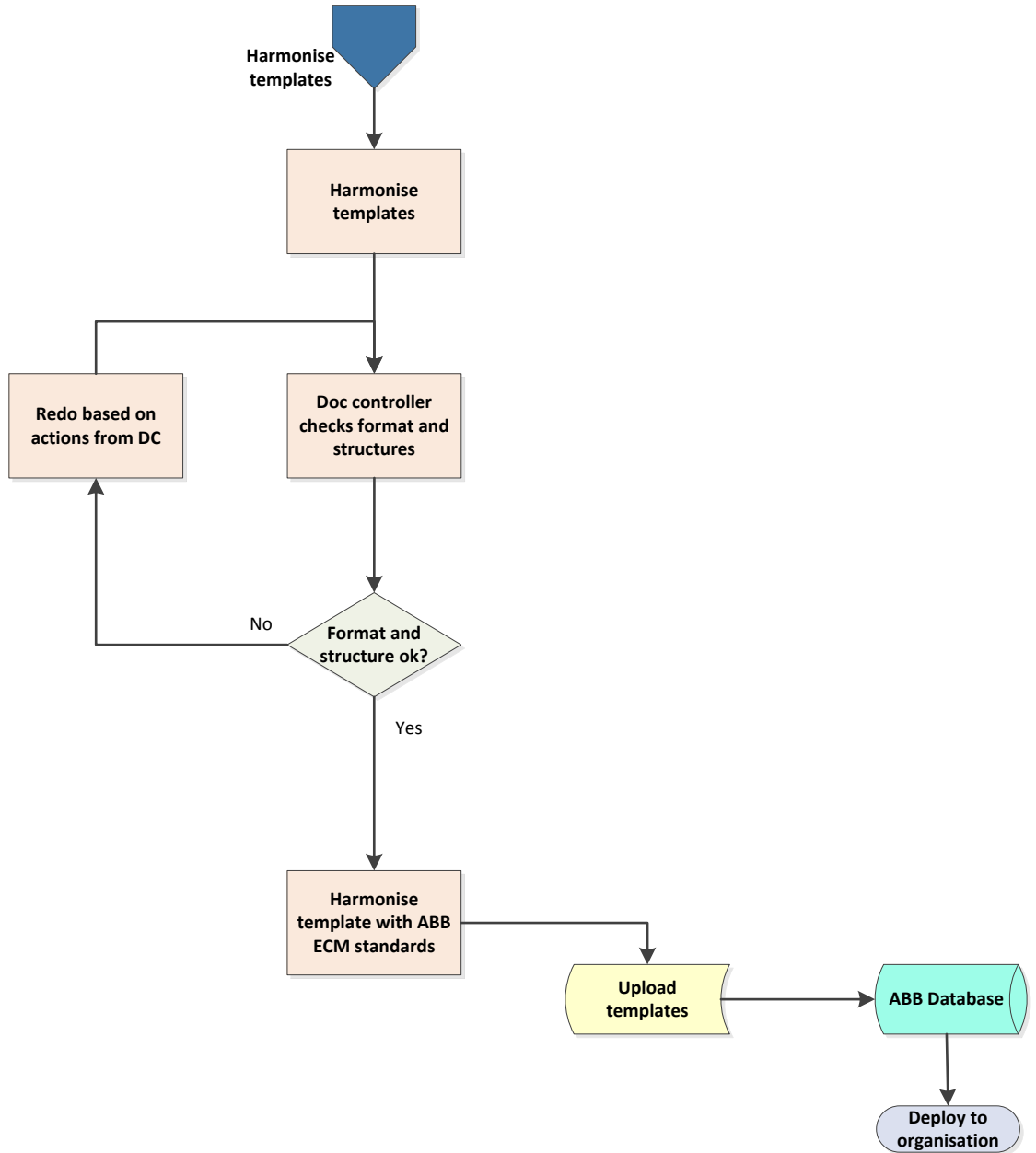


Figure 13 Phase III and phase IV process flow

To proceed to the next phase, the templates are reviewed by the DC to ensure their ABB ECM documentation standards conformity. The Inputs generated at the end of the review are considered for improvement and the documents are re-submitted for further verification.



#### 4.1.4 Upload to e-library

The last phase of the project implementation is the upload of the documents to an existing storage e-library platform. For easy accessibility to the templates, it is essential that they are uploaded where users can easily reach with minimum effort. The templates are uploaded on the ABB intranet server which can be accessed through the ABB Microsoft SharePoint platform. The Microsoft SharePoint is ABB's collaboration platform that was implemented to aid document collaboration and sharing within teams and which integrates seamlessly with the intranet network drive. The template documents can be accessed through SharePoint via the direct interface link from MS Office to the document library.

#### 4.2 Project quality

To ensure the completeness and correctness of the project outcome, quality is built into the implementation process. The outcome is measured and validated with respect to the set standards and objectives. The essence of review meetings is to ensure that errors are further minimised and eliminated at each phase. The reviews were done by experienced users with or without the project manager by properly scrutinising the content and structure of the templates so as to ensure they meet the expected outcome. Actions generated from the review serves as input into the template development process. The template outcomes are verified and validated by the process performers to ensure they perform their intended purpose.

### 5 CONCLUSION

The implementation of any BPI initiative is an arduous task that requires the organisation to commit time and vast resources for its success. Adequate preparation and planning is an essential requirement that needs to be ensured before the actual implementation. Unlike any project, organisation leaders have a great influence in determining its success. It could hence be deduced that the synergy that KM tools and techniques provide with BPI tools have powerful effects in achieving BPI and corporate competitiveness.

Through this thesis work, I have gained a greater insight into organisational strategic operation in effecting improvement initiatives. The study of KM and BPI tools discussed in this thesis coupled with my industrial experience in manufacturing has widened my knowledge of the Lean and Six Sigma concepts and implementation as well.

To conclude this chapter, below are recommendations this thesis work proffer in ensuring successful implementation, operation and sustainability of the project work, and other related BPI initiatives.

#### 5.1 Recommendations

The need for assigning a process owner is a vital step to successful implementation and sustainability of the CI practices. The process owner who has a cross-functional wealth of experience should be nominated to drive and sustain the ini-

tiative before its kick-off. In addition to the roles of the process owner (as explained in chapter 3), employee behaviour should be adapted to cope with the improvement initiatives. Change, however, is not easily adopted since employees whose daily work is affected by the change are usually the first to resist it, even when the gains are eminent. To avoid such organisational push-backs, process improvement initiatives should originate from process performers and/or with the backing from the leadership. Process owners must seek for the support of the stakeholders - leadership, employees, customers and suppliers- early in the project and at each stage of the process design through effective communication and collaboration. A cross-functional process improvement team should be setup to participate in the improvement initiative. Such strategy of engaging the workforce that will influence the value streams in the process optimisation will enable successful implementation.

Another important practice is to establish measurable metrics that quantify the To-Be of the process. Measuring metrics in the form of KPIs will give direction to the process by providing a focused-based approach on the strategic goals and their attainment through data and information. Common tools used to analyse data are Pareto analysis, statistical process control (SPC), control charts, matrix analysis, etc. Measurement areas are the areas of the initiative that directly impact the project objectives. Examples of such areas are cost, lead time, customer satisfaction, process efficiency, etc. The level of process compliance to the set goals should however be communicated to the entire organisation through the use of activity boards, posters, meetings and email messages.

A periodical audit centred on the newly established process is another method to improving the ongoing process performance. The process owner defines the frequency of the process audit (e.g. bi-annually, quarterly or annually). However, care must be taken in other to ensure that the interval of the audits is not too wide apart and that it is sufficient to implement previous audit actions. Actions generated from a previous audit are checked to see if they have been implemented. The aim of the process improvement audit is to carry out health checks of the process and ensure the established process continues to deliver the set business goals by critically analysing the established KPIs. It also aims to expose areas that need improvement and proffer solutions by identifying the inherent risks and measuring its rate of compliance to the ideal design. The process KPIs are checked to see if they continue to meet the requirements of the organisation. The process audit results should be shared with the organisation and management as this will spark up new performance strategies.

The sustainability of any BPI initiative is hinged on the organisation's efforts to create an enabling corporate culture that supports its growth and development. Such organisational culture can be achieved through:

- creation of a positive corporate behavioural framework that connects with the expected strategic.
- empowering employees to have a sense of ownership and control of their working environment and involved in operational decision making activities.
- developing a corporate culture that the organisation's leaders model and are committed to.

- encouraging employees' education and training on the importance of KM implementation and practices.
- promoting teamwork work activities that help employees collaborate in a way that aid capturing and sharing innovative ideas.
- creating a reward and recognition systems that encourages employees effort in achieving KM sustainability.

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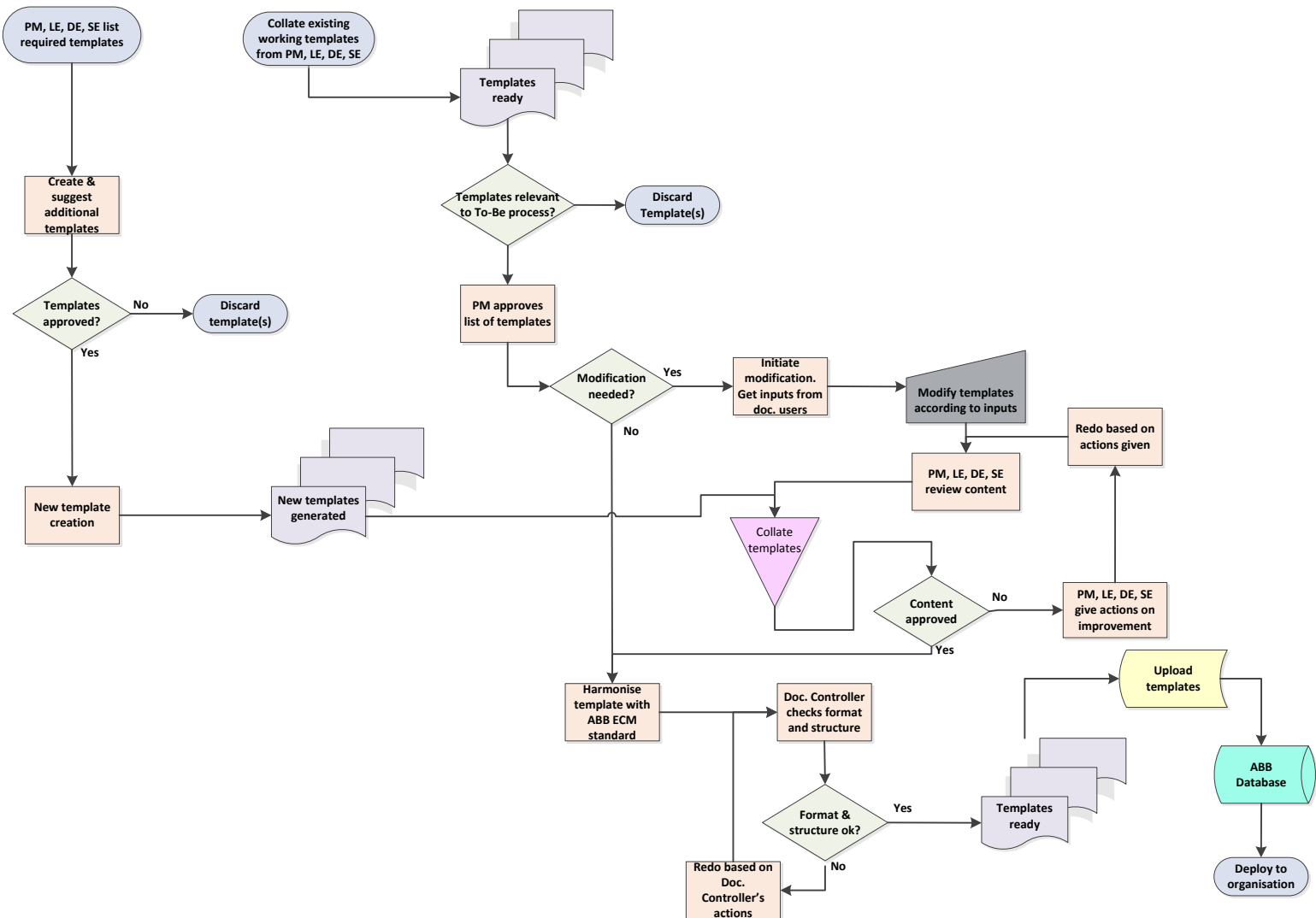
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### PROJECT PROCESS FLOW





PROJECT SCHEDULE

