

# **REDUCING DAYS TO COLLECT THROUGH THE EXECUTION OF SIX SIGMA WITHIN BUSINESS PROCESS MANAGEMENT**

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## **ABSTRACT**

*Organisations are constantly looking out for ways of counteracting customer pressures, improving performance, while also optimizing costs and improving financials. The opportunity of implementing Six Sigma within Business Process Management is more and more appealing for such Organisations that are targeting both short and long term performance and financial impact.*

**KEYWORDS :** *Business Process Management, Continuous Improvement, DMAIC, Six Sigma.*

**JEL CLASSIFICATION :** *L10, L15, L60, L80, M10, O30.*

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## **1. INTRODUCTION**

Irrespective on the industry, research in the area of quality management became more and more frequent in the last couple of years, concepts as Business Process Management(BPM) or Six Sigma being presented quite often as synonyms for quality excellence. Although there is extensive research available on these concepts presenting theoretical aspects, proof on the successful application of Six Sigma within Business Process Management in the Service Industry is found to be scarce.

Is it suitable to apply Six Sigma within Business Process Management ? Can the application of Six Sigma within Business Process Management generate EBIT impact ? We target answers for these questions with this research.

## **2. RESEARCH METHODOLOGY**

Considering that empirical research on Six Sigma's application within BPM in services is scarce, this research is evaluated as being exploratory and as there is little validated knowledge on the researched topic and thus quantitative investigation can't take place, the research approaches a qualitative analysis.

Due to the fact this paper is assessing Six Sigma's application within BPM, an organisation utilizing the DMAIC improvement methodology was selected in order to enable assessment of the required qualitative data that would enable the analysis that is being targeted.

## **3. SIX SIGMA AND BUSINESS PROCESS MANAGEMENT**

With extensive research being available on Business Process Management, it is possible to conclude that organisations following BPM hold improved efficiency and effectiveness, face market pressures quicker and provide higher levels of customer satisfaction (O'Neill & Sohal, 1999 ; Pritchard & Armistead, 1999).

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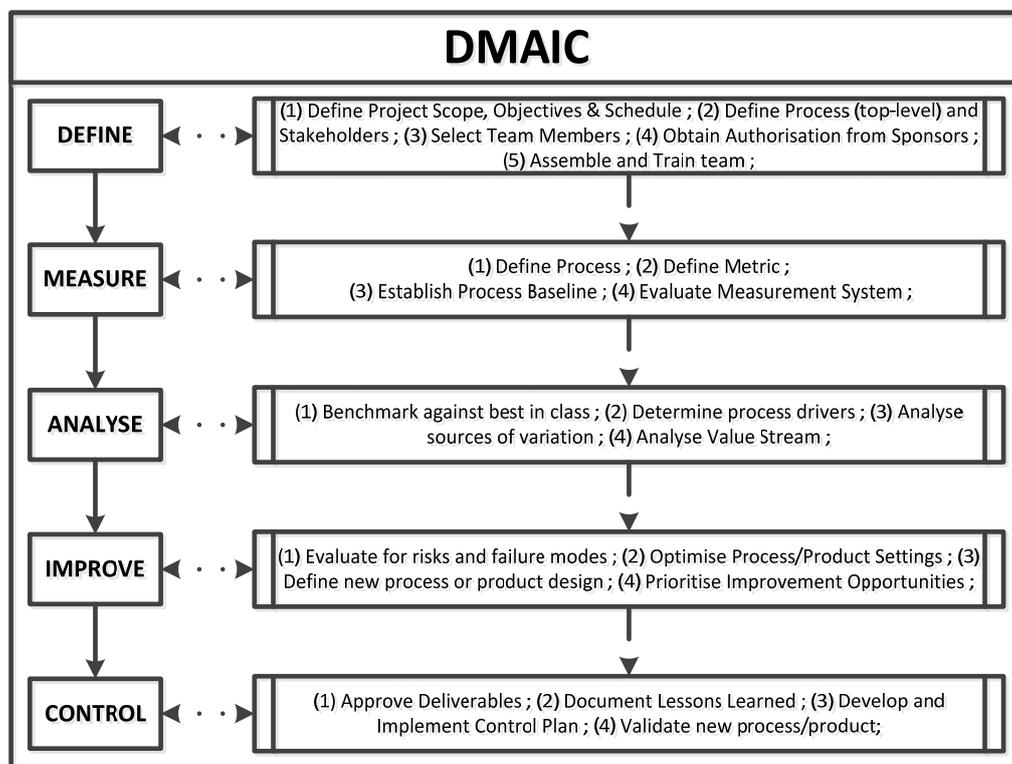
Six Sigma developed from scientific management and the continuous improvement theories that followed, representing a separate concept that combined the finest elements of practices that it followed (Aboelmaged, 2009).

Six Sigma is viewed as a parallel organized structure that targets to reduce process variation through specialized improvement personnel, structured methodology and key performance indicators in order to ensure that strategic objectives are reached (Schroeder et al, 2007).

Research within Six Sigma is prevalent within practitioner environment while research published by academics is less frequent (Aboelmaged, 2009 ; Brady & Allen, 2006).

Pande & Holpp (2002) identify 6 critical elements for Six Sigma : customer focus, fact based management, process importance, proactive management, elimination of cross-departmental barriers, target performance/tolerate failure.

DMAIC is Six Sigma’s improvement methodology that captures the steps that should be taken from project definition to process analysis, assessment of available solutions, implementation and control. DMAIC is a systematic, robust, data-based approach that targets improved quality and fundamentally the solving of issues and problems (Carreira & Trudell, 2006). DMAIC can be seen as a meta-routine (Schroeder et al, 2007), a routine that is followed either to modify routines or to implement new ones.



**Figure 1. DMAIC explained**

*Source : adapted from Pyzdek & Keller (2009)*

Finance professionals would need to consider Six Sigma as it has the potential of driving improvements that would translate to impact on the bottom-line and likewise on the top-line (Stamatis, 2003).

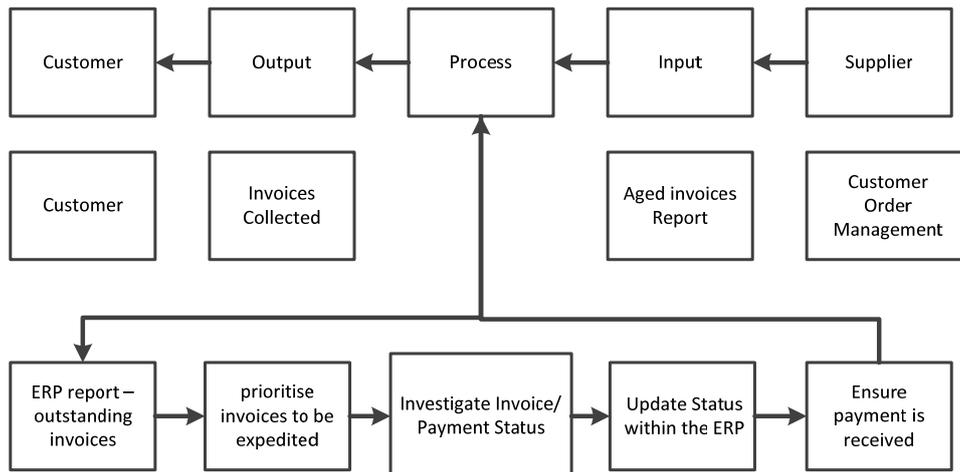
#### **4. THE APPLICATION OF SIX SIGMA WITHIN BUSINESS PROCESS MANAGEMENT**

The research was carried out within the outsourced Accounts Receivables and Collections of a Service Corporation that was facing pressures on improving the EBIT and other financial key performance indicators as days to collect cycle time.

#### 4.1. Define

This case study was developed in an Accounts Receivable & Collections back-office for a major player in the service industry. Overdue invoices are those invoices which are due to pay and haven't yet been collected. Days to Collect is an important metric for an Accounts Receivable process. Median Days to Collect is 44 days ; each day improvement would lead to strong positive cash-flow impact.

The project aims at improving Median Days to Collect by 5 days thus generating a positive cash-flow impact which can be translated into a robust EBIT impact. Project Y – Days to Collect is a continuous data type. Defect was defined as the instances where invoices are paid in more than 44 days.



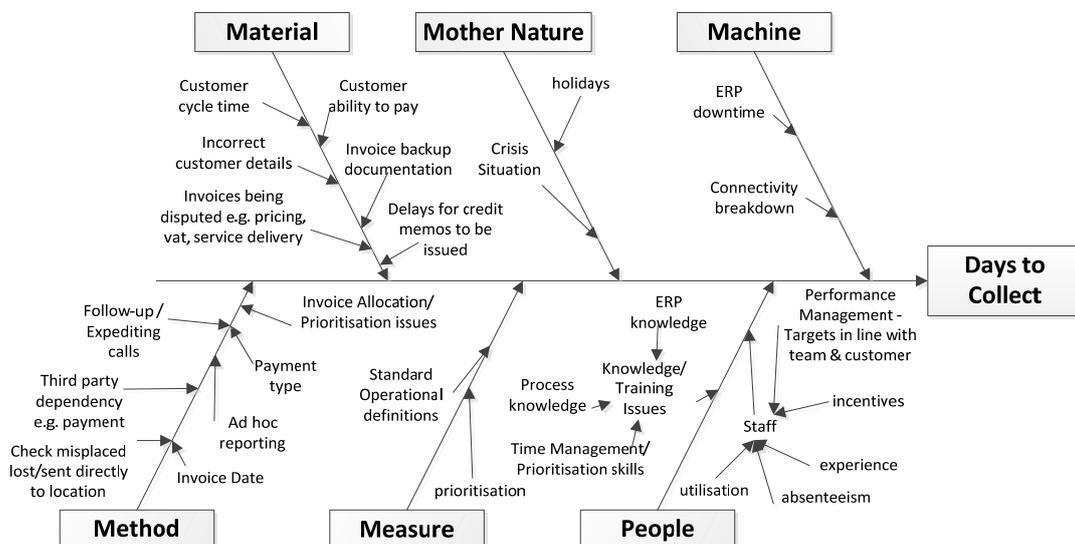
**Figure 2. SIPOC**

Source : made by authors

A project charter was developed to define the project, business case, problem statement, goal, project scope, project team and milestones for the Define, Measure, Analyse, Improve and Control.

#### 4.2. Measure

With the Project Y clearly stated, defect, units and defect opportunities per unit understood, and targets set a fishbone root cause analysis was drafted in order to enable an understanding into the levers that affect project Y.



**Figure 3. Fishbone analysis**

Source : made by authors

Afterwards the data was collected to enable a better understanding of the current performance and the measurement system was likewise analysed for accuracy, repeatability and reproducibility.

### 4.3. Analyze

The product performance was established and performance objective defined considering the measurements from the previous step and the project Y.

Product Performance												
Component	Obs Defs	Obs Units	Opps per Unit	Cmplx	Adj Defs	Adj Units	Adj Total Opps	DPU	DPMO	Z.Shift	Z.ST	YTP
1	7855	16279	1	*	7855	16279	16279	0.482523	482523.5	1.500	1.544	0.517477
Total					7855	16279			482523.5	1.500	1.544	

**Figure 4. Product Performance - before**  
*Source : minitab extract - made by authors*

**Table 1. Initial vs Target**

	Opportunities	Defect	DPMO	Sigma zst
Initial	16279	7855	482523	1.54
Target			400000	1.75

*Source : made by authors*

The project team made an initial analysis on the potential factors that impact days to collect in order to establish focus areas for the analysis phase.

**Table 2. Potential X's on Days to Collect**

No	Common X
1	Staff Performance
2	Ineffective Training
3	Low follow up on invoices
4	Staff Experience
5	Invoice Date
6	Customer
7	Collection Call Process
8	Commercial Terms
9	Insufficient Staff
10	Insufficient billing documentation
11	Customer approval process
12	Incorrect invoices
13	ERP System errors
14	Invoices not being expedited
15	Customer invoice processing cycle time
16	Invoice under dispute (pricing, quantity, etc.)
17	Cash Application Process
18	Invoice transmission process
19	Missing customer details

*Source : made by authors*

A brainstorming session was carried out by the project team in order to clarify which of these common X's could be considered.

**Table 3. Screening on Potential X's**

		IMPACT		
		HIGH	MEDIUM	LOW
CONTROL	HIGH	<ul style="list-style-type: none"> <li>aligning goals and objectives</li> <li>insufficient process knowledge</li> <li>invoice expediting</li> </ul>	<ul style="list-style-type: none"> <li>Performance Management System</li> </ul>	<ul style="list-style-type: none"> <li>other activities</li> </ul>
	MEDIUM	<ul style="list-style-type: none"> <li>ineffective prioritization of collections activities</li> <li>customer process for invoice processing</li> <li>obsolete customer contact details</li> </ul>	<ul style="list-style-type: none"> <li>invoice date</li> <li>invoices being disputed (due to price, quantity discrepancy, incorrect invoices)</li> </ul>	<ul style="list-style-type: none"> <li>payment method</li> <li>ERP outage</li> <li>Cash Application process</li> </ul>
	LOW	<ul style="list-style-type: none"> <li>invoices not received by customers</li> </ul>	<ul style="list-style-type: none"> <li>check misplaced/lost</li> <li>invoice backup documentation</li> </ul>	

Source : made by authors

The causes that were identified were collated together with causes previously identified by observation or data collection and depending on the type of the concerned data, the hypotheses were tested resulting in some of the causes to be deemed as significant while others not.

**Table 4. Summary of Considered X's**

X's	Approach	Test Used	Significant
Staff Performance	Data – Discrete	HOV + Moods Median	Yes
Staff Process Awareness	Data – Continuous	Regression Analysis	Yes
Staff Experience	Data – Discrete	HOV + Moods Median	No
Invoice not received	Data – Discrete	HOV + Moods Median	Yes
Low Value Invoices	Data – Discrete	HOV + Moods Median	Yes
Customer	Data – Discrete	HOV + Moods Median ; Pareto Analysis	Yes
Commercial Terms	Data – Discrete	HOV + Moods Median	Yes
Invoice Date	Data – Discrete	HOV + Moods Median	No
Performance Management			

Source : made by authors

#### 4.4. Improve

Once the causes for the variation were identified and tested, improvements have been proposed in order to generate the targeted improvements.

**Table 5. Improve on X's**

<b>X</b>	<b>Root Cause Analysis</b>	<b>Solution</b>
Staff Performance	Uneven balance among staff in terms of workload, performance.	Staff performance management system implemented for tracking the number of customer invoices expedited and results in terms of number of invoices and corresponding amounts being collected.
Staff Process Awareness	Gaps in staff training and process awareness	Onboarding training plan being updated while ensuring that current process gaps are being emphasised. Process changes are being updated within the standard operating procedures. Staff is being trained and assessed on process changes. Best practice sessions scheduled and coordinated by Staff top performers.
Invoice Not Received by Customer	Low visibility on the number of invoices that arrive with customers upon transmission	Analysis on the invoice transmission process, updated contact details for top volume customers. Moving towards electronic invoicing with some high volume suppliers. Implemented an invoice expediting process that targets having all invoices queried with the customer in order to ensure receipt.
Low Value Invoices	No process for expediting low value invoices	Invoice expediting process is including also low value invoices that need to be expedited on a regular basis. This requirement is captured within the Performance Management System.
Customer	Customer Processes ; missed invoices. Obsolete Customer Contact Details	Automatic statements sent proactively to customers in order to reconcile accounts. Customer Master Data clean-up.
Commercial Terms	Contractual Payment terms are affecting overall cycle time	Program for tackling customer payment terms run in correlation between Finance/Sales
Performance Management	Low alignment of goals and objectives (team/managers/individuals)	Performance Management system in place having individual goals and objectives in sync with team SLA's and objectives

*Source : made by authors*

#### **4.5. Control**

After the improvements have been implementing the product performance was measured in order to assess the impact and verify the effectiveness of improvement actions and thus we can notice an improvement in DPMO together with a move of ZsT from 1.54 to 1.756.

Product Performance												
Component	Obs Defs	Obs Units	Opps per Unit	Cmplx	Adj Defs	Adj Units	Adj Total Opps	DPU	DPMO	Z.Shift	Z.ST	YTP
1	1987	4978	1	*	1987	4978	4978	0.399156	399156.3	1.500	1.756	0.600844
Total					1987	4978			399156.3	1.500	1.756	

**Figure 5. Product Performance - after**  
*Source* : minitab extract - made by authors

**Table 6. Initial vs Target vs Achieved**

	Opportunities	Defect	DPMO	Sigma zst
Initial	16279	7855	482523	1.54
Target			400000	1.75
Achieved	4978	1987	399156	1.756

*Source* : made by authors

With the implementation of this project Days to Collect came down from 44 days to 40 days resulting in a collections efficiency improvement from 55% to 78%.

## 5. CONCLUSIONS

This research investigates the opportunity of implementing Six Sigma within Business Process Management. The case study suggests that Six Sigma's application within Business Process Management, within an Accounts Receivable and Collections process, is suitable and the improvement methodology DMAIC can be used for capturing improvements within Business Process Management.

This case study describes the implementation of Six Sigma in Accounts Receivable Collections and is highlighting how changes in the business process management can enable cash-flow and EBIT gains.

The research is limited and additional validation would be required in order to sustain the outcomes exposed by this exploratory research on the application of Six Sigma within Business Process Management.

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