Journal of internet and information system Vol. 2(3), pp. 35-42, October 2011
Available online at http://www.academicjournals.org/JIIS
ISSN 1684–5315 ©2011 Academic Journals

Full Length Research Paper

Lean and digitize sourcing

Bernardo Nicoletti

Master in Procurement, University of Rome "Tor Vergata", via Leon Pancaldo, 26, I-00147, Rome, Italy.
E-mail: info@bernardonicoletti.com. Tel: +39 348 470 7016.

Accepted August 4, 2011

Recently, lean six sigma has been applied to the service context. In the literature, there is no strong empirical evidence to clarify how lean six sigma can be applied in sourcing, where there is an extensive use of information technology and communication (ICT) systems. This study presents a methodology to streamline and digitize processes in order to reduce waste. It does that by using an approach indicated as "Lean and Digitize". Based on the analysis of best practices and on several real implementations, a framework was developed and applied to the sourcing processes. The study found out that the digitization of a process not streamlined can generate problems. A process must be mapped to highlight waste and low quality. The new process should be improved taking also into account that it will be possible to use ICT supports. Once that is done, the process can be digitized. The new process will digitize only value-added activities recognized by the users and by the organization.

Key words: Lean thinking, six sigma, sourcing, digitization.

INTRODUCTION

During the recent economic crisis more and more organizations have worked to be more agile and leaner. In this way it is possible to adapt rapidly to changing socio-economic conditions. The sourcing departments must take into account this imperative. For instance an agile organization makes more use of external suppliers for its non-core activities. In order to help the businesses to become more agile, it is essential for sourcing to become leaner by improving its processes and right-sourcing. On this respect, there are more and more opportunities connected with outsourcing, but also with business process outsourcing (BPO) and more recently with knowledge process outsourcing (KPO).

Lean six sigma is recognized as one of the most effective methodologies to improve business processes. Lean six sigma aims to satisfy customers in terms of product and service quality and to reduce simultaneously the lead times (Womack and Jones, 1996) (Atkinson, 2004). 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). 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; and
2. Lean Thinking which helps in reducing the cycle times and the 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 these methodologies to help mainly manufacturing organizations to become more agile.

This paper presents a methodology called 'Lean and Digitize Sourcing'. The methodology is based on the application of the tools of the Six sigma methodology combined with the lean principles while taking into account of the digitization opportunities. Lean six sigma allows organizations to obtain drastic improvements in their business processes. This study combines lean six sigma with digitization. The idea is to make the processes leaner by simultaneously taking into account the opportunities offered by digitizing them. In this way, it is possible to reap the benefits of the automation of an optimized process.

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 systems. This problem is even more evident if we focus on service organizations or the service sectors in any organization. In these sectors, processes are more and more essentially driven by information and telecommunication systems (Piercy and Rich, 2008).

The study (Bortolottiet 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 paper presented a sequential process to optimize processes. The methodology presented in this paper aims at the same time to streamline and automate the processes and their management. This methodology is named “lean and digitize”. Out of a long experience in different types of organizations and several research works in sourcing and procurement, a methodology was defined for sourcing processes reengineering using lean six sigma principles and tools and digitization techniques (Nicoletti, 2010a). The methodology shows clearly the sequence of activities to integrate the methods of business process improvement and digitization in any organization. The methodology is applied to streamline and digitize the sourcing processes, in order to obtain competitive advantages. In order to avoid the digitization of errors and waste, this research suggests to:

1. Map the manual and automated activities;
2. Highlight and delete every non value added activity for the final customer and the organization;
3. Redesign the new process made lean taking into account also the opportunity offered by digitization; and only at the end
4. Automate it.

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

LITERATURE REVIEW

The quality in service is a strategic element because it allows one to gain competitive advantages, reduce costs and increase market share and profits (Thompson et al., 1985; Zeithaml et al., 1988). 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 are often not as efficient as manufacturing processes (Lovelock and Gummesson, 2004). This implies that there is the need to transfer in the world of services the practices commonly adopted in the manufacturing context (Smith and Waterman, 1981), taking into account the substantial differences described in the foregoing.

Back in the 50’s, Eiji Toyoda and Taiichi Ohno joined craftsmen’s knowledge and abilities with typical mass production assembly lines. They defined the Toyota production system (TPS), from which Lean thinking originated. The “Lean thinking” term was coined by James Womack, Daniel Jones and Daniel Roos in “The Machine that Changed the World” (Womacket 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 every human activity in an organization which does not provide any added value for the customer (Hayes and Wheelwright, 1979). In the case of *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 every organization member. “Value stream” is the whole set of activities which compose the process (Womack and Jones, Lean Thinking: Banish Waste and Create Wealth in your Corporation, 1996). Lean Thinking implementation provides several benefits, among them: cost reduction, productivity increase, quality improvement, lead time reduction, supplies reduction, flexibility and customer satisfaction improvement. Five main principles were set by 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, among which 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 (Taco Bell, Tesco, etc.), services in support of production (administration of a manufacturing organization) or services in healthcare. None of these studies focused on the application of lean principles to services like sourcing.

Sugimori et al. (1977) argued that the use of the information and communication systems for production planning introduces unnecessary costs, overproduction and uncertainty. This theory contrasted with the trends of the 80’s and 90’s, when the interest on MRP and ERP systems, numerical control machines and fully-automated production lines 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 (General Motors in the'80s; CIM) (Bowen and Youngdahl, 1998). Although, e-sourcing has substantially

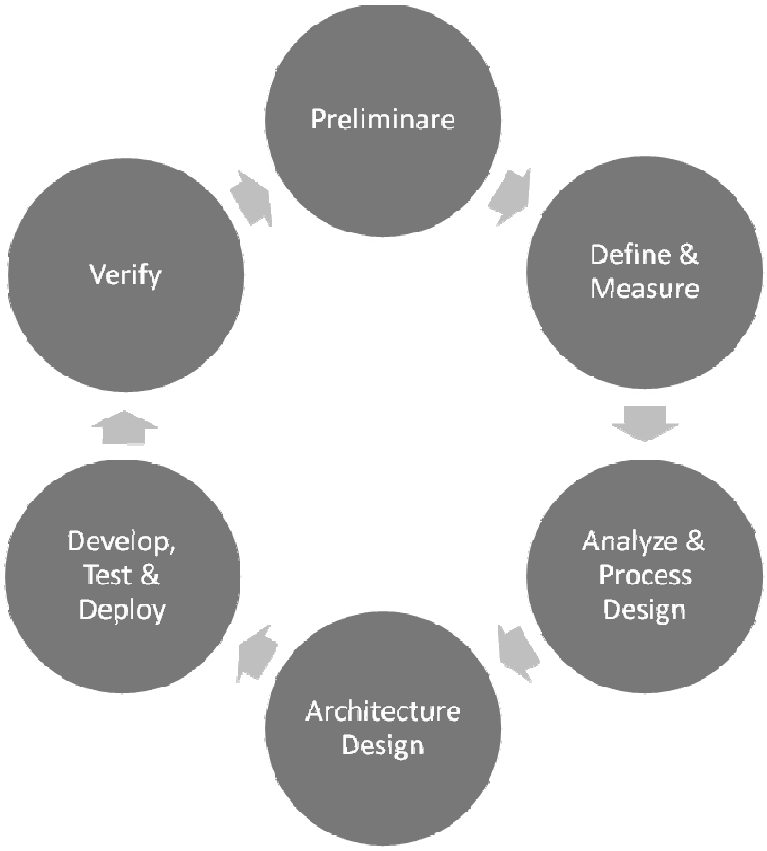

Figure 1. The Lean and digitize methodology.

streamlined the sourcing and coordination processes mainly for indirect goods, many organizations operate multiple e-sourcing solutions. For integrated sourcing solutions, this paper recognizes the need for:

1. An overall sourcing strategy and organization;
2. An alignment of various e-sourcing solutions along the sourcing process; and
3. The need for integrated system architectures.

Organizations have to realize that no standardized e-sourcing 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 simple and controllable. The numerical control machines and fully-automated production lines are replaced by cells with less automation. However, it is not clear how the principles, techniques, tools and approach of lean thinking can be applied in a service context, like sourcing.

In this case, there is an intensive use of Information and Communication Technology and digitization to process the huge quantity of information and documents, representing the backbone of the sourcing 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 and digitize methodology

The Lean and digitize methodology is based on several macro-phases: Preparatory, define and measure, analyze and process design, architecture design, develop, test and deploy and verify (Nicoletti, 2010a) (Figure 1). It is essential to apply this methodology and its tools (Nicoletti, 2010b) in strong partnership among all the sectors of the organization involved, quality and support organizations (such as ICT, finance or operations). Stakeholders from all parties need to align in setting up and staffing both the improvement project and the project team. Lean and digitize specialists can assist and even help lead these projects at a client organization. The organizations must treat the initial Lean and digitize project as the beginning of an iterative cycle that generates continuous improvement. Process improvement should not be

triggered by a 'problem' or 'challenge', but rather become ingrained in the organizational culture.

Similar benefits have been achieved by the application of the Lean and digitize methodology also in other fields, such as logistics (Nicoletti, 2008) and maintenance (Nicoletti, 2010c). In the following paragraphs, we shall discuss how to apply this methodology to the sourcing processes.

THE LEAN AND DIGITIZE SOURCING

Prepare

The Preparatory phase is the initial phase of the Lean and digitize initiative. Giving for defined the context, vision and strategy of the organization, the main activities in the preparatory phase is the prioritization with which process would be better to start and the selection of a valid project leader. The project launch should be communicated to the entire organization (and in some cases also to the suppliers). The processes tackled could be the request for information, the request for quotation, the order to pay and so on. At the end of this preparation, it would be important to set up a lean and digitize committee. It is necessary to submit the proposal of the process improvements to this committee for its approval. In the lean six sigma jargon, this activity is called Tollgate Zero.

Define and measure

The “Lean and digitize” methodology starts with the “define and measure” macro-phase. “Lean and digitize” projects must be supported by the organization and assigned to a project team with representatives from all the functions involved. Firstly, the project team has to “listen” the voice of the customer (VOC) to focus on what it is really important for the success. It is necessary to detail the user requirements to understand the metrics that should be measured, monitored and improved. Generally the most important metrics are cycle times and service levels. Following this 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:

1. The sequence of manual operations and the layout, to understand how the physical and organizational flows are regulated; and
2. The applications, systems, interfaces and automated sequences, to understand how the digitized flow is regulated.

Once mapped the process, the project team needs to define and measure 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 data gathering. The analysis of other cases was rather an example of best practice: processes are measured extracting data from the information systems data bases. This provides a fast and accurate measurement. This example shows how the involvement of the information and communication technology in the Lean and digitize projects would accelerate and optimize the measurement phase.

The real first phase of the application of the methodology of Lean and digitize would be the Define. The main phases in this macro step are:

1. Define in detail the process and the problems which the organization want to improve;
2. Define the macro-objectives for the initiative;
3. Set up the team which will go through the application of the methodology:
4. Assess the current environment (suppliers, organization, processes);
5. Define product/service requirements (current and expected);
6. Identify opportunities and quantify potential benefits;
7. Build implementation plan (for the entire project).

The deliverables of this phase are:

1. Current process documentation, from an organization, physical and Information Systems point of view (“As-Is”). In this phase, it is important to define also the interfaces with the other processes in the organization;
2. The Swot (Strengths, Weaknesses, Opportunities, Threats), Stakeholder and risk analysis;
3. The stakeholder requirements;
4. The project plan through the development phase;
5. A rough and initial cost benefit analysis.

All these aspects can be summarized in a document that is called the project charter. This document is submitted to the Lean and digitize committee for approval. In Lean 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, we should have:

1. Defined the key processes or problems to be addressed;
2. Agreed upon the goals of the initiative;
3. Identified the key stakeholders involved in the project;
4. Gained consensus and approval to move forward with the project.

The key objectives of the following phase "Measure" phase are the definition of:

1. An accurate measurement system, based on stakeholder-approved definitions;
2. Sufficient information to validate the need and quantify of the potential benefits;
3. Specific objectives to be met by the remainder of the initiative;
4. Approval (or agreement not to move forward) with the remainder of the Lean and digitize committee.

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 and digitize sourcing initiative are:

1. One should not ignore the classical measures, such as the number of suppliers (stratified by function/service), service quality, time to pay, number of transactions, utilization of products/services, and so on;
2. 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 and Digitize initiative. Often, simply reducing unnecessary suppliers and tracking and enforcing basic performance metrics can provide sizable benefit;
3. In cases where the implementation of a new measurement system cannot be avoided, be sure to treat its implementation as a

formal project. Done properly, this can be a big win by itself;
4. The Lean and Digitize 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;
5. Data does not need to come from an Information and Communication Technology (ICT) system. Even qualitative and 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 collected;
6. It is ok if a large-scale program is not there. 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, and a quantitative way of measuring the progress towards the goal.

Analyze 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. They must redesign the sequence of activities eliminating all sources of waste and variability. The process should be redesigned through:

1. The elimination of non value added and not necessary activities;
2. The redesign of operations that produce waiting times, unproductiveness, batches, queues and stocks;
3. The outsourcing or centralization of activities with low value added but necessary;
4. The simplification, standardization, optimization and automation of some manual activities;
5. The reduction of excessive and not controlled automation.

The most important prerequisite for the Analyze and Process Design macro-phase is to clearly demonstrate a meaningful potential benefit. It is important also to understand very specifically how one will measure the effectiveness of any subsequent solution. However, there are scenarios where the project team might want to consider moving into the Analyze and Process Design macro-phase without this:

1. There was not enough time or resource to collect conclusive information and data on the current sourcing program;
2. A key stakeholder (leadership, board member, etc) insists on moving forward for qualitative strategic reasons;
3. The measure phase proved inconclusive, and only by analyzing and even piloting solutions can one analyze the true cost benefit balance.

To begin the Analyze and Process Design macro-phase should be done with the full understanding and approval of the key stakeholders. Most importantly, stakeholders should accept the very real possibility that the results of the analyze phase may be to do little or nothing. The key objectives of the "Analyze" phase include the following:

1. The solution: During the Analyze phase, the team should look at various solutions, such as: reducing the number of suppliers, implementing SLA tracking systems, renegotiation programs, multi-sourcing, process improvements and ICT systems for suppliers and purchasing management. After reviewing the cost/timeline/benefit 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, In this way it is possible to maximize benefit while minimizing disruption to the business, additional cost and other forms of stakeholder fallout;
3. Pilot preparation: A carefully chosen target area (perhaps a single business unit, a single element of the plan, etc.) 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 refine the plan for the overall program. Ideally, steps can be taken during the Analyze 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 Analyze phase is perhaps the most critical time to have a detailed, updated stakeholder management plan. Many projects do not make it to this point. 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;
5. Approval (or agreement not to move forward) to implement the solution.

The Analyze 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 stakeholder plan. In sourcing, there are often long-standing and deep relationships between key people inside the organization and some of the suppliers. 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 jeopardizing the success of the program.

A few things to keep in mind when conducting the Analyze phase of a Lean and digitize sourcing initiative are:

1. 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;
2. 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;
3. Be very wary of "visionaries": Often, stakeholders 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 Analyze phase, avoid diplomatically these ideas at all costs. This factor has contributed to high-profile project failures examined during the preparation of this paper;
4. Know the full stakeholder impact of the decisions taken: Let's say one of the decisions is to reduce the number of IT development service providers by 50%. There are clear winners and losers both inside and outside the organization. The suppliers being downsized or eliminated, and the IT leaders who champion them, may push back very strongly. Those suppliers getting a bump should be very happy with the plan. Remember to address both parties. If one is expending efforts to manage the "losing" stakeholders, it is worthwhile to reap some benefits from the "winners".

As with any framework, it is important to keep the big picture in sight. Detractors state that this type of methodologies merely adds

an inordinate amount of bureaucracy and work to a process that should be "common sense". 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:

1. To plan in minute detail the technical and functional characteristics of each activity, component and service that is part of the two flows;
2. To design any interface between automated and manual activities; and
3. To regulate the process flow to make it continuous and connected with the final customer.

It is important in this macro-phase to focus on value. For every activity that is performed in the sourcing process, one should ask : is the customer prepared to pay for this activity? Then analyzing the value stream mapping, eliminate wastes. In analogy to the lean manufacturing wastes (over-production, rework, motion, excess transportation, excess inventory, over-processing, and waiting):

1. Look for purchasing and sourcing activities that can be eliminated;
2. Try to combine different suppliers of the same type of products or services;
3. Build effective collaborative supplier relationships: e-sourcing simplifies and makes electronic most of the interactions with the suppliers;
4. Increase supplier relationship visibility;
5. Measure and improve supplier performance;
6. Reduce administrative tasks;
7. Try to create flow for products and data;
8. Eliminate bottlenecks in administration:
9. Approvals;
10. Requests for Proposal;
11. Status inquiries;
12. Empower users to perform purchases with pre-set spending limits;
13. Establish pull from the customer;
14. Limit purchases until they are actually needed and to the needed quantity;
15. Automate purchasing (integrate sourcing software with inventory software);
16. Improve continuously; and
17. Involve suppliers in the continuous improvement process.

Combining this approach with digitization bring substantial value (Beaumont, 2009). For instance, the adoption of Web-based tools in the sourcing process allows firms to either reduce transaction costs or improve internal sourcing process efficiency, or even increase collaboration with suppliers (Bartezzaghi and Ronchi, 2003; Boeing, 1998; Karlsson and Åhlström, 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 phase of “Architecture Design”. Every part is tested individually to verify the correctness of development. Verified the correctness of the development, a pilot is launched. Following the designed process and architecture, the process is implemented and simulated on a small scale, in order to verify the real functions. In case of issues, appropriate changes are made. Verified the correctness of the new process, it can be introduced within the delivery system and digitized.

The Develop, Test and Deploy phase is often refer to as a "build" phase, because the primary goal is to execute the process defined in the Analyze and Process Design phase. While virtually every activity undertaken should ultimately reside in refined, ongoing processes, there are often several "one-off's" that fall outside of the future sourcing processes. For example, supplier consolidation is (ideally) a one-off or as-needed activity, while managing and maintaining the right supplier mix is an ongoing process. The other caveat to remember is that unlike many internal processes, it may be very tricky to fully ring-fence a Lean and Digitize pilot involving suppliers. For example, if part of the solution involves introducing a new project-based outsourcing process, or moving from single- to multi-sourced models, the suppliers 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. Supplier preparation: The suppliers that will be involved in the pilot run of the Lean and digitize initiative will need to be prepared for upcoming changes. In cases where a process is significantly changing, use incentives to help ensure their compliance. Incentives can be direct (e.g. promising more business, penalties, bonus) or indirect (for example, 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 new suppliers. 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 will be necessary;
3. Process and technology: The new processes must be laid out and communicated thoroughly to the internal teams. Additionally, now is the time to install and configure any technology to be used in supporting these new processes;
4. Stakeholder prep and close monitoring: In the Analyze phase, we did the analysis - now it’s time to get ready and ramp up. In the same way that the suppliers need to be informed and bought into the new processes, so must the internal teams. Frequent and regular updates and open forum meetings should be scheduled throughout the late Develop, Test and Deploy and Verify stages;
5. Support structure: Any tools or people who will be used in supporting the Lean and digitize initiative should be put in place. These can include training websites, a help line and/or sourcing 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;
6. Pilot Kickoff: Once the stage has been set, the processes laid out, technology pilot in place (where applicable), and the suppliers 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 and digitize initiative:

1. The suppliers are not machines: Do not lose sight of the fact that strong supplier relationships can still trump any process rigor one has put into place. A competitive bidding process, for example, can reduce costs dramatically, but if the suppliers become disenfranchised, quality and timeliness will be impacted;
2. 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 factors seriously impact the success of the initiative, they should be thoroughly addressed with top-level stakeholders. In this way, they can either remove the barrier, or reset expectations accordingly.
3. Empower the operational team: Possibly the single biggest source of failure in big sourcing initiatives is the mismanagement of operational stakeholders. Once the sourcing groundwork has been laid, the initiative and project leaders responsible for delivering those services become both the biggest weapon and the potential failure points. Sourcing teams can manage and monitor overall spend and service levels. The people who interact with the suppliers on a daily basis have the ability to closely monitor and manage these services. They can detect service erosion far earlier than ICT or sourcing managers. If properly empowered, they can also resolve these issues before they snowball. Conversely, disenfranchised managers may use new sourcing 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 the pilot run. The goal should be to have strong buy-in from senior management, the operational teams and the suppliers. The solutions may have changed somewhat during this phase due to incumbent processes and contracts, or because concessions were needed to be made in order for all parties to work together successfully. Provided that the ultimate solution has a strong projected ROI, one can move on to the "Verify" macro-phase.

Verify

The last macro-phase of the Lean and digitize methodology is the “Verify” phase. The process must be constantly monitored measuring the reference metrics. 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, the project team should define and implement any changes after installation and the plan for decommissioning of parallel processes no longer active.

In a perfect world, the pilot delivered better than expected results. The project team would then be fully confident in "flipping the switch" and immediately rolling out the new sourcing processes and systems throughout the business. In reality, "Verify" is an ongoing, iterative process of continuous improvement, tweaking and expansion of the program.

The likely best case scenario is that as a result of the launch of the new process cost savings would start. There is often an "unwinding" period whilst existing contracts are closed out, or service providers switched. So not always 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 sourcing strategy that looked great on paper, did not work out as expected once the actual users in the organization started using the resultant processes. This generally happens when a far stronger emphasis is given to re-negotiations and rate reductions than is given to supporting and preparing the internal clients (such as 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 time to rethink the fundamental aspects of the Lean and digitize sourcing strategy implemented. In addition to the lack of user readiness, the issues uncovered during a pilot can include:

1. Supplier capability challenges. Reducing supplier count can save a great deal of time and costs. It may also create gaps across the product and service set;
2. Product or service failure. Switching or consolidating suppliers runs the inherent risk of a failure in the processes or products in the organization;
3. Slow adoption or no adoption. Unless there is a clear CEO-mandate, there needs to be something in it for the users of the new process. If there is no perceived benefit, one may get little more than polite lip service.

In these cases, it is critical to quickly identify and address the "misses" before the stakeholders become disillusioned. Almost by definition, any sourcing organization can become leaner and more effective, yet the steps one must take 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 components are reviewed.

The sourcing 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 lean, it will deny the future successor an opportunity to look like a hero.

ILLUSTRATION

We have used the methodology in several cases. One of the most interesting application has been in the Italian headquarter of a large multinational, active in the construction of large equipment (Nicoletti, 2006).

This improved sourcing models empowered multiple levels of the organization to help attain its goals (such as project based sourcing). It yielded significant results. Based on this case study in sourcing, the benefits were:

1. Cost reduction between 20 and 40% (according to the cost benefit method used);
2. Speedier responses to the need of the Business;
3. More flexibility;
4. A wider range and pool of resources from vendors;
5. Reduction of risks with the supplies.

Conclusions

The approach presented is an example of a process improvement methodology, Lean and digitize applied to

the sourcing context. Starting from this statement, and with a focus on the Lean and digitize model, it is possible to assume two propositions for the result of this research. They could be the starting point for a follow-up study on different types of organizations:

Proposition 1: Unlike the manufacturing context, where Lean thinking requires a reduction of digitization, in sourcing, digitization is essential for the improvement of the processes;
Proposition 2: In the sourcing context, digitize a process not streamlined is counterproductive.

Corollary to proposition 2: In the sourcing context, one should take the sequence of implementations that provides an improvement of the quality of service and streamlining of the process by the elimination of any source of waste. At the same time, one should take into account the need for digitization.

The final model responds to the lack in literature of a consistent methodology that manages and integrates the classical activities of streamlining a delivery process with the activities of digitization. In addition to the academic contribution, this study supports management in sequencing the activities in a sourcing process improvement initiative. The model provides a logical sequence to the activities of streamlining and digitizing processes: streamline the process and at the same time digitize the value-added activities recognized by the final customer and by the organization. In this way, one can avoid to include in the information system and in the automation flows any waste that could be the cause of ineffectiveness, inefficiency and un-economical sourcing processes.

The main research limitation of this study is associated with the type of organizations studied. The study used a broad selection of large enterprises. A possible future research could be the adaptation of the methodology in the context of small and medium enterprises (SME's).

In conclusion, the framework developed provides a logical sequence to re-engineer sourcing processes by using the Lean and digitize methodology. It would be extremely useful to:

1. Process improvement practices, by helping in reaping the benefits of management automation;
2. ICT project leaders, by helping in digitizing optimized processes.

ACKNOWLEDGEMENTS

The author duly acknowledges Prof. Gustavo Piga and Prof. Corrado Cerruti for their support in this research finalized by a seminar at the Master in Procurement Department, University of Rome "Tor Vergata".

REFERENCES

Abdi F, Shavarini S, Hoseini S (2006). Glean lean: How to use lean approach in services industries? J. Serv. Res. 6(Special issue): 191-206.
Bartezzaghi E, Ronchi S (2003). Internet supporting the sourcing process: Lessons from four case studies. Integ. Manufact. Syst., 14(8): 632-641.
Beaumont N (2009). Guest editorial. J. Manuf. Technol. Manage., 20(6): 787.
Boeing S (1998). Boeing Streamlines Aluminium-Procurement Strategy. The Boeing Company, 6 July.
Bortolotti T, Romano P, Nicoletti B (2009). Lean first, then automate: An integrated model for process improvement in pure service-providing companies. Bordeaux, France: Advances in Production Management Systems, Sep..
Bowen D, Youngdahl W (1998). "Lean" service: In defense of a production-line approach. Int. J. Serv. Ind. Manag., 9(3): 207-225.
Cheng CF, Wang WM, Lo V, Lee WB (2004). An agent-orientated andknowledge-based systems for strategic e-procurement. Expert Syst., 21(1): 11-21.
Fitzsimmons J, Fitzsimmons M (1994). Service Management for Competitive Advantage. New York, NY: McGraw-Hill, Inc.
Hayes R, Wheelwright S (1979). Link manufacturing process and product life cycles. Harvard Bus. Rev., 57(1): 133-140.
Hines P, Rich N (1997). The seven value stream mapping tools. Int. J. Oper. Prod. Manage., 17(1): 46-64.
Karlsson C, Åhlström P (1997). A lean and global smaller firm? Int. J. Oper. Prod. Manage., 17(10): 940-952.
Lovelock C, Gummesson E (2004). Whither services marketing? In search of a new paradigm and fresh perspectives. J. Serv. Res., 7(1): 20-41.
Nicoletti B (2008). Servizi di logistica industriale attraverso il "lean and digitize, Impiantistica Italiana, 21(6): 2-10.
Nicoletti B (2010a). Gli Strumenti del Lean and Digitize. Milano: FrancoAngeli.
Nicoletti B (2010b). La Metodologia del Lean and Digitize. Milano: FrancoAngeli.
Nicoletti B (2010c). Il Miglioramento dei Processi dell'Assistenza Tecnica con il Lean and Digitize, 10: 22-23.
Nicoletti B (2006). Nuovo Pignone, l'arte di fondere Lean Management e Six Sigma, Computerworld Italia, 6: 1-2.
Ohno T (1988). The Toyota Production System. Cambridge, MA: Productivity Press.
Puschmann T, Alt R (2005). Successful use of e-sourcing in supply chains. Supply Chain Manag: An Int. J., 10(2): 122-133.
Sarkar D (2007). Lean for Service Organizations and Offices - A Holistic Approach for Operational Excellence. Milwaukee, WI: ASQ Press.
Smith T, Waterman M (1981). Identification of common molecular subsequences. J. Mol. Biol., 147: 195-197.
Sugimori Y, Kusunoki F, Cho F, Uchikawa S (1977). Toyota production system and kanban system: Materialization of just-in-time and respect for human systems. Int. J. Prod. Res., 15(6): 553-564.
Thompson P, Desouza G, Gale BT (1985). Strategic management of service quality. Quality Progress, (June): pp. 20-52.
Uday M, Chon G (2004). Applying lean manufacturing principles to information intensive services. Int. J. Serv. Technol. Manage., 5(5-6): 488-506.
Wilson MMJ, Ram NR (2009). Enabling lean sourcing: a consolidation model for small- and medium-sized enterprises. J. Manuf. Technol. Manage., 20(6): 817-833.
Womack J, Jones D (1996). Lean Thinking: Banish Waste and Create Wealth in your Corporation. New York, NY: Simon and Schuster.
Womack J, Jones D, Roos D (1990). The Machine that Changed the World. New York, NY: Rawson Associates.
Zeithaml V, Berry L, Parasuraman A (1988). Communication and control processes in the delivery of service quality. J. Mark., 52(2): 35-48.