COMPANY OVERVIEW

COMPANY WEBSITE

www.kirbygroup.com

Founded in 1964, Kirby is an international multi-disciplinary engineering company operating across Ireland, UK, and European markets offering an extensive range of high-value engineering and contracting services. We aspire to be the most trusted provider of high-value engineering and construction services through a culture committed to collaboration, innovation, safety, and excellence. Clients trust Kirby to deliver a quality installation, safely, on-time, at a satisfactory cost. We specialise in Mechanical, Electrical, Power T&D, Instrumentation, Data Technologies, Design & Engineering and BIM for indigenous and multinational clients. We currently employ over 1,000 employees across these regions and service offerings.

AUTHOR

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OVERVIEW OF THE LEAN INITIATIVE

This case study encompasses various unnamed projects within Ireland, with budgets ranging from €1M to €25M in value.

BACKGROUND TO THE LEAN INITIATIVE

The construction sector is considered highly inefficient with productivity gains stagnant or declining since the 1950s while other sectors have significantly improved their processes. Research has indicated the cost of non-conformance to be between 10% and 20% of the total construction project costs. In addition, this author's own research found the cost of rework in the M&E (Mechanical & Electrical) services sector to be between €80-€100 per defect raised to rectify.

In early 2015, Kirby set about to strategically improve this process company-wide as a key Quality Improvement and Lean objective. This resulted in a Green Belt project on transitioning from a Manual to an Automated Process which focused on the following three key elements:

1. The systematic elimination of administrative time.
2. Data gathered to shape our decision-making on site.
3. Enhancing our culture of prevention and customer satisfaction (on final handover of our systems).

This Green Belt project was split into three stages:

1. A Feasibility Study and Software selection from May 2015 to August 2015.
2. Trialling on two M&E projects from September 2015 to February 2016, with 2% savings to be made at each stage.
3. Phase 1 Roll-out in February 2016 (over 12 months), with a "wash, rinse, repeat" process being applied, namely the PDCA approach.

A second Phase 2 Roll-out went company-wide in January 2017, again over 12 months, on over 50 live projects utilising the software solution across the Group.

The Green Belt project was completed over 10 months in May 2015, led by our Strategy & Innovation Manager, and sponsored by our Managing Director, Mr. Jimmy Kirby, with a team of four Kirby people supporting (a Kirby Project Manager, Group IT Manager, Group QA, and QC personnel). This was to create a platform and to build from this into Phase 1 and 2 roll-outs. Kirby's goal in the early stages was to streamline and automate our Defect Management system, to feed into our monthly Quality KPI reports, and to reduce our own overall project costs. We focussed on the administrative process (rather than addressing the defects head-on). So, it became a standardised process, thus cutting through any complexity and conflicting opinions that may be encountered with defect management and to harness the rich data gathered electronically.

LEAN INITIATIVE UNDERTAKEN – LEAN THINKING, TOOLS, TECHNIQUES

The snagging ("defects") process was selected to apply Lean principles to internal business processes. If this process was not improved the costs of an inefficient defect management ("snagging") system would continue to increase. The goal was to prove the concept that an improved snagging process can bring significant benefits and reduce snag processing time. An internal Green Belt project was selected as the initial focus for this continuous improvement initiative.

The DMAIC methodology was applied to improve the defect management process. A Data Centre Client project and a Commercial fit-out project were selected for the baseline data analysis, which allowed Kirby to frame and validate the problem.

Define Phase

- A SIPOC Diagram was developed to identify the critical elements of the snagging process. This allowed us to scope the project correctly and define what elements were to be included and excluded from the improvement process.
- A Critical Quality Requirements tree was drawn-up to identify the customer requirements, needs, drivers, and critical to quality (CTQ) metrics.
- Stakeholder Analysis was completed to identify the interested parties in the project and how they defined success of this Lean Construction project.
- A Communication Plan was developed to ensure the Kirby Group stakeholders were informed throughout the project of the project's KPIs, thus ensuring ongoing buy-in from these key stakeholders.

Measure Phase

- An 'As-Is' process map was developed for the current snagging process.
- A baseline was created based on existing data to identify the following:

o Average processing time of a snag (defect).
o Average close-out time of a snag (defect).
o Average number of project snags per €1M of project value.
o Average number of snags categorised as 'Other'.

- TIMWOODS (8 Wastes) was utilised to identify at a high level where the key areas of waste were occurring.

Analyse Phase

- A Fishbone Diagram was used to identify the root causes for an inefficient snagging process for a high volume of snags and the long close-out window.
- 5 Whys was also used to determine the root cause of each problem area.

Improve Phase

- The SCAMPER Model was used to generate creative thinking on how to improve the snagging process. This helped to develop a 'To-Be' process map for the ideal snagging process.
- A Value Stream map was then developed to identify each specific area for waste elimination and potential improvement.
- A comparison table was created to analyse the different software tools on the market. This was used to determine the most suitable software package available which would facilitate the improvement programme and fit with Kirby Group's processes.

Control Phase

- A Standardisation approach was then taken to control the transition from an initial two pilot projects to a company-wide roll-out. This involved the standardisation of the company defect list, which ensured that all defects were grouped into the correct categories, which allowed for improved data analysis to be completed. A "Standardised Toolbox Talk and Training" presentation was also developed to ensure the required level of training was provided for early adoption and understanding.

Figure 1. 'Real time' Outputs from the Defect Management Software.

The following baseline data was collected for the pilot projects:

- Pareto Analysis identification ("Other" category = 9%).
- Snag close-out window – 40% of snags were taking longer than 3 weeks to close-out (a 5% improvement).
- Snag processing time – a detailed analysis during the Analysis Phase identified a process time of 0.57 hours per snag.
- Cost of processing a snag was identified as €25.73 per defect raised.

A Quarterly Dashboard was developed which was communicated to the Senior Management Team (Directors). This was coupled with a Stakeholder Influence Strategy and a Change and Risk Management register to elicit support and reduce resistance. A quarterly review and analysis of the snags which had been raised was undertaken to determine if the standard snag list required updating. Monthly reviews at project level were conducted to identify repeat snags and Quality Toolbox Talks (QTBTs) given to reduce repetitive snags from reoccurring.

LEAN INITIATIVE IMPROVEMENTS & IMPACT

The concept of implementing an improved and automated snagging process was proven through the following tangible benefits:

- A cost saving of 45.16% was made per processing of one snag.
- Number of snags per €1M project value was significantly reduced, predominantly due to removal of duplications.
- Improved snag categorisation – proper allocation of categories that allowed effective action; "Other" category snags decreased from 33% to 9%.
- The close-out time of a snag was reduced by 20% due to improved communication and collaboration using a single software platform.
- This proves the concept that the improved and automated snagging process brings significant savings to the business, as well as competitive advantage.

Figure 2. Real-time Trend Analysis from the Defect Management Software.

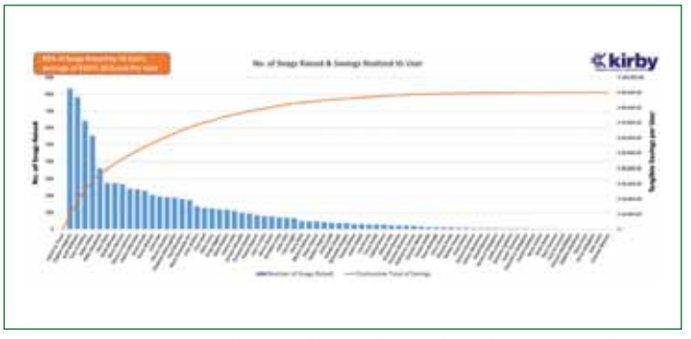

Figure 3. Pareto Analysis of Number of Defects Raised.

The following intangible benefits were also identified:

- Better quality real-time data was obtained which improved categorisation, project visibility, dashboard monitoring, automated reporting and data analysis; which improved information sharing, management, and enhanced communication between project team members.
- Snagging trends and analysis of sub-contractor/project performance promoted continuous improvement and provided less room for error – digitised process/no paperwork/exact pin location of snags/photographic proof of close-out, time and date stamped – less people "touching" the snag, no duplications and building regulation compliance re BC(A)R 2014.
- Improved customer satisfaction – a more efficient and organised approach to snagging and project completion on time with no significant issues upon final handover.

- Improved attitudes towards change and introducing mobile technology on sites – user-friendly application.

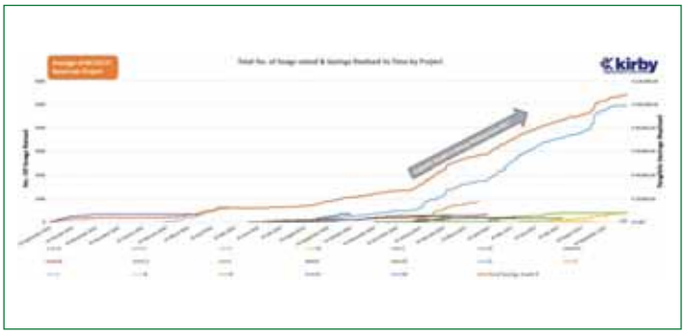

Figure 4. No. of Defects Raised Over Time as the No. of Projects Adopted the Software.

Some key initiative outcomes include:

- Time and Cost Savings due to streamlined snagging process. Up to 63% savings made due to the removal or automation of non-value-added (NVA) steps in the snagging process.
- Time and Cost Savings due to clearer communications to specialist sub-contractor trades.
- Time and Cost Savings due to demonstration of BC(A)R 2014 compliance.
- Time and Cost Savings due to streamlined inspection process. Up to 38% savings made due to the removal or automation of NVA steps in the inspection process.
- Time Savings due to the reduction in emailing of reports and inspections performed.
- Time and Cost Savings due to the generation and timely close-out of system handover punch-lists. System handover inspection report automatically updated as snags are closed. These are then included in test packs/handover packs, as QA evidence of works completed.

Figure 5. Real-time Site Reports on Close-out of Field Defects Raised Internally.