



Self-Publishing Author Struggles to be Green and Save Green Using Conventional Publishing Methods

INTRODUCTION

The book publishing industry has undergone major changes since use of the Internet became ubiquitous. Book publishing houses continue to consolidate or close, leaving even fewer opportunities for authors to be "picked up" by publishers. At the same time, an increasing number of aspiring authors seek to be published. These converging trends are facilitating a positive tsunami of interest in self-publishing. Through ever-advancing technologies publishing books is become increasingly affordable with such improvements in the "Print On Demand" or POD digital printing, which rapidly print books with inventories as small as one (N=1). Furthermore, the increased popularity and improvement of electronic (eBook) formats creates a demand for an infinitely more affordable electronic product that generates negligible adverse environmental impacts and provides instant product delivery to the End-Customer (reader).

Each step of the book publishing process provides both opportunities and pitfalls for a self-publishing author. The revenue margins in book publishing are very small unless one writes an overnight bestseller. Even in such cases, the associated notoriety most often leads only to increased revenue through opportunities such as consulting and speaking, not from book sales itself.

OVERVIEW OF THE PROJECT

Applying Lean Manufacturing Principles and Tools to self-publishing was initially explored in the Midterm project. That analysis demonstrated the benefit of using reader-customer-based Pull Production to maintain control over inventory levels. Pull Production potentiates lower manufacturing costs and generates significant reductions in the environmental impact associated with Over-production of product. The analysis for this report delves into an application of Lean Tools that not only improve Pull Production through product offerings like eBooks, but also re-configures the Product-Oriented Layout by integrating Customer Value at the beginning of the manufacturing Value Stream process.

In order to arrive at these conclusions, several Value Stream Maps were created (both for the Midterm and the Final project) after researching the industry. The maps provided a visual understanding of the manufacturing process and revealed several areas of opportunity to eliminate Wastes and to improve the effectiveness of Non-Value-Added-But-Necessary activities. The Lean Tools deemed most applicable are highlighted in Figure 2 and explored in depth in Figure 3.

METHODOLOGY

Seven book printers were consulted as part of the research in order to understand the Value Stream via GEMBA (Japanese for "the real place") analysis. Their services, price-points, inventory volume requirements, sustainability practices, and product design offerings were compared to try and identify the best printing options for a Self-publisher. The Pilot Project for this research is a modest-sized cookbook consisting of 70 black and white pages and 40 color pages. Analysis correlated inventory runs of 1, 25, 50, or 100 to try to reveal a balance between obtaining a good price-point from the printer while maintaining low inventory levels. A book with color images was deliberately selected because color printing presents numerous common manufacturing challenges. While the entire Extended Value Stream was researched, this report emphasizes the Customer Defined Value and Printer components of the Value Stream as both these roles were deemed to have the greatest impact on the book publishing process in terms of the Lean Metrics: Waste, Non-Value-Added but Necessary Activities and Time Spent.

MANUFACTURING OVERVIEW

The Printer, representing one component of the Original Equipment Manufacturer stage in the Extended Value Stream, is the fulcrum of book publishing. Particularly for a Self-publisher, the printer establishes minimum order volume requirements and prices, which thereby largely dictates whether a particular book product is cost-effective or not. The printer controls the product quality such as the use of durable card stock for book covers and accurate color representations for images. According to online

customer reviews, production quality can vary greatly between printers and even between print runs from the same printer (See <http://createspacesucks.com/> for several examples product Defect Wastes). The printer determines whether environmentally-responsible book publishing materials, such as offering recycled-content paper options, are available. Book printers who are cognizant to the sustainability issues surrounding their services may also offer socially-responsible sourced paper that is, for example, respectful of the land-use rights of indigenous peoples living in the forests where paper pulp is harvested (FSC Forest Stewardship Council, N.D.).

Prioritizing the Customer Defined Value element of the Extended Value Stream is another way to improve the effectiveness of book publishing. In the conventional, linear book manufacturing model, there is a focus on making the book product itself, particularly as it pertains to the book's content and the production of inventory levels, which often conflict with existing consumer demand. As an example, The Green Press Initiative (GPI) noted that in 2006 within the United States, 1 billion books printed remained unsold by year's end (Eco-Libris, 2008). Clearly the industry is not producing books with sufficient Customer Value or benefiting from Pull Production.

The conventional model leads to at least five forms of Waste (Sanchez, R., 2013c, Slide 4 and Liker, 2004, Loc 750). The Wastes are: Wait and down time, Product and materials transportation, Excessive inventory levels, and related additional movement of excess product. In contrast, a Lean Manufacturing model rearranges the order for product production by first asking the paramount question: *How can this product provide Value to the Customer by providing what they need/want when they want it?* (Womack & Jones, 2003, p. 16). In Lean product design (which originated in the philosophy and practice called the Toyota Production System of the Toyota Motor Company and the ideas of business consultant, Dr. W. Edwards Deming) it is the Customer, who dictates the manufacturing process. The Customer's definition of Value, including their own product feature preferences, establishes their demand for a product.

In order to significantly reduce the wastes identified, this report recommends reconfiguring the manufacturing layout from a "product-oriented" focus to a "Customer-Reader Pull-Production" layout.

This can be achieved by:

1. Engaging the Customer at the beginning of the Value Stream to test book content before the book product is written (proof of concept);
2. Utilizing eBook formats for on-demand Pull Production by instantly fulfilling Customer orders via electronic delivery; and
3. Evaluating the success of Defining Customer Value post-sale through Validated Customer Value (defined as book sales coupled with positive feedback and/or repeat sales).

ADVERSE ENVIRONMENTAL IMPACTS OF BOOK PUBLISHING

Perhaps the greatest negative impact of book publishing lies with Over-production of physical books. Establishing a balance between Customer Demand and Inventory is always a manufacturing challenge but for the Self-publisher, this balance could be the difference between a book project producing realized economic profit or loss.

Over-production of books affects the environment in numerous ways, including: 1) reducing the carbon dioxide sink capacity of the trees harvested for the paper; 2) increasing the number of printing chemicals produced, used, and disposed of in the environment; and 3) producing methane greenhouse gases when the books are disposed of in a landfill. GPI estimates that methane landfill release alone accounts for 8.2% of the carbon footprint for the U.S. book industry (Book Industry Study Group & Green Press Initiative, 2008, p. 2).

Paper consumption is the most obvious and adverse environmental impact of the book industry, with all paper-related activities estimated to account for 97.5% of a book's carbon footprint (Book Industry Study Group & Green Press Initiative, 2008, p. 2). "Globally, 40% of trees harvested are for paper" (Green Press Initiative, 2007); although not all of that paper is used by the book industry. On a

global scale, we lose the equivalent of 36 football fields of forest each minute (World Wildlife Fund, 2013). Clearly a billion unsold books each year can lead to catastrophic environmental impacts. Two proposed solutions in addition to controlling for Over-production include 1) increasing the use of recycled-content paper in book printing and 2) increased utilization of eBook formats.

Harvard Professor, Dr. Ramon Sanchez, provided an environmental impact assessment using the sustainability metrics program SimaPro 7.3 to compare virgin paper versus recycled paper. Details of the impacts are included in the VoiceThread portion of this presentation; however, some notable comparisons of 100 kg of regular paper versus recycled paper include:

1. Carcinogen chemical output: 2.09 versus 0.74 kg C₂H₃Cl eq;
2. Aquatic ecotoxicity output: 8,974.18 versus 2,519.89 kg TEG water;
3. Land occupation: 37.93 versus 4.22 m²org.arable; and
4. Global warming impact: 125.14 versus 79.84 kg CO₂ eq (SimaPro 7.3, 2012).

In light of the above problems with using paper to print physical copies of books, eBook formats warrant serious consideration as a mechanism for the book industry to mitigate their adverse environmental impacts.

With eBooks, Customer-Readers are no longer confined to read when they have their physical book in their hands. Instead, they can read "on-the-go" and during personal downtimes because their electronic book library is always accessible through electronic devices. The Pew Research Center reports a marked shift in preference for reading on electronic devices, citing "some 43% of Americans age 16 and older say they have either read an e-book in the past year [2011] or have read other long-form content such as magazines, journals, and news articles in digital format on an e-book reader, tablet computer, regular computer, or cell phone" (The Pew Research Center's Internet & American Life Project, 2012).

The major benefit for the Self-publisher is that electronic versions of books are significantly more cost-effective to produce (at an average cost of \$300 for infinite copies of an eBook versus \$900-2,450 for 50 printed copies of the same book with color images). Additionally, at least four forms of manufacturing

Waste become irrelevant for eBooks, including Over-production, Wait-time, Transportation, and Inventory. Producing a book product in this way is an example Value Engineering, where the product is re-engineered to be more cost-effective and have a better environmental impact standard (Sanchez, R. 2013a, Slide 67).

No matter the ease or popularity of an eBook, many readers will contend that nothing will replace the enjoyable experience of reading a physical book. And while there are ample opportunities for larger entities of the book industry to improve their adverse environmental impacts due to the sheer volume of physical inventory they create; for a Self-publisher, environmentally-sustainable printing yields marginal positive environmental offsets.

This assessment holds true as long as book sales remain below the low thousands. For example, the effect of selecting an eco-friendly printer can result in the positive environmental offsets of:

1. 1 tree left un-cut (as recycled paper was used);
2. 3 pounds of waste water production avoided;
3. 4 pounds of solid waste not generated;
4. 9 pounds of greenhouse gases generation averted; and
5. 699,720 BTUs of energy consumption avoided (*based on a print run of 50 books with 70 black and white and 40 color pages*)
(Seeds Green Printing, 2013).

Several of the above metrics may not seem significant or comprehensible to the average book reader. In fact, one of the metrics, "1 un-cut tree" only represents 1/50th of the impact for the individual Customer-reader. Yet consumers in a recent study conducted by The Green Printing Initiative indicate that at least 42% of customers are willing to pay a dollar extra for a book printed on recycled paper (Book Industry Study Group & Green Press Initiative, 2008, p. 2). This statistic represents an opportunity for the green printing industry as it provides a mark-up margin in the book list price to accommodate for the use of more expensive, environmentally-friendly materials. Ultimately, it is the Customer who defines the

materials and the level of an environmental footprint through their "willingness to pay" for any associated premiums (Sanchez, R. 2013b, Slide 16).

CONTINUOUS IMPROVEMENT PROGRAM

In his 1936 book, How to Win Friends and Influence People, celebrated business author, Dale Carnegie, revealed that the publishing world had been in financial trouble since the early 1900s. One book publishing president confessed to Carnegie that in the company's last seventy-five operating years, they lost money on seven out of every eight books they published. Carnegie asked his readers, "Why, then, have I had the temerity to write another book?" (Carnegie, D., 1936, p. 12). Considering that Amazon.com presently ranks Carnegie's now 77 year-old book near its top 200 book sales each year, many business leaders and sales people continue to applaud Carnegie's audacity to publish his book. So, in order to have publishing houses keep their doors open the sales revenue of that "eighth" book that Carnegie mentions must be massive. However, if publishers were to employ Lean Manufacturing principles, such as Continuous Improvement Programs, could they shift their revenue model from a "leader-loss" to one of continued, progressive profitability? Certainly, for a self-publishing author, it is critical to improve these economic statistics, as the Self-publishing author may not have the resources (i.e. time, stamina, or funds) to experience the home run with that "eighth" book.

Just as the Printer is the fulcrum of book publishing, a Continuous Improvement Program is a comprehensive Lean Tool functioning as the engine of an effective manufacturing process. The primary goal of a Continuous Improvement Program is to identify root causes of problems and to prevent them from happening (Liker, 2004, Loc 171). Exploration of how the program can be designed are detailed in both the "To Be" Value Stream Map (Figure 3).

As for the recommended Continuous Improvement management tools, the following can be most helpful for improving self-published products: 1) Suggestion boxes; 2) a KANBAN system; 3) On-site Value Stream visits; and 4) a process review tool such as the Plan, Do, Check, Act (PDCA) system.

To Define Customer Value the Self-publisher engages potential customers using Social Media venues for Suggestion Boxes. The Suggestion Boxes can survey preferences for book formats (electronic, hardcover, spiral-bound cookbook, etc), design (color images and large picture book or compact, dense book with more recipes), and content (gourmet, organic, or easy-to-cook recipes). Commonly used Social Media sites include: Google +, Facebook, Twitter, LinkedIn, and Pinterest (Kawasaki, 2013).

Managing the Defined Customer Value phase can be distracting as there are many details. A KANBAN visual monitoring tool normally used on a manufacturing floor to maintain the flow of inventory (Leon, N.D., p. 2) is adapted here in concept as a spreadsheet system for maintaining process flow for the Suggestion Boxes.

KANBAN Spreadsheet System						
Date Began	Writer's Idea for Recipe	Recipe Written	Recipe Posted Online	Online Suggestion Box Feedback Metrics <i>after 10 days</i>	Conclusions drawn from data	Date Completed
11/26/2013	Gluten-free, vegan recipe for holiday spice cake	12/5/2013	12/5/2013	14 Retweets, 125 Facebook Likes; 4 reader's comments with ingredient substitutions	Include in cookbook but only as gluten-free recipe, readers struggled to get good results as a vegan desert	1/10/2014

Figure 1

Using Suggestion Boxes coupled with the KANBAN system can create a relatively inexpensive, risk-free mechanism to prove the concepts of the product and Define *Potential* Customer Value before making the product and expending its resources. These are vital, Value-Added, activities.

The next phase for Continuous Improvement is to employ GENCHI CEMBUTSU, the Japanese term referring to the act of "going to see for yourself" (Liker, 2004, Loc 972). Improving the relationships between the Self-publisher and other team members in the Value Stream is the key to quality control and waste reduction. Unfortunately, the Self-publisher is an external agent to the book printer, retailer, raw materials manufacturer, and the component manufacturer who actually creates the paper and

inks used for a book. As an outsider, the Self-publisher may not have much influence over the work performed by these Value Stream members; however, on-site visits develop relationships, improve communication efforts, and increase accountability. The Self-publisher can communicate his goals on making the process as efficient and/or environmentally-sensitive as possible. The Self-publisher may find that some of the Value Stream members share similar goals and together they can Co-engineer a superior book product (Sanchez, R. 2013a, Slide 54). On-site visits also provide the Self-publisher with a better understanding of the workmanship and materials involved and may elucidate opportunities to improve product quality through Error Proofing and Value Engineering to create products with reduced environmental impacts.

Beatrix Potter (1866-1943), the creator of the endearing children's book hero, Peter Rabbit, understood the value of GENCHI CEMBUTSU. While self-publishing her first book, she nearly drove the book printer as mad as Mr. McGregor, the fictional character in her stories. Her diligent oversight of the book production process, including the scrutiny of the color depictions of her illustrations included daily visits until the colors "were just right" (Lane, 1946, p. 65). It is reasonable to speculate that her attention to detail led to the high-quality imagery captivating audiences both young and old, fostering Customer Value still today.

Finally, Poet Robert Burns (1759-1796) wryly implied that the best laid plans can often go astray. Simply capturing a plan on paper, whether it is with a KANBAN spreadsheet or a "To Be" Value Stream Map, does not ensure Lean effectiveness. The only way our intentions move from plan to continuous improvement is if they transition to habits. As Fujio Cho, one Toyota Motor Company President also warned, "What is important is having all the elements together as a system. It [Continuous Improvement] must be practiced every day in a very consistent manner – not in spurts – in concrete way..." (Liker, 2004, Loc 731). To implement the habit, a Plan, Do, Check, Act system of accountability can be employed. This system not only measures what should be done, but who will do it, who will confirm it was done, what was the result, and if the result was not the desired result, then modify accordingly.

LEAN PRINCIPLES & TOOLS TO ADD VALUE

Lean Principle/Tool	Value Stream Role(s) Engaged	Corrective Action	Addresses Reduction for Waste or Non-Value Added?	Benefit
GEMBA (The Real Place)	Self-Publishing Author	Consult with 7 book printers to understand the real-world manufacturing process	Both	Research to identify best practices and build supply chain willing to support Self-Publisher's goals.
Value Stream Mapping	Self-Publishing Author	Map out process	Both	Identify Wastes, Non-Value-Added but Necessary Activities, and Value-Added Activities to reduce costs, lost time, and wasted materials
Define Customer Value	Customer-Reader, Self-Publishing Author	Use Social Media as a "Suggestion Box" for Customer-Reader interests	Waste	Decrease environmental impact of product, decrease over-production, increase revenue
JIDOKA (Automation)	Self-Publishing Author, Printer, Distributors	Develop strong relationships with printer and distributors who meet quality control standards, use their existing, automated systems for production and delivery of product	Both	Decrease: over-production, defect wastes, and wait time, plus management time; Increase profit margins
Just-in-Time (JIT) Delivery	Self-Publishing Author, Distributors, Customer-Reader	Select eBooks as the preferred book product format	Waste	Decrease customer wait time for product delivery (aka increase Customer Value), decrease environmental impact via reduction in use of materials, increase profit margins
KAIZEN (Continuous Improvement)	Entire Value Stream	Self-Publishing Author leads and perpetuates this effort	Both	Continuously looks to eliminate waste and reduce time on Non-value added but necessary tasks
KANBAN Visual Tools	Self-Publishing Author	This visual representation system is adapted to a spreadsheet format that tracks progress on the activities of the value chain. This tool can be used to Define Customer Value, track Key Performance Indicators (KPI) to ensure goals are being met, and measure progress on improvement goals, for example, track a PDCA (Plan, Do, Check, Act) system.	Waste	Reduces talent and time waste, reduces over-processing and over production of unwanted product
POKA-YOKE (Error Proofing) via GENCHI GEMBUTSU (to go and see for yourself)	Self-Publishing Author, Printer	On-site visits to printing facility to improve quality of product	Waste	Reduces defect waste
HANSEI (reflection)	Entire Value Stream	Self-Publishing Author leads and perpetuates this effort by evaluating the KAIZEN efforts via other defined metrics (KPI). For example, measuring Validated Customer Value (VCV = book sales coupled with positive feedback and/or repeat sales).	Both	Continuously refines plan to increase value, decrease time spent on non-value added, identifies more areas of waste

Figure 2

(Sources of Lean Tool Suggestions: Dr. Ramon Sanchez, the book The Toyota Way, and the article 25 Lean Tools by Vorne Industries, Inc. as cited in the References Section)

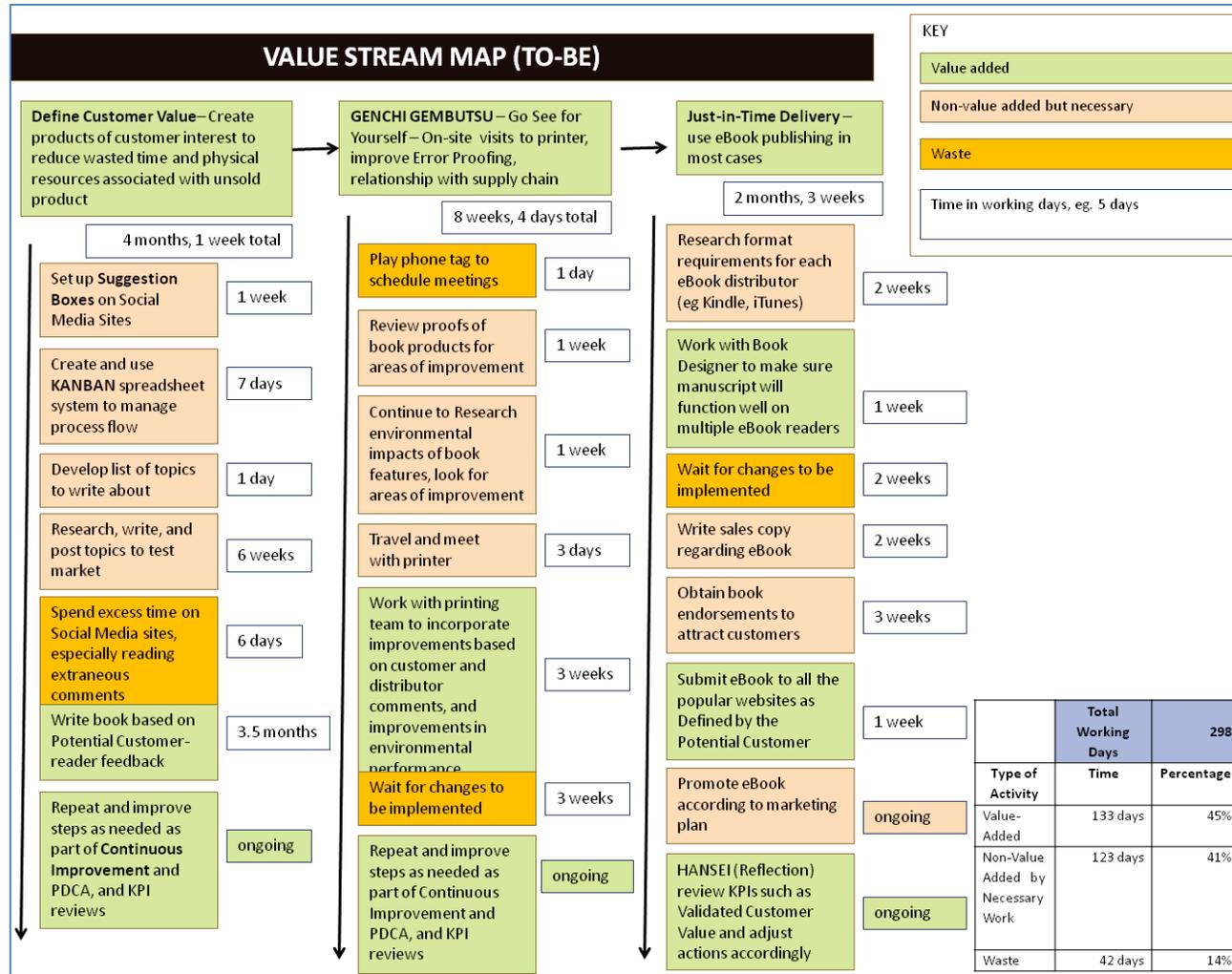


Figure 3

REFERENCES for PAPER AND VOICETHREAD

- Book Industry Study Group & Green Press Initiative. (2008). Summary of Findings from the U.S. Book Industry: Environmental Trends and Climate Impacts. Retrieved from http://www.greenpressinitiative.org/documents/trends_summary.pdf on December 3, 2013.
- Carnegie, D. (1936). *How to Win Friends and Influence People*. New York: Simon and Schuster.
- Bernman, D. K. (N.D.). CreateSpace Review: One Author's Experience. Retrieved from <http://createspacesucks.com/> on November 10, 2013.
- Eco-Libris. (April 12, 2008). Environmental Trends and Climate Impacts: Findings from the U.S. Book Industry – 3 Part Coverage of the Report. Retrieved from http://www.ecolibris.net/book_industry_footprint.asp on December 1, 2013.
- FSC Forest Stewardship Council, A.C. (N.D.). Mission and Values. Retrieved from <https://us.fsc.org/mission-and-vision.187.htm> on December 4, 2013.
- Green Press Initiative. 2008. Order Form. Retrieved from <http://www.greenpressinitiative.org/orderform.htm> on December 3, 2013.
- Lane, M. (1946). *The Tale of Beatrix Potter: A Biography*. London: Frederick Warne Publishers Ltd.
- Leon, D. J. (N.D.). *Toyota Production System and Lean Manufacturing*. Texas A&M University. Retrieved from <ftp://entc.tamu.edu/entc412/Archive/Lean1.pdf> on November 7, 2013.
- Liker, Jeffrey K. (2004). *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*. New York: McGraw-Hill, Kindle Edition (N.D.).
- Neave, H. R. (1987). Deming's 14 Points for Management: Framework for Success. *Journal of the Royal Statistical Society. Series D (The Statistician)*, Vol. 36, No. 5, Special Issue: Industry, Quality and Statistics, pp. 561-570. Retrieved from <http://www2.fiu.edu/~revellk/pad3003/Neave.pdf>.
- Poynter, D. (N.D.) Books That Were Originally Self-Published. Retrieved from <http://www.parapublishing.com/files/pressroom/155-Self-Published%20Books.pdf> on November 15, 2013.
- Public Broadcasting Service (PBS). (February 14, 2013). Kawasaki, G. Guy Kawasaki's 10 Social Media Tips for Authors. Retrieved from <http://www.pbs.org/mediashift/2013/02/guy-kawasakis-10-social-media-tips-for-authors045/> on December 2, 2013.
- Seeds Green Printing and Design, Inc. (2013). Personal Communication dated October 25, 2013.
- Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. New York: Crown Business.

- Sanchez, R. (November 24, 2012). Average Environmental Impacts of 100kg of Regular Paper versus Recycled Paper (a SimPro 7.3 analysis). Retrieved from <http://my.extension.harvard.edu/icb/icb.do?keyword=ext&subkeyword=k97458&pageid=icb.page607918> on November 30, 2013.
- Sanchez, R. (2013a). ENVR E-137: Sustainable Manufacturing and Supply Chain Management Operations, Session 1. [PowerPoint document]. Retrieved from Lecture Notes Online Web site: http://isites.harvard.edu/fs/docs/icb.topic1290622.files/Session01_Sept03.pdf on September 3, 2013.
- Sanchez, R. (2013b).). ENVR E-137: Basic concepts of Manufacturing and Supply Chain Operations, Session 2. [PowerPoint document]. Retrieved from Lecture Notes Online Web site: <http://my.extension.harvard.edu/icb/icb.do?keyword=ext&subkeyword=k97458&pageid=icb.page607924> on September 12, 2013.
- Sanchez, R. (2013c). ENVR E-137: Types of Waste, Value Stream Mapping and the Environmental Bottom Line Approach, Session 6. [PowerPoint document]. Retrieved from Lecture Notes Online Web site: http://isites.harvard.edu/fs/docs/icb.topic1290622.files/Session06_Oct8_2013_Types%20of%20Waste%20and%20Value%20Stream%20Maps.pdf on October 11, 2013.
- The Pew Research Center's Internet & American Life Project. (April 4, 2012). The Rise of E-Reading. Retrieved from <http://libraries.pewinternet.org/2012/04/04/the-rise-of-e-reading/> on November 16, 2013.
- Vorne Industries Inc. (2010-2013). Top 25 Lean Tools. Retrieved from <http://www.leanproduction.com/top-25-lean-tools.html> on December 5, 2013.
- Womack, J. P. & Jones, D. T. (2003). Lean Thinking: Banish Waste and Create Wealth in Your Corporation, Revised and Updated. New York: Free Press.
- World Wildlife Fund. (2013). Responsible Forestry. Retrieved from <http://worldwildlife.org/industries/responsible-forestry> on December 4, 2013.