International Journal of Lean Six Sigma
Lean Six Sigma and digitize procurement
Bernardo Nicoletti

Article information:
To cite this document:
Permanent link to this document:
http://dx.doi.org/10.1108/20401461311319356

Downloaded on: 13 November 2014, At: 05:45 (PT)
References: this document contains references to 45 other documents.
To copy this document: permissions@emeraldinsight.com
The fulltext of this document has been downloaded 663 times since 2013*

Users who downloaded this article also downloaded:
Bernard Kornfeld, Sami Kara, (2013),"Selection of Lean and Six Sigma projects in industry", International Journal of Lean Six Sigma, Vol. 4 Iss 1 pp. 4-16

Access to this document was granted through an Emerald subscription provided by 603825 []

For Authors
If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com
Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.
Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.
Lean Six Sigma and digitize procurement

Bernardo Nicoletti
Master in Procurement, Università di Roma Tor Vergata, Rome, Italy

Abstract
Purpose – The purpose of this paper is to demonstrate how the lean Six Sigma method can be applied to procurement, processes where there is an extensive use of information technology and communication (ICT) systems. The paper defines a method to streamline, digitize and reduce waste in procurement processes by using the “lean Six Sigma and digitize” methodology.

Design/methodology/approach – A framework was developed and applied to the procurement processes, based on the analysis of best practices and on several implementations.

Findings – It was found that the digitization of a procurement process which is not streamlined can generate problems. A process must be mapped to highlight waste and low quality. Only when the new process is improved, taking into account also that it will be possible to use ICT supports, can it be digitized. The new process will digitize only value-added activities recognized by the users and by the organization.

Practical implications – The paper should be of interest to the academic world, as well as to management working in all types of organizations.

Originality/value – Within the field of lean Six Sigma and information and telecommunication technology, there has been a continuous debate as to whether both approaches are complementary or contradictory. This paper fulfils an identified need to study the interactions between a modern example of information technology and its role within procurement, making a valid contribution within this field of research.

Keywords Lean Six Sigma, Procurement, Service, Digitization, Information systems, Information and communication systems

Paper type Technical paper

Introduction
Procurement is the acquisition of goods or services. It is important that the goods/services are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location. Purchasing is any activity for which the organization receives an invoice from an outside party while procurement includes all activities in order to get the product from the vendor to its final destination (Van Weele, 2009).

During the recent economic crisis the organizations learned the importance of being Lean. In this way, they can be to improve the value to the customers and reduce costs. The procurement departments must take into account this imperative. It is essential for procurement to become as Lean as possible by improving its processes and right PROCUREMENT. On this respect, there are more and more opportunities connected not only with outsourcing, but also with business process outsourcing (BPO) and more recently with knowledge process outsourcing (KPO).

Lean thinking is recognized as one of the most effective methodologies to improve business processes. It aims to satisfy customers by increasing the value of the products/services for them and to reduce simultaneously the lead times.
These objectives are achieved through the use of methods and tools, which allow eliminating waste, reduce process time and simplify operations (Womack et al., 1990).

Six Sigma is a data-driven process improvement methodology used to achieve stable and predictable process results, reducing process variation and defects. Snee (2004) defined it as: “a business strategy that seeks to identify and eliminate causes of errors or defects or failures in business processes by focusing on outputs that are critical to customers”. While both Lean and Six Sigma have been used for many years, they were not integrated until the late 1990s and early 2000s (Snee, 2010). Today, Lean Six Sigma is recognized as: “a business strategy and methodology that increases process performance”. Lean Six Sigma combines the best of two distinct methodologies:

1. Six Sigma, which helps in reducing the number of defects and the variation of the outputs.
2. Lean thinking which helps in reducing the cycle and lead times.

A certain number of organizations, such as Motorola, GE, and Toyota have achieved excellent results by the use of these methodologies, in fields such as production, maintenance, marketing and finance. Various consultants and thought leaders have developed a specific adaptation of the method to help mainly manufacturing in their client organizations to become leaner.

This paper presents a method called Lean procurement. It is based on the application of the tools of the Six Sigma method combined with the Lean thinking and Six Sigma principles while also taking into account of the digitization opportunities.

Both in the literature and in the practice, often the main problem is the excessive separation between improvements of manual activities and automated activities, between optimization and digitization, between “factory” and information and telecommunication systems (ICT). This problem is even more evident if we focus on service organizations or the service sectors in any organization. In these situations, processes are more and more essentially driven by ICT (Piercy and Rich, 2008).

The study (Bortolotti et al., 2009) tackled with the main question: “how can one introduce Lean principles in the pure-service context, where the typical production elements are missing and information management prevails?” The lack of an effective response to this question generates a serious problem encountered at managerial level: a problem of sequence. Because it is not clear when streamline and when automate the processes, one could automate errors and waste. The papers presented a methodology for leaning first and then automate.

This paper aims to apply to procurement the methodology indicated as Lean and digitize (Nicoletti, 2012). This is a method to simultaneously streamline and automate processes and their management. Out of a long experience in different types of organizations and several research works in procurement and procurement, a methodology was presented for process reengineering using Lean Six Sigma principles and tools and digitization techniques (Nicoletti, 2012). The methodology shows clearly the sequence of activities that should be done to integrate the methods of digitization in the activities of any organization. This paper applies the methodology to streamlining
and digitizing the procurement processes, in order to obtain competitive advantages. In order to avoid the digitization of errors and waste, the research suggests to:

- map the manual and automated activities;
- highlight, delete or, at least, minimizes every non value added activity for the final customer;
- redesign the new process to make it Lean taking into account also the opportunity offered by digitization; and at the same time
- automate it.

The digitization is like a magnifying glass that reveals, accelerates, and exalts the improvements, such as the errors. The digitization of an incorrect process drives to make errors faster. The digitization of a streamlined process accelerates the achievement of the objectives, and amplifies the competitive advantages obtainable with the improved process.

**Literature review**

The quality in the service context is a strategic element because it allows gaining competitive advantages, reduces costs and increases market share and profits (Gronroos, 1982; Thompson et al., 1985; Zeithaml et al., 1988; Parasuraman, 1997). Service processes are fundamentally different than manufacturing processes. Some of the factors that differentiate services from manufacturing are: the active participation of the customer into the delivery process, the place of delivery and the place of use of the service are often the same, the service intangibility and the impossibility of storing the services (Fitzsimmons and Fitzsimmons, 1994). It is also proved that service processes have not been as efficient as manufacturing processes (Lovelock and Gummesson, 2004). This implies that there is the opportunity to transfer in the world of services the practices commonly adopted in the manufacturing context (Smith and Waterman, 1981; Antony et al., 2005; Snee, 2004), taking into account the substantial differences described above.

Back in the 1940’s, Eiji Toyoda and Taiichi Ohni defined the Toyota production system (TPS), from which Lean thinking was created. The “Lean thinking” term was coined by James Womack, Daniel Jones and Daniel Roos in *The Machine that Changed the World* (Womack et al., 1990). The main objective of Lean thinking is the elimination of the so-called three M’s: *Muda* (waste), *Mura* (unevenness) and *Muri* (overburden). They are defined as an activity which does not provide any added value for the customer (Hayes and Wheelwright, 1979). Relative to *Muda*, there are seven different sources of waste: overproduction, defects, transportation, waiting, inventory, motion, and processing. Lean thinking is defined as a systematic waste removal from every value stream part, by a team effort. “Value stream” can be defined as the whole set of activities which compose the process (Womack and Jones, 1996). All efforts should be done in such a way that each activity adds value to the customer. Lean thinking implementation provides several benefits, such as: cost reduction, productivity increase, quality improvement, lead time reduction, supplies reduction, flexibility, and customer satisfaction improvement. Womack *et al.* set five main principles (Womack *et al.*, 1990), in order to achieve a Lean business model: value, value stream, flow, pull, and perfection. Lean thinking has been applied in the service context through recent
“Lean service” studies. The most important are: Hines and Rich (1997), Abdi et al. (2006) and Sarkar (2007). However, these studies focused on process streamlining of services associated with products (for instance Taco Bell, Tesco, etc.), services in support of production (administration of a manufacturing organization) or services in healthcare (De Mast et al., 2006) or financial services (De Koning et al., 2008; Uprety, 2009; Lokkerbol et al., 2012). None of these studies focused on the application of Lean principles to the procurement processes.

Sugimori et al. argued that the use of the information and communication systems for production planning introduces unnecessary costs, overproduction, and uncertainty (Sugimori et al., 1977). This theory contrasted with the trends of the 1980s and 1990s, when the interest on MRP and ERP systems, numerical control machines and production lines fully-automated was huge. The highly automated organizations were less vulnerable to the typical problems of manual work. However, there were examples of over-investment in digitization that have worsened the flexibility and the ability to respond to the demand changes (for example General Motors in the 1980s; CIM) (Bowen and Youngdahl, 1998). Recently, some authors have underlined how systems in general (Gibbons et al., 2012) or some specific automation technologies (such as RFID) can help leaning processes (Powell and Skjelstad, 2012).

Although e-procurement has substantially streamlined, and integrated the procurement and coordination processes for indirect goods, many organizations operate multiple e-procurement solutions. For integrated procurement solutions, this paper recognizes the need for an overall procurement strategy and organization, an alignment of various e-procurement solutions along the procurement process and the need for integrated system architectures (Secchi, 2012). Organizations have also to realize that no standardized e-procurement solutions exist and that important success factors are “non-technical” in nature (Puschmann and Alt, 2005; Wilson and Roy, 2009). Lean thinking focuses on flexible and “intelligent” automation and “low cost” technologies. MRP is replaced by just-in-time techniques such as Kanban and Heijunka boxes, much more controllable and simpler. The numerical control machines and production lines fully-automated are replaced by cells with less automation. However, it is not clear how the principles, techniques, tools, and approaches of Lean thinking can be applied in a service context internal to the organization, like procurement, where there is an intensive use of information and communication technologies to process the huge quantity of information and documentation, representing the workflow of the procurement process (Uday and Chon, 2004). On the other side, the use only of automation to improve performance remains uncertain (Cheng et al., 2004).

The Lean Six Sigma and digitize methodology

The Lean Six Sigma and digitize methodology is based on the application of several macro-phases: preparatory, define and measure, analyse and process design, architecture design, develop, test and deploy and verify (Nicoletti, 2012) (Figure 1). It is essential to apply this methodology and its tools (Nicoletti, 2012) in strong partnership between all the departments of the organization involved, quality and support organizations (such as ICT, finance or operations). Stakeholders need to align in setting up and staffing the improvement project team. Process and ICT specialists can assist, and help lead these projects at a client organization. Perhaps more importantly, the organizations must treat the initial Lean and digitize project as the beginning of an
iterative cycle that generates continuous improvement and lead to a change in the culture of the organizations towards Lean thinking (Womack and Jones, 2003). Process improvement should not be triggered by a problem or challenge, but rather become ingrained in the organizational culture.

This procurement methodology empowers multiple levels of the organization to help attain its goals (such as project-based procurement). It can yield significant results. Based on several case studies, on average the benefits would be (Nicoletti, 2012):

- cost reduction between 20 and 40 percent;
- speedier responses to the need of the business;
- more flexibility;
- a wider range and pool of talents from outsourcing organizations; and
- reduction of risks with the vendors.

In the next few paragraphs we shall discuss the way to apply this methodology to the procurement processes.

**The Lean procurement**

The following pages detail the steps in a successful Lean procurement initiative. They underline the critical success factors for such an initiative. The latter aspects are extremely important in any Lean Six Sigma initiative (Laureani and Antony, 2012).
The words Lean procurement are used for short in the following pages to indicate the Lean Six Sigma and digitization initiative.

**Prepare**

The Lean procurement initiative should start with a preparatory phase. Giving for defined the context, vision and strategy of the organization, the main activity in the preparatory phase is the prioritization on which process to launch the initiative and the selection of a valid project leader. In the case of procurement, possible process candidates for improvement could be the request for information or quotation, the procure to pay, the logistics and so on. In kicking off the project, it is important to communicate the launch of the initiative to the entire organization (and in some cases also to the vendors and the customers).

At the end of this preparation, it would be important to set up a Lean procurement committee. It is necessary to submit the proposal of the process to this committee for its approval. In the Lean Six Sigma jargon, this activity is called tollgate zero.

**Define and measure**

The Lean Six Sigma and digitize method really starts with the define and measure macro-phase. The entire organization should support the Lean procurement project with a team effort. There should be full time or part time representatives from all the departments involved. First, the project team must record the voice of the customer (VOC) to focus on what it is really important for the success of the initiative. It is necessary to detail the user requirements to understand what are the metrics that should be measured, monitored and improved (the CTQ or critical to quality). Generally the most important CTQs are cycle times and service levels. Following that phase, the project team has to map the As-Is process. The process mapping involves both the manual and the automated flows. Specifically, the project team has to observe the sequence of manual operations and the layout, to understand how the physical flow is regulated, and the applications, systems, interfaces and digitized flow are regulated. Mapped the process, the project team measures the metrics and identify the critical points related to the As-Is process.

The analysis of real cases revealed a point of weakness: the method adopted for the measurement, the interview, caused loss of time and poor accuracy of the data gathering. The analysis of other cases was rather an example of best practice: processes are measured extracting data from the data warehouse (when available). This provides a fast and accurate measurement. This example shows how the involvement of the information and communication technology in the Lean procurement projects would accelerate and optimize the measurement phase.

The first phase of the method would be the define, the main steps in this step are:

1. define in detail the process and the problems which we want to improve;
2. define the macro-objectives for the initiative;
3. set up the team which will go through the application of the method;
4. assess current environment (vendors, organization, logistics, processes);
5. define product/service requirements (current and expected);
(6) identify opportunities and quantify potential benefits; and
(7) build implementation plans.

The deliverables of this phase should be included in a document labelled project charter with:

- The assignment of the project leader, the main members of the project team and the belts (or the consultants should the organization not have belts) to support.
- Current process documentation, from an organization, physical and information systems point of view (As-Is). In the latter case, it is important to define also the interfaces with the other processes in the organization.
- The strengths, weaknesses, opportunities and threats (Swot), stakeholder and risk analysis.
- The stakeholder requirements.
- The project plan through the development phase.
- A rough and initial cost benefit analysis.

The project charter should be submitted to the Lean procurement committee for approval. In Lean Six Sigma and digitize jargon, this step is called tollgate one. The basic premise of this step is to lay the groundwork for a successful initiative. Before beginning the following measure phase, the team should have:

- defined the key process or problem to be addressed;
- agreed upon the goals of the initiative;
- identified the key stakeholders involved in the project; and
- gained consensus and approval to move forward with the project.

The key objectives of the following phase measure phase include the following:

(1) the selection of the CTQ measures and the key process indicators (KPI);
(2) an accurate measurement method, based on stakeholder-approved definitions;
(3) sufficient information to validate the need and quantify the potential benefits;
(4) specific objectives to be met by the remainder of the initiative; and
(5) approval (or agreement not to move forward) with the remainder of the project.

Many initiatives falter or even fail in the measure phase because it is very easy to get bogged down in data collection activities. Often, information is not readily available, or is “hidden” across different groups, teams and stakeholders. In cases where no previous data has been collected, it may take weeks, or even months for a new measurement system to start producing meaningful information. Further, in cases where there is a great deal of data, simply putting the means in place to collect information can be an entire project in itself.

A few things to keep in mind when conducting the measure phase of a Lean procurement initiative:

- One should not ignore the standard measures, such as the number of vendors (stratified by function/service), service quality, time to pay, number of transactions, utilization of products/services, and so on.
• Be cognizant of spin-off projects, such as time tracking for services, or asset management for software and hardware products. Such projects are very helpful in squeezing waste out of the budget, but the absence of these tools should not stall a Lean procurement initiative. Often, simply reducing unnecessary vendors or consolidating them, tracking and enforcing basic performance metrics can provide an large benefit.

• In cases where the implementation of a new measurement method cannot be avoided, be sure to treat its implementation as a formal project. Done properly, this can be a big win by itself.

• The Lean procurement committee and key stakeholders should be consulted often. The team member tends to be burrowing deep into the details, so high-level reviews will help keep the big picture in focus.

• Data does not need to come from an information and communication technology system. Even subjective data, such as satisfaction surveys and focus group discussions can yield actionable information. At the very least, they will provide a good sanity check for other data one collects.

• It is unfortunate but it should be accepted that an unsuccessful project be cancelled. Although projects are typically kicked-off as a response to a seemingly obvious need, sometimes the data will say otherwise. Halting an expensive initiative for lack of clear benefits is as good as running a successful project.

At the end of the measure phase, there should be a clear understanding of the problem at hand, the future target of the relevant CTQs and KPIs, and a precise method of measuring the progress towards the goal.

**Analyse and process design**

Once completed the define and measure phase, the project team has to find every waste and non-quality present in the As-Is process and redesign the sequence of activities eliminating all sources of waste and variability. The process should be redesigned through: the elimination of non value added and not necessary activities; the redesign of operations that produce waiting times, unproductiveness, transportation, queues, stocks; the outsourcing or centralization of activities with low value added but necessary; the simplification, standardization, optimization, and automation of some manual activities; and the reduction of excessive, obsolete and not controlled automation.

The most important prerequisite to kicking off the analyse and process design macro-phase is to have clearly demonstrated meaningful potential benefits. It is important also to understand very specifically how one will measure the effectiveness of any solution. However, there are scenarios where the project team might want to consider moving into the analyse and process design macro-phase without this:

• there was not enough time or resource to collect conclusive information and data on the current procurement program;

• a key stakeholder (leadership, board member or similar) insists on moving forward for qualitative strategic reasons; and

• the measure phase proved inconclusive, and only by analysing and even piloting solutions can one understands the true cost benefit analysis.
If any of these scenarios apply, there may still be good reason to begin the analyse and process design macro-phase. This should be done with the full understanding and approval of the Lean procurement committee. Most importantly, stakeholders should accept the very real possibility that the result of the analyse phase may be to do little or nothing.

The key objectives of the analyse phase include the following:

1. **The solution.** During the analyse phase, the team should have looked at various solutions that may be part of any Lean procurement initiative, such as: reducing the number of vendors, implementing SLA tracking systems, renegotiation programs, multi-procurement, process improvements, integration of the different flows and e-procurement systems for vendor and procurement management. After reviewing the costs/timeline/benefits of these options, a future state solution should be identified.

2. **Multi-generational project plan.** While very simple solutions may only need one “generation”, most solutions will need to be implemented in phases over time to maximize benefit while minimizing disruption to the business, additional costs, and other forms of stakeholder fallout. A rule of thumb is that each phase or generation in which the project might be divided should not last longer than six months.

3. **Pilot preparation.** A carefully chosen target area (perhaps a single business unit, a single element of the plan, and so on) should be chosen. The goal of the pilot (conducted in a later macro-phase) is to prove the effectiveness of the solution, build support for the greater program, and to refine the plan for the overall program. Ideally, steps can be taken during the analyse phase to prepare the pilot group/process for a quick ramp-up given approval.

4. **Updated stakeholder review and management plan.** The end of the analyse phase is perhaps the most critical time to have a detailed communication plan. Many projects do not make it to this point, and so people may not be truly engaged or aware of what’s happening. Once this tollgate is passed, real change will begin to happen. It is imperative to have the people who will make that happen fully on board.

The analyse phase takes a step back out of the detail. It requires looking again at the broader program. In addition to the specific solution, special attention must be paid to the implementation plan. In procurement, there are often long-standing and deep relationships between key people inside the organization and some of the vendors. These relationships must be identified, classified, and ideally leveraged for the success of the program. In some cases, mitigation plans may be necessary to avoid unhappy stakeholders or vendors jeopardizing the success of the program.

A few things to keep in mind when conducting the analyse phase of a Lean procurement initiative are:

- **Avoid the pressure to deliver.** In an ideal world (at least from the shareholder’s perspective), everyone in a business is focused solely on the growth and success of the business. In real life, people are also focused on the growth and success of their careers. Therefore, one may be under pressure, both personally and from the management, to get something done. It is very hard to demonstrate the value
of not doing something. It will be much harder to demonstrate the value of something that should not have been done.

- **Enable to have frequent and regular wins.** This holds true with any project. The best way to keep momentum, funding and support for an initiative is to show results. Further, solutions that have several benefit-yielding milestones are easier to manage, and the risk of failure is significantly reduced. Even if an element of the plan consists of implementing complicated new systems, it is worthwhile to try to include changes and improvements that can be completed in the near term.

- **Be very wary of visionaries.** Oftentimes, some stakeholders or members of the project team may push one towards certain solutions because of a vision about how things should be. Unless those visions align with what has been concluded during the previous phases, avoid diplomatically these ideas at all costs. This factor has contributed to high-profile project failures examined during the preparation of this paper.

- **Know the full stakeholder impact of the decisions taken.** Let’s say one of the decisions made is to reduce the number of third-party logistics providers by 50 percent. There are clear winners and losers both inside and outside the organization – the vendors being downsized or eliminated, and the procurement leaders who champion them, may push back very strongly. Those vendors getting a bump should be very happy with the plan. Remember to address both. If one is expending effort to manage the losing stakeholders or vendors, it is worthwhile to reap some benefits for the winners.

As with any framework, it is important to keep the big picture in sight. Detractors state that structured methods merely add an inordinate amount of bureaucracy and work to a process that should be common sense. And in some ways, they are correct. It is easy to look at a process or program from the outside and have a good idea about how it should be run and managed. However, as a project or program manager working in the detail, with pressure coming from all over the organization, it is very easy to lose sight of the big picture. The key is to use the frameworks as the means to remain on the right path – not as a series of ends which must be satisfied.

**Architecture design**

The To-Be process describes the sequence of activities that will form the future delivery process. These activities may be part of the manual flow or automation flow. The tasks of the architecture design macro-phase are to plan in minute detail the functional and technical characteristics of each activity, component and service that are part of the two flows (manual and automatic), to design any interface between activities, and to regulate the process and information flows to make them continuous and connected with the final customer. This is achieved by defining the organizational, physical and automation architecture.

It is important in this macro-phase to focus on value. For every activity that is performed in the procurement process, one should ask the question: is the (external and internal) customer prepared to pay for this activity? Then analysing the value stream mapping, eliminate wastes. In analogy to the Lean manufacturing, wastes are over-documentation, unnecessary work, rework, motion, excess transportation, excess inventory, over-processing, and too long waiting times.
It is particularly important to concentrate on integration (within the organization and with the vendors). There are several ways to integrate. Figure 2, shows some of them. The main activities in this phase are:

1. Look for purchasing, logistics and warehousing activities that can be eliminated.
2. Build effective collaborative vendor relationships: e-procurement simplifies and makes digital most of the interactions with the vendors.
3. Increase process and vendor relationship visibility.
4. Measure and improve vendor performance using the CTQs defined in the measure phase.
5. Improve automation, but do not over-automate (integrate procurement software with ERP, transportation and warehouse software).
6. Reduce administrative and documentation tasks.
7. Create flow for products and data.
8. Eliminate bottlenecks in administration:
   - approvals;
   - requests for proposal; and
   - status inquiries.
9. Empower users to perform purchases with pre-set spending limits.
10. Establish pull from the customer.
11. Postpone purchases until they are actually needed.
12. Limit purchases to the needed quantity.
13. Improve continuously investing in systems for spend visibility.
15. Approval (or agreement not to move forward) to implement the solution.

**Figure 2.** The ways to better integrate
Combining this approach with digitization bring substantial value (Beaumont, 2009). For instance, the adoption of web-based tools in the procurement process allows organizations to either reduce transaction costs or improve internal procurement process efficiency, or even increase collaboration with vendors (Bartezzaghi and Ronchi, 2003; Boeing, 1998; Karlsson and Ahlström, 1997).

Develop, test and deploy

During the build, test and deploy macro-phase, the To-Be process is implemented and tested:

- the new physical structure, new software, and new interfaces are developed, following the functional and technical specifications designed in the previous macro-phase of architecture design;
- every part is then tested individually to verify the correctness of the development;
- once this is verified, a pilot is launched; the process is implemented and simulated on a small scale, in order to verify the real functions, and in case of malfunctioning, appropriate changes are made; and
- verified the correctness of the new process, it can be introduced within the delivery system and fully implemented.

The develop, test and deploy phase is often refer to as build phase, because the primary goal is to execute the pilot defined in the analyse and process design phase. While virtually every activity undertaken should ultimately reside in refined, on-going processes, there are often several one-off’s that fall outside of future procurement processes. For example, vendor consolidation is (ideally) a one-off or as-needed activity, while managing and maintaining the right vendor mix and consolidate shipments is an on-going process. The other caveat to remember is that unlike many internal processes, it may be very tricky to fully ring-fence a Lean procurement pilot. For example, if part of the solution involves introducing a new project-based outsourcing process, or moving from single- to multi-source models, the vendors may react as if the entire organization has committed to the shift before it actually has.

The key objectives of the develop, test and deploy or build macro-phase include the following:

1) **Vendor preparation.** The vendors, involved in the pilot run of the Lean procurement initiative, will need to be ready for upcoming changes. In cases where a process is significantly changing, it might be necessary to use incentives to help ensure their compliance. Incentives can be direct (for instance promising more business, penalties, bonus, or other means) or indirect (for instance making it clear that new projects and services will only be procured via the new process).

2) **Contractual work.** Depending on the nature of the pilot, one may need to either renegotiate certain aspects of existing contracts and/or negotiate new contracts with vendors that one is introducing. In many cases, however, it may make sense to work off informal agreements throughout the design and verify macro-phases as it is likely that additional process and strategy changes might be needed.

3) **Process and technology.** The new processes must be laid out and communicated thoroughly to the internal teams. Additionally, now it is time to install and configure any technology to be used in supporting these new processes.
Stakeholder prep and close monitoring. After the analysis in the analyse phase, it is time to get ready and ramp up. In the same way that the vendors need to be informed and bought into the new processes, so must the internal teams. The project team should dedicate particular attention to the communication plan. Frequent and regular updates and open forum meetings should be scheduled throughout the late develop, test and deploy and verify stages.

Support structure. Any tools or people that will be used in supporting the Lean procurement initiative should be put in place. These can include instructional web sites, a help desk, and/or procurement support staff. It is important to use the support team both as a facilitator as well as a measurer of the challenges and successes of the initiative.

Pilot kick off. Once the stage has been set, the processes laid out, the pilot in place (where applicable), and the vendors and internal stakeholders are ready, it is time to begin using the new processes and enter into the verify macro-phase.

A few things to keep in mind when conducting the develop, test and deploy phase of a Lean procurement initiative:

- **The vendors are not machines.** Do not lose sight of the fact that strong vendor relationships can still trump any process rigor one puts in place. A competitive bidding process, for example, can reduce costs dramatically, but if the vendors become disenfranchised, quality and timeliness will be impacted.

- **Stay flexible.** It may not be feasible to change some or many of the processes and contractual agreements that are currently in place, at least not in the short term. While one does not want to treat these as barriers to success (or an excuse for failure), one may well need to work around them. If any of these incumbent factors seriously impact the success of the initiative, they should be thoroughly addressed with stakeholders so that they can either remove the barriers, or reset expectations accordingly.

- **Empower the operational team.** Possibly the single biggest source of failure in big procurement initiatives is the mismanagement of the operational teams. Once the procurement groundwork has been laid, the initiative and project leaders responsible for delivering those services become both the biggest weapon and potential failure points. While procurement teams can manage and monitor overall spend and service levels, the buyers and vendor managers can closely monitor and manage these services. They can detect service erosion far earlier than ICT or procurement leaders, and if properly empowered, they can also resolve these issues before they snowball. Conversely, disenfranchised managers may use new procurement processes as an excuse for failure, undermining the entire initiative.

At the end of the develop, test and deploy macro-phase, one should have the processes and in-scope teams ready for going live. The goal should be to have strong buy-in from senior management, the operational teams, and the vendors. The solution that it is planned to go live may have changed somewhat during these previous phases due to incumbent processes and contracts, or because concessions needed to be made in order for all parties to work together successfully. Provided that the ultimate solution set one has a strong projected ROI, one can move on to the verify macro-phase.
Verify
The last macro-phase of the Lean procurement method ends with the verify phase. The process must be constantly monitored measuring the reference CTQs. A process not monitored could degrade and cause huge losses due to a possible customer satisfaction decrease. At the start of the verify phase, when the process becomes effective, any changes after installation and the plan for decommissioning of parallel processes no longer active must be defined and implemented.

In a perfect world, the pilot delivered better than expected results, and the project team would be fully confident in flipping the switch, and immediately rolling out the new procurement processes and systems throughout the business. In reality, the act of verify is an on-going, iterative process of continual improvement, tweaking, and expansion of the program.

The likely best case scenario is that, as a result of the pilot, there would be the start of actual cost savings, or a clear path towards savings. There is often an unwinding period whilst existing contracts are closed out, or service providers switched, and these expected “investments” will start paying for themselves in the near term. In these cases, the verify macro-phase is used to validate the measurement system in place, to develop a full-term rollout plan, and to execute.

In a more middle-of-the-road scenario, the pilot provides the foundations for success. Certain aspects are either more difficult or costlier than anticipated. Possibly the most common issue faced is finding that a procurement strategy, that looked great on paper, did not work out as expected once the actual users in the organizations started using the resultant processes. This generally happens when a far stronger emphasis is given to renegotiations and rate reductions than is given to supporting and preparing the users (generally ICT and operations managers) to be successful. While this is by no means a show-stopper, it should certainly be addressed in subsequent rollout plans through training, stakeholder management, and even compromises.

In the unfortunate cases where the expected benefits are not delivered, it may be necessary to rethink the fundamental aspects of the Lean procurement strategy implemented. In addition to the lack of user readiness, the issues uncovered during a pilot could include:

- **Supplier capability challenges.** Reducing the number of vendors and logistics operators can save a great deal of time, efforts, documentation and cost, but it may create gaps across the product and service set.
- **Product or service failure.** Switching or consolidating vendors run the inherent risk that a process or product in the organization might fail.
- **Slow adoption or no adoption.** Unless there is a clear top management-mandate, there needs to be something in it for the users by the new process. If there are no perceived benefits out of the initiative, one may get little more than polite lip service.

Even in these cases, it is critical to quickly identify and address the misses before the stakeholders become disillusioned. Almost by definition, any procurement organization can become leaner and more effective. Yet the steps necessary in each case can be very different. It is necessary to remind frequently to the stakeholders that a pilot is intended to uncover these very challenges, and that it has been decidedly successful in doing so. The pilot should also uncover short-term opportunities that can be used to maintain momentum for the program whilst the larger strategic component is reviewed.
Unlike the other stages, there is hardly a discrete end to the verify stage. The procurement leader should have time-bound targets based on savings, efficiency, and/or simplification. However, a commitment to continual review and improvement should not only keep the organization leaner and leaner, it will deny the future successor an opportunity to look like a hero.

A real case

We used the method in several cases. One of the most interesting applications was done in the Italian-based divisional headquarter of a large multinational company, active in the construction of large machinery (Nicoletti, 2006).

The objective was to create an effective company sourcing platform, including processes, procedures, tools, datasets, and metrics, also enabling sourcing operations to leverage the global organization of the group to which the company belonged.

The team worked through:

- Several workout events (called WO!). The first step was to perform a thorough Sipoc analysis.
- Weekly meetings to review the Kaizen plan, with all the departments involved, e.g. with the accounts payable team.
- Past due analysis, root causes, ownership and issues solving. There were meetings held with manufacturing and accounts payable to agree on a procedure and the automation.
- Interfaces with the main vendors to do a two way match vs receiving.

In terms of processes, the team:

- Adopted a policy of no purchase order no pay (“NO PO NO PAY”) to enforce the use of the sourcing department. The policy is applied also in the field where the company is doing installation and maintenance work at customer sites.
- Developed a payment terms rationalization and definition of golden rules for down payments.
- Used feedbacks received from vendors in order to improve the poor forecasting accuracy.

The project team set up:

- Vendor management centralization: a single company vendor repository.
- A company unique repository to store internal regulations and vendor documentation (rebates, frame agreements, meeting minutes, etc.).
- A search appliance from a major vendor to ease the search of the documentation.

The team designed and implemented tools to minimize manual work, such as:

- Tests to verify the ERP purchase order capability to manage also the letters of intent in order to fully standardize and automate the process.
- A supplier portal, to connect the vendors to the company digital platform. Sharing accurate and timely information is key for B2B success and relationships.
- Lead time management for full alignment among the company systems.
Lea Six Sigma  
and digitize

- eSQM – electronic supplier qualification management.
- eRequirements to get a deeper integration with the engineering department.
- eRFQ management both in the inquiry to order and in the order to remittance processes.
- A new corporate eAuction tool.
- eMSD – material ship direct.
- TPS – trade payables system. Good opportunity to get savings.
- Indirect goods saving purchasing tracking system. To track and report savings for indirect purchases.

The team supported also a better governance of the sourcing processes:

- several reports were set up to support a spend visibility;
- budget match, adopting a common paperless solution across the entire company (no more manual spreadsheets); and
- audit sourcing procedures and applications.

Lean procurement in this case supported the organization in achieving its goals (such as project-based procurement). It has produced significant results. Benefits were (for confidentiality we may not indicate the actual values):

- faster and leaner quoting process, increasing competitiveness;
- substantial reductions in costs thanks to synergy;
- more flexibility with quick answers to the needs of the organization;
- a wider range and pool of vendors;
- sourcing governance improvement; and
- risk reduction with supplies, by introducing a continuous Fmea analysis.

Other applications are documented in a book currently in press (Nicoletti, 2013).

Further research

Further research is going on: the main research limitations of this study can be categorized in the following way.

Scope

The study used a broad selection of large enterprises. A possible future research field should be the adaptation of the framework in the context of small and medium enterprises (SME’s). In order to address this limitation, the framework should be applied to more case studies in order to observe and register further examples in the domain of SME’s.

Tools

Further work is necessary also on the support of Lean Six Sigma and ICT to the procurement processes. Until now, most of the tools and systems are built to support functions rather than processes. It is necessary to analyse in more details the connections between Lean Six Sigma and ICT. There is the need of more integrated tools.
Procurement

In the specifics of procurement, a better conceptual model of e-procurement is necessary, especially to take into account the extended Lean enterprise.

Conclusions

The approach presented is an example of a process improvement method. Lean Six Sigma and digitization applied in the past mainly to the manufacturing. This paper applies the method to the procurement processes. Two propositions are the result of this research. They could be the starting point for a subsequent study on different types of organizations:

P1. Unlike the manufacturing context, where Lean thinking does not essentially require a reduction of digitization, in procurement digitization it is essential for the improvement of the processes.

P2. In the procurement context, digitize a process not streamlined is counterproductive.

Corollary to P2: in the procurement context, it is convenient to take the sequence of implementation that provides first an accurate improvement of the quality of service and streamlining of the process by the elimination of any source of waste, while taking into account the digitization imperative.

The final model responds to the lack in literature of a consistent method that manages and integrates the classical activities of streamlining a procurement process, with the activities of digitization. In addition to the academic contribution, this study proposes a structured sequencing of the activities in a procurement process improvement initiative. The model provides a logical sequence to the activities of streamlining and digitizing processes: first streamline, and at the same time, digitize the value added activities recognized by the customers. In this way, one can avoid to enter in the process and information systems any waste that could be the cause of delivery process delays or blocks.

In conclusion, the framework developed provides a logical sequence to reengineer procurement processes by using the Lean Six Sigma and digitize method. To be more precise: it is necessary to Lean the process and at the same time digitize value added activities.

References


**Further reading**


**About the author**

Bernardo Nicoletti has worked for GE and AIG, with assignments in Italy, UK, USA and Argentina. Currently he is Professor of ICT Procurement at the Master in Procurement of the University of Tor Vergata, Rome, Italy and provides consultancy and coaching on ICT Strategy, Organization, Procurement, Security and Compliance. He is the author of 20 books on Management, published in the UK and in Italy and frequently is a speaker in international conferences. Bernardo Nicoletti can be contacted at: info@bernardonicoletti.com

To purchase reprints of this article please e-mail: reprints@emeraldinsight.com
Or visit our web site for further details: www.emeraldinsight.com/reprints