



Improving the Production Process of the Irish Retail Sales Index (Satisfying Customers' Needs Using Lean Six Sigma Thinking)

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Eurostat established a Task Force on retail trade quality in December 2008 to investigate and improve the timeliness, high revisions and volatility of the retail trade figures of all Member States. The final report was launched in November 2010. Management within the CSO responded to Eurostat's requirement by launching a formal Lean Six Sigma (LSS) project to guarantee that high quality Irish retail trade indices were consistently disseminated to Eurostat within 28 days of the end of the reporting period. This paper outlines the structured approach adopted by the project team in applying the LSS philosophy to resolve the inter-linked problems of a lack of process clarity and poor timeliness. The project was steered using the Define, Measure, Analyze, Improve and Control (DMAIC) framework which is a central component of the Lean Six Sigma philosophy. This paper clearly demonstrates the effectiveness of the LSS approach in dramatically reducing the median publication date from 46 days after the end of the reporting period to 28 days. Evidence is also provided that the date of publication is now far more reliable and a revision analysis indicates that revisions to the index are now smaller and less varied. This paper clearly demonstrates that, using lean six sigma thinking, public sector organizations and processes can do far better with less by focusing on truly value-adding activities. In a challenging environment of austerity, reduced budgets and increased demands, these dramatic quality improvements were achieved at no additional costs to the organization and resulted in a reduction of staffing requirements for the Retail Sales Index (RSI) by 50 percent - a savings of €170,000 per annum. Freed-up resources were allocated elsewhere allowing the CSO to produce a new Monthly Services Index. The original project report was seminal in the CSO redefining its strategy for process improvement.

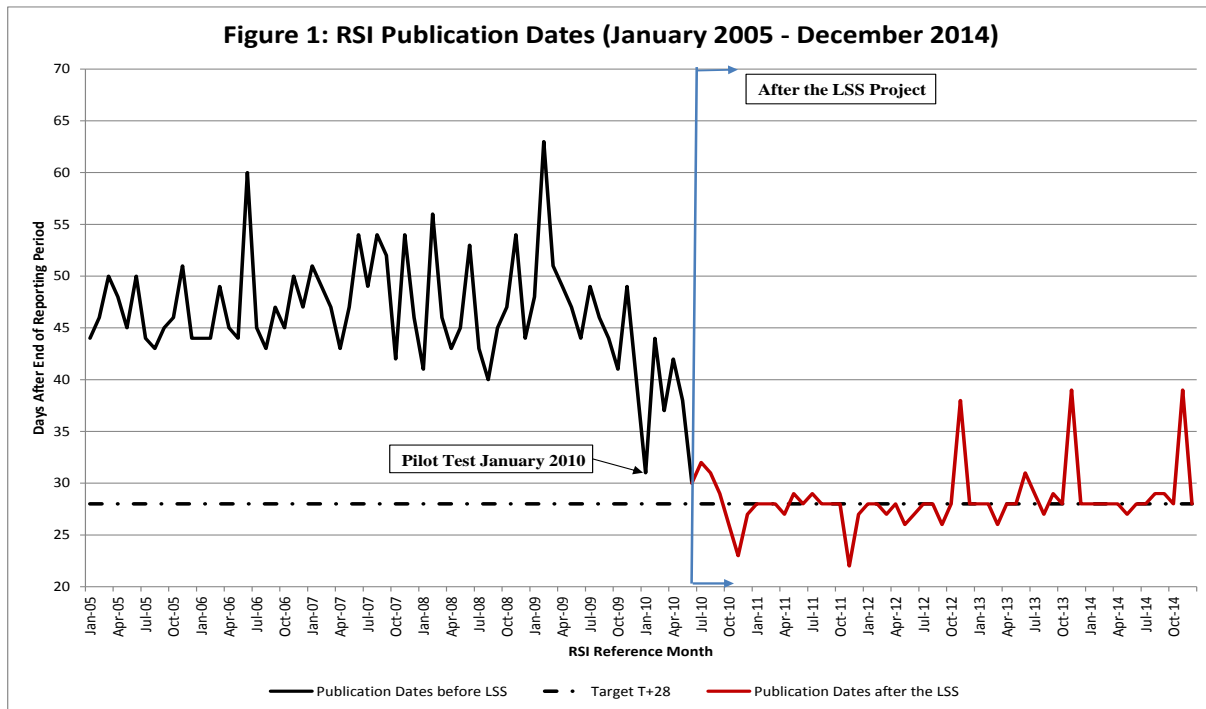
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1. Introduction

Lean Six Sigma (LSS) is a process improvement methodology, widely used in both the private and public sector, which strives to identify and eliminate waste from a process so that scarce resources can be focused on value adding activities, i.e. the process is made lean. Six-sigma then sets out to reduce variation in the lean process, Cole (2011). In December 2008 Eurostat established a task force on retail trade quality, Eurostat (2010). The main goal of this task force was to ensure consistent high quality retail trade figures were sent to Eurostat 30 days after the end of the reporting period. Management of the Short Term Statistics (STS) division of the Central Statistics Office (CSO) responded to Eurostat's requirement by launching a formal LSS project to streamline the RSI's process.

The monthly Retail Sales Index (RSI) is the official short-term indicator of changes in the level of consumer spending on retail goods in Ireland. Up until December 2009 the median publication date for the dissemination of provisional RSI figures to the public was 46 days after the end of the reporting

period, see Figure 1. Final figures were published 76 days after the end of the reporting period. Early estimates, subject to revision, were forwarded to Eurostat 30 days after the end of the reporting period.



The peaks in publication dates after the LSS project coincide with the timing of the November releases which fall during the Christmas holidays when staff availability is reduced.

The highly successful RSI LSS project resulted in dramatic improvements in the timeliness of the RSI by moving the median publication date from 46 days after the end of the reporting period to just 28 days. The publication dates since the completion of the project are also now far more predictable, see Figure 1. The published provisional figures are also more stable, being subject to smaller revisions. These process and quality improvements were achieved while also reducing the labour inputs for the survey by 50 per cent. As the LSS approach and techniques were new to the CSO these improvements were achieved using a very basic LSS toolkit.

This paper outlines the systematic, structured and phased approach adopted by the project team in improving the RSI processes through LSS thinking. The structure of the paper follows the DMAIC framework, which is integral to the LSS approach. DMAIC is an acronym that stands for Define, Measure, Analyze, Improve and Control, which are the distinct consecutive phases of the LSS approach. The phased approach of the DMAIC framework ensures that a problem is addressed using clear evidence, and more importantly, strives to prevent management from making impulsive decisions based on their own, often, ill-informed perceptions..

2. The 'Define' Step

The CSO's mission is the efficient and timely provision of high quality information for a changing society, CSO (2008). Moreover, the CSO's stated values include statistical professionalism, excellent service to our customers and value for money. Amongst the stated high-level goals of the CSO, two, in particular, were not always being achieved by the RSI and many other areas within the CSO, i.e. (i)



the improvement in the scope, quality and timeliness of our statistics and (ii) the achievement of greater efficiencies using best practices. The RSI practices were also at odds with the spirit of the European Statistics Code of Practice, Eurostat (2005) most notably: (i) principle 10 - cost effectiveness and (ii) principle 13 - timeliness and punctuality. In the spirit of the CSO's Statement of Strategy and the European Statistics Code of Practice, local management of the STS division decided to review the RSI's processes.

Having clearly stated Specific, Measurable, Achievable, Relevant and Time bound (SMART) goals is a key component to any successful LSS project. The 'Define' phase of the project established two clearly stated project goals, i.e. (i) improving the timeliness of the RSI release to T+28 days, without compromising the quality of the product and (ii) providing greater process clarity through the development of a process map and additional process documentation.

The define phase is all about identifying the pain. The work of Eurostat's task force on retail trade quality highlighted the need to improve the reliability and quality of early retail data forwarded by the CSO to Eurostat. To meet Eurostat's requirements, the CSO's practice was to forward rough figures to Eurostat at T+30 days and flag the data as 'confidential'. Higher quality provisional data was then disseminated to the public and Eurostat at a median of 46 days after the end of the reporting period, which is poor timeliness by international standards. Furthermore, as is evident from Figure 1, as well as being late, publication dates were volatile and unpredictable.

3. The 'Measure' Step

The project team included all the members of staff working within the RSI section as well as two staff members from outside the section working as a 'fresh pair of eyes'. Team members represented all grades (i.e. a mixture of statistical, management and administrative staff) working within the production process. It is worth noting that the project took place in the context of public sector pay cuts and widespread industrial disputes related to these pay cuts. Managing people's apprehensions and reassuring team members that their contributions were valued and confidential were key components to gaining the trust and co-operation of the team.

LSS thinking is grounded in evidence-based decision making. The measure step required the identification and development of key process metrics to support the project. One of the first tasks of the team was to conduct a Suppliers, Inputs, Process, Outputs, and Customers (SIPOC) analysis. The SIPOC outlined the start and end of the process, identified the key customers and suppliers, identified the requirements of the customers and highlighted the principal inputs and outputs of the RSI process. The next step was the establishment of a process map. A process map helps to define the process as it currently stands and is an essential tool in providing clarity around the process. The 'as is' process map was drafted by staff in a number of process mapping workshops and evolved through a number of iterations. These meetings were conducted in a very open and non-judgmental manner. Staff members from outside the section acting as 'fresh pairs of eyes' validated the process, as it was being described, seeking further clarifications where necessary, see Foley (2012).

The process map also allows waste in the process to be identified. Waste is an activity that does not add value to the product or process but uses time, resources or space. The acronym TIMWOOD describes the classic seven wastes, i.e. Transport, Inventory, Motion, Waiting, Over-processing, Over-production and Defects. The types of waste most obvious in the RSI system were those of transportation, waiting and over-processing.

Basic quality tools, e.g. run charts, Pareto analyses etc., were used to summarize data on the process. Key data providers were identified. Data were collected on the timing of the post-out of the survey



instrument and reminders. Clear patterns were identified between the timing of the post-outs and the returns of completed survey instruments. It was also clear that the timeliness of the RSI post-outs from the CSO were volatile. Over-processing was also evident in respondent management. All non-respondents were being pursued heartily but mostly unsuccessfully and with little impact on the final results. Many data steps in the process were inefficient, involving excessive data handling increasing the potential for error, e.g. seasonal adjustment and website updates.

At the end of the measure step, much greater clarity and transparency was established around the process. Drafting the map resulted in all staff having a greater understanding of the overall RSI process together with the added appreciation of their roles within that process. Useful process metrics, as well as gaps in process information, were identified and wasteful activities were highlighted.

4. The 'Analyze' Step

The analysis step focused on the development of solutions to the project's problems. The 'as is' process metrics were reviewed in detail by the project team. Both value adding activities and waste were identified. The contributions at these meeting were extremely positive with the emphasis on processes and not people. Initial proposals from the team were refined to a number of action items, the most salient being; (i) the strict control and enforcement of the timing of post-outs of surveys and reminders, (ii) non-response management to begin strictly at T+14 days, (iii) active non-respondent management to be restricted to the 150 retailers identified as being essential to the index, (iii) the automation of routines involving seasonal adjustment and web updates and (iv) the discontinuation of paper publications of the RSI.

5. The 'Improve' Step

In February 2010 a highly successful pilot test of the new process was conducted incorporating a number of the easy to implement solutions in a trial run, see Figure 1. After the success of the pilot project the process improvements were implemented more formally. To implement the project fully the RSI team needed the co-operation of other support divisions and data providers. The data providers were very supportive of the project and its goals. For the most part the other support divisions within the CSO also co-operated and when difficulties arose across divisions, senior management were quick to support the goals of the RSI LSS team.

The Improve phase was launched in June 2014 with each successive month seeing improvements in the efficiency of the RSI process. The September 2010 figures were released on the 29th October 2010 i.e. within the 30 day target set out at the beginning of the project as a measure of success.

6. The 'Control' Step

This phase is designed to ensure that the improvements from the project are maintained and institutionalized. The process maps and all process documentation were updated to reflect the new improved process. Key process metrics such as; post-out survey dates, response rates matched to agreed targets, the behavior of essential firms, publications dates and revisions are now readily available within the RSI management system. These improved metrics are now more focused on value added activities and are clearly visible.

As part of the Control phase it is important to provide clear evidence of the success of the project. The most salient evidence of the success of the RSI LSS project is provided in Figure 1. The RSI is now consistently produced at a median of T+28 days and there is clearly greatly reduced variation around the publication dates, as is evident from the change in both the standard deviation of the number of days to publication and the interquartile range; see Figure 2 and Table 1. Another objective of the project was to improve the timeliness without compromising the quality and reliability of the RSI

figures. One measure of the quality of the RSI figures is the size of revisions. RSI revisions are now smaller and show less variance, see Figure 3 and Table 2. The average revision has reduced from 2.3 to -0.3 with the corresponding standard deviation also decreasing from 2.0 to 0.7.

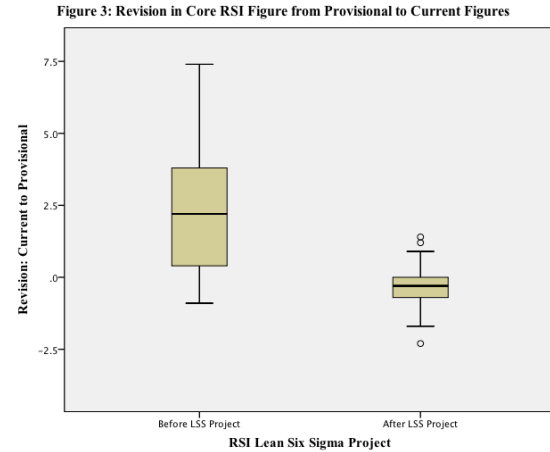
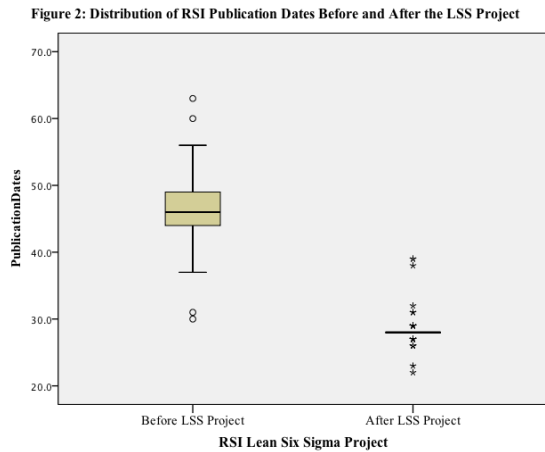


Table 1: Summary Statistics for the Date of Publication of RSI

	Mean	Standard Deviation	Median	Interquartile Range
Before LSS	46.3	5.5	46.0	5.0
After LSS	28.4	2.9	28.0	0.0

T-test: Difference in the means is significant at the 0.01 level of significance

Mann Whitney-test: Difference in the median is significant at the 0.01 level of significance

Table 2: Summary Statistics for the Revisions to RSI

	Mean	Standard Deviation	Median	Interquartile Range
Before LSS	2.3	2.0	2.2	3.4
After LSS	-0.3	0.7	-0.3	0.7

T-test: Difference in the means is significant at the 0.01 level of significance

Mann Whitney-test: Difference in the median is significant at the 0.01 level of significance

7. The Impact

A significant outcome from the RSI LSS project was that the resources required to produce the RSI were halved. This resulted in savings of €170,000 per annum, as reported by the Department of Public Expenditure and Reform (2012). The freed resources from this project were then allocated to the development and publication of a new Monthly Services Index. The Monthly Services Index was published for the first time March 2012.



In early September 2010 a detailed project report was forwarded to the CSO's Senior Management Committee (SMC) for their consideration. The report had a profound impact on the SMC's attitude to business process improvement within the CSO and in October 2010 they announced a more ambitious approach, moving from a simple process mapping approach to a more formal Lean Six Sigma approach to problem solving.

The RSI LSS project has been central in changing the culture of the business statistics division in the CSO. Waste reduction, the demand for high quality metrics and a focus on value added activity are now central to how processes are designed and managed within the division. The experience gained and the lessons learned from this project have instilled a desire for continuous process improvement within the wider CSO. Members of the project presented the findings of the project to management within the CSO and members also played a big role by sharing their expertise with other LSS project teams. The RSI LSS project team, with their willingness to solve their stated problems and their commitment to following the DMAIC framework, has set the standard by which the success of other LSS projects within the CSO is judged.

The success of the project was probably best summarized at a CSO user group meeting when the representative from the Irish Business and Employer's Confederation (IBEC) noted that "*Timeliness improvements mean that the RSI now provides real time market intelligence.*"

References

- Cole, B. (2011), *Lean-Six Sigma for the Public Sector*, ASQ Quality Press, Milwaukee.
- Central Statistics Office (2008), *Statement of Strategy 2008-2010*.
- Department of Public Expenditure and Reform (2012) '*Organisational Review Programme – Report on Implementation*'.
<http://per.gov.ie/wp-content/uploads/GRP-Progress-Report-on-Implementation.pdf>
- Eurostat (2005), *European Statistics Code of Practice*.
- Eurostat (2010), *The Final Report of the Task Force on Retail Trade Quality*.
- Foley, P. (2012), *Improving the Production Process of the Irish Retail Sales Index*, European Conference on Quality in Official Statistics, Athens, May, 2012.