Notes on Operations
A Scenario Analysis of Demand-Driven Acquisition (DDA) of E-Books in Libraries

Yin Zhang, Kay Downey, Cristóbal Urbano, and Tom Klingler

Demand-Driven Acquisition (DDA) has been commonly adopted by academic libraries in the United States for acquiring e-books in recent years. Implementation of the e-book DDA model varies by library. This paper introduces and demonstrates a scenario analysis approach for libraries to evaluate, identify, and select a DDA plan that works best for them based on their DDA program data. This approach helps address some key questions facing libraries with a DDA e-book program: How may a DDA program be evaluated under different scenarios? Does a short-term loan (STL) option make sense? And, is the current DDA implementation a good fit for the library? The implications and related issues are discussed.

I n recent years, Demand-Driven Acquisition (DDA), also known as Patron-Driven Acquisition (PDA), has been commonly used in academic libraries in the United States for acquiring e-books based on patron selection and use from a pool of potential titles. E-book providers have introduced numerous implementation prototypes, and implementation of the e-book DDA model varies by library. For example, some libraries use a short-term loan (STL) element prior to a purchase, while other libraries have set a threshold of patron usage for triggering a purchase directly without an STL. Likewise, the parameters within each business model, such as purchase triggers and contract terms, may vary by library.

Kent State University Libraries (KSUL) introduced a DDA model in January 2012 that provided about 20,000 e-book discovery records in its library catalog, with links to the e-books hosted on the ebrary platform. KSUL's DDA model uses an auto-purchase triggered by a set number of uses with no STL component. Selection criteria for DDA-eligible e-books are based on the print approval profile. Each week new discovery records are added to the local catalog and become accessible to KSU faculty and students. To date, nearly 50,000 discovery records have been added to the catalog and, of those, less than 2,500 merited enough use to trigger a purchase. In essence, the program includes the following components:

1. selected discovery pool of e-book records which are uploaded into the library catalog
2. catalog which patrons use to discover e-books and a link to their full text on the ebrary server

Yin Zhang (yzhang4@kent.edu) is Professor, School of Library and Information Science, Kent State University. Kay Downey (mdowney1@kent.edu) is Associate Professor and Collection Management Librarian, University Libraries, Kent State University. Cristóbal Urbano (urbano@ub.edu) is Associate Professor, Facultat de Biblioteconomia i Documentació, Universitat de Barcelona, Spain. Tom Klingler (tk@kent.edu) is Professor and Assistant Dean, University Libraries, Kent State University.

3. pre-set threshold for e-book usage, which when reached will automatically trigger e-book purchases
4. method to track e-book triggers and usage, which is reported by ebrary and shared with the library

Given that the DDA model is relatively new, libraries have adopted it on a "learn-as-you-go" basis. Academic libraries have employed the model without the benefit of guidelines for best practices. Today, the National Information Standards Organization's (NISO) *Demand-Driven Acquisition of Monographs* recommendation provides librarians and e-book providers with standard industry definitions and consistent methods for implementing DDA programs (www.niso.org/workrooms/dda). The NISO document covers all types of libraries, and applies to both e-books and print.

This paper provides an overview of some common e-book DDA implementation scenarios, and highlights important considerations for e-book DDA programs. It introduces a systematic approach to evaluate and compare some common scenarios using data from the KSUL e-book DDA program. The research reported in this paper addresses key questions facing libraries with a DDA e-book program:

• How may a DDA program be evaluated under some common DDA implementation scenarios?
• Does an STL option make sense?
• Is a DDA implementation a good fit for a library based on its e-book usage?

The methodology illustrated in this paper will help libraries gain a better understanding of how DDA works under various conditions and identify the scenario that works best to achieve a maximum return on investment (ROI). The paper concludes with important considerations for e-book DDA implementation and suggestions for future study.

Literature Review

The DDA Model

The major advantage of the DDA model for academic libraries is its capacity to provide immediate access to a large collection of e-books, enabling the library to purchase only those e-books that have utility to patrons.[1] The library considers which e-books they would like to make available to their users and sets selection parameters to make sure that the discovery records fall within a defined scope. When implemented properly, DDA can augment traditional acquisition models to provide a more utilitarian collection for its users.[2] Common DDA models include: (1) auto-purchase

triggered by a set number of uses, and/or (2) auto-purchase after a set number of STL transactions.

Most DDA models employ a usage formula to determine how e-books will trigger a purchase by the library. Although the trigger formulas vary by provider, a common trigger threshold is ten page turns within the body of the text, ten consecutive minutes of use, or one print, copy, or download. Also known as the 10-10-1-1-1 paradigm, a purchase or pay-per-view STL is triggered when one of these conditions is met.

There are many variables to consider when implementing a DDA program, and libraries must decide which elements are the best fit for their collection development objectives. Many libraries have integrated STLs into their DDA program. Generally, this model utilizes the 10-10-1-1-1 paradigm to trigger a certain number of STLs prior to final purchase as summarized and observed in the NISO DDA report.[3] The library presets STLs generally for one day to a week, and the STL cost varies with the duration of the loan. Once a certain number of STLs have been logged, the e-book is purchased by the library for the cost of each rental plus the list price of the e-book. For example, if the rental fee for a one-day STL is 10 percent of the list price of a $100 e-book, each STL would cost the library $10. If the STL threshold is 3, then the fourth use is a purchase. The total cost to the library is $130; $30 for 3 STLs and the $100 purchase price.

DDA Practices

Prior to the recent NISO recommendation, academic libraries employed the DDA model without the benefit of guidelines for best practices. This section provides several DDA examples to show the implementation variations and assessment variations in a number of program scenarios.

The University of Texas Libraries (UT Libraries) implemented a variation of the DDA model in 2007 using e-book content offered through the E-Book Library Corporation (EBL). UT Libraries allocated $300,000 for a DDA pilot project using STLs. This model consisted of three STLs at 5–10 percent of the list price with an auto-purchase at list price on the fourth use. The STL threshold was based on ten years of usage data captured from their NetLibrary e-books. Because a small number of their NetLibrary e-books had been used more than four times, they determined that this would be the logical formula. In cases where books were rented for more than $50.00, a mediator would determine if it was more economical for the library to purchase the book outright or to allow additional rentals.[4]

The DDA model employed by KSUL is mediated by KSUL's book approval service, YBP Library Services, and does not employ STLs. E-books eligible for the discovery pool must meet certain criteria such as the classification

requirements of the print approval plan, be published after 2011, and cost less than $200. Excluded from the discovery pool are publications duplicated in the local print collection or consortial e-book holdings. In this way, KSUL controls spending and provides access only to e-books that fit existing collection-development guidelines.[5] KSUL did not opt to use STLs with their DDA model based on some preliminary analysis. Purchase triggers consist of ten page views, ten consecutive minutes of use within a title, or one page (or portion thereof) copied or printed.

Similar to the KSUL DDA model, Emory Libraries also filter e-book availability through an approval plan service provider. They chose to use EBL as the vendor with the added requirement of three STLs effective after a five-minute browsing period. Purchase then occurs on the fourth use. In this model, the STL costs between 10 and 20 percent of the list price and, upon the fourth STL, a purchase is made. Emory justified use of this model based on data provided by EBL that most titles are browsed for less than five minutes and that 80 percent of titles are never used more than three times. Consultation with library peers confirmed EBL's findings.[6]

The University of Kansas Libraries (KU) conducted a pilot for a print DDA program. The discovery pool included specific publishers with the most expensive titles and highest publishing rates, while less expensive books continued to be acquired on approval.[7] In this model, a price cap was imposed on books for direct purchase, and those books that exceeded the threshold were loaded in the catalog for discovery. In this way KU could provide "as-needed" services for more expensive books.

Saint Anselm College in New Hampshire provides another example of a print DDA model. With this model, interlibrary loan requests that meet a certain condition are intercepted, rush purchased, made available to the patron, and added to the general collection. Because Saint Anselm College adopted the program in 2004, they have a significant amount of circulation data to assess their DDA's performance. They conducted assessment using four basic categories: circulation, appropriateness of selections, turnaround time, and cost. After studying the circulation comparison between DDA print books and those selected by faculty and librarians, they concluded that the DDA print books circulated more than those acquired through traditional means, and regarded the program as an effective mechanism to strengthen their local book collection.[8]

NISO DDA Recommendations

The NISO DDA recommendations provide an overview of the various DDA business models and give guidelines on records management, profiling, and program implementation.[9] It furnishes academic librarians and e-book suppliers with standard industry definitions and guidelines to develop sustainable DDA programs. It covers central aspects of DDA such as control over expenditures, lease versus purchase, hybrid models, and evidence-based acquisition (EBA). The document also considers key aspects of assessment and raises issues regarding the impact of the DDA model on library services, publishing, and scholarly communications.

Also useful is the section on MARC records management. Although DDA access appears seamless to the user, record management requires frequent monitoring, upgrading, and removing and replacing content due to publisher changes. The document is tremendously helpful as it outlines the variables and options that help collections managers determine which DDA scenario best fit their library. Variables such as content profile, continued use, and distributor and publisher services contribute to the program's overall cost.

Another important topic in the guidelines addresses setting goals and assessing the DDA program's effectiveness. Evaluation criteria will vary by program, but some of the more common metrics include cost-per-titles purchased and cost-per-total number of accessible titles. Although NISO asserts that the STL structure is more economical than a straight DDA model, the guidelines also caution readers that when assessing cost-per-use values, a title may not realize its true value until after a number of years post purchase.

Theoretically, the STL option offers advantages over automated purchases without STLs because an STL book purchase is more likely to be based on the needs of multiple users. Until recently, the average cost for an STL was about 10–15 percent of an e-book's list price. However, in spring 2014, a number of commercial publishers raised the cost of STLs as much as 300 percent. Some withdrew from the STL model completely as it was interpreted as not profitable, although the long-term impact of STLs on publisher revenues remains to be seen as STLs are still a relatively new practice. Academic librarians balked at this cost increase and questioned the ethical considerations of this price increase.[10] Did commercial publishers find that the STL model was truly not profitable? Could we also postulate that the STL model reduced the rate at which e-books sold and consequently destabilized the revenue stream?

DDA Assessment and Research Gap

Most published literature on DDA programs focuses on implementation practices at individual libraries. Among the reported cases with assessment components, libraries tend to compare their DDA programs with traditional print book acquisitions. In general, studies have found that usage statistics for DDA e-books tend to be higher than the usage of those selected by traditional means.[11]

KU Libraries found circulation to be higher for DDA materials than typical print collections.[12] Brigham Young University compared the expenditure, usage, and average cost-per-use of DDA with the library's traditional purchasing model, and found that while the cost is roughly the same, the usage of DDA-acquired items is much higher. They concluded that DDA is more cost-effective when compared to a traditional acquisition approach.[13]

KSUL assessed its DDA program by comparing it to its print books approval model regarding budget, costs, workflow, subjects, publishers, and usage.[14] The results suggested that (1) the DDA program aligns the library's collection with current user requirements, (2) DDA-acquired e-books tend to have more uses than print books acquired traditionally, and (3) DDA is more cost-effective as an acquisition model. Similar comparisons have also been conducted for acquired items initiated by librarians and patrons. The University of Iowa Libraries case showed that patron-selected e-books were used twice as often as those selected by librarians.[15]

There have been reported cases of possible reconfiguration of DDA programs in hypothetical what-if scenarios. For example, after studying its first year of e-book spending, Grand Valley State University found that it could have saved about $20,000 by moving the automatic purchase trigger from three to five loans. In essence, they discovered that the fifth loan was optimal.[16] This finding supports NISO's STL recommendation (www.niso.org/apps/group_public/download.php/13373/rp-20-2014_DDA.pdf), which is based on studies that show that most e-books are used only a few times.[17]

However, the benefits of STLs have not been supported in the KSUL DDA program.[18] Because of conflicting evidence regarding the STL model, more research is needed for individual libraries to analyze their e-book usage under different DDA scenarios to determine which DDA model would achieve a maximum return on investment for the library.

Research Method

KSUL started its pilot e-book DDA program with ebrary in January 2012 and continues to load discovery records into its library catalog weekly. KSUL uses the 10-10-1-1-1 trigger formula for a DDA purchase without the use of STLs. The threshold associated with a trigger is defined as any one of the cumulated uses of an e-book: ten page views; ten minutes of view; or one copy, one print, or one download. Under the license terms, any initial e-book use is free until a purchase is triggered, and any use after purchase is also free.

For this study, the timeframe for data collection ranged from the beginning of the DDA program at KSUL, January 1, 2012 to May 31, 2014. The data sources include the following:

- discovery records uploaded to the local library catalog during the period
- ebrary trigger reports for all purchased e-books with triggering details such as when an e-book was triggered, the trigger event, the purchase transaction date, list price, purchase price, eligibility for STL and purchase
- ebrary title report with e-book usage data such as number of views, minutes viewed, downloads, copies, and prints associated with each e-book title that is used during the timeframe regardless of whether an e-book is triggered or not
- Counting Online Usage of Networked Electronic Resources (COUNTER) Book Report 2 compiled by ebrary that offers detailed title usage data by month. The COUNTER reports follow industry-standards for recording and reporting usage data of electronic resources, which allow libraries to compare usage across publishers and vendors[19]

Figure 1 illustrates the sample size of each data source and the relationship among the data sets. During the review period, of the 46,858 discovery records uploaded to the library catalog, 87 percent (40,875) were not used. Among the 13 percent (5,983) of e-books that were used, only 5 percent (2,124) were used, triggered, and purchased while the remaining 8 percent (3,859) received uses, but the usage was below the trigger threshold.

As stated earlier, STL is a common option for many DDA programs and the recently released NISO report also recommends STL. For KSUL, it has been a question of whether the DDA program should also include STLs prior to a triggered purchase. To get a clear answer to the question, the following common scenarios are used for comparison:

- Scenario 1 (current KSUL DDA practice): direct purchase after first trigger without STLs
- Scenario 2 (the what-if scenario): 3 one-day STLs prior to purchase at the fourth trigger, with each STL at 10 percent of list price
- Scenario 3 (the what-if scenario): 3 one-week STLs prior to purchase at the fourth trigger, with each STL at 20 percent of the list price

According to the ebrary representative who handles KSUL's DDA program, the STL trigger threshold is the same as that for a purchase trigger threshold. It is essentially
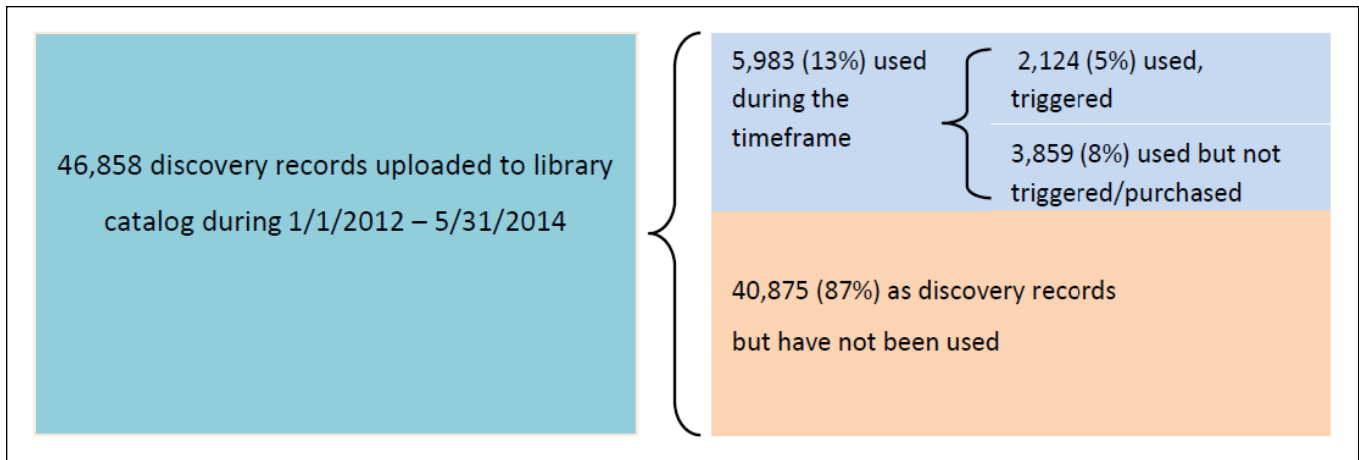
Figure 1. Data Used for Analysis

possible, based on usage data, to estimate the number of triggers per e-book, translate the usage into scenarios with STLs, and calculate the associated cost:

- 1 trigger: 1 STL
- 2 triggers: 2 STLs
- 3 triggers: 3 STLs
- 4 triggers and above: 3 STLs + 1 purchase

To calculate how many possible triggers are associated with each e-book, the researchers examined the trigger reports and found that the copy, print, and download triggers are mutually exclusive without overlap with other triggers. However, the minute trigger is tied to the view trigger. In the ebrary reports up to December 2012, all five types of triggers and usage (view, minute, print, copy, and download) are included specifically. However, in ebrary reports after this period, the minute triggers and minute usage are merged with views for reporting. The researchers used the 2012 annual trigger report to calculate the average page views for the combined view and minute triggers. This resulted in the benchmark value of 9.8 views for a trigger by view and/or minute. The benchmark for view/minute triggers is below 10 views due to some minute triggers containing low views.

Finally, the researchers developed a set of rules for calculating how many triggers a purchased e-book might accumulate in different scenarios:

1. Copy trigger count: number of copies, which is no more than the number of user sessions;
2. Print trigger count: number of prints, which is no more than the number of user sessions;
3. Download trigger count: number of downloads, up to the number of user sessions;

4. View/minute trigger count: number of views/9.8 to get the raw count; the actual count should use whole numbers without any rounding off up or down;
5. Add the above trigger counts to get the total possible triggers for each e-book.

With the methods described above, based on the actual KSUL DDA e-book usage data, the researchers were able to calculate the number of triggers that may fit in different scenarios plus the associated costs for different scenarios. This simulation approach can be replicated for other DDA programs, providing scenario comparisons leading to an implementation plan that fits a particular library.

Results

Fitting DDA Triggered E-books into Different Scenarios

All KSUL DDA triggered e-books are examined based on the method described in the Methods section. Table 1, broken down by year, summarizes how KSUL acquired e-books in different scenarios during the entire review period.

The results show that, based on the actual e-book usage, the majority of KSUL DDA purchased e-books would have been purchased either after three STLs, or due to ineligibility for STLs according to acquisition options specified for individual DDA e-books. Specifically in 2012, 83.8 percent of the triggered e-books would have been purchased in scenarios with STL options. This ratio was lower in 2013 at 70.7 percent, which could be due to the cumulative nature of e-book usage over time. This purchase ratio for 2012 to May 2014 would have been 78.2 percent. It should be noted that the three STLs prior to purchase would incur extra costs.

Table 1. Scenarios Based on Usage

Scenarios			2012			2013			1/2012-5/2014		
			No. of E-books	%	% Total	No. of E-books	%	% Total	No. of E-books	%	% Total
Scenario 1 (current KSUL DDA practice): Direct triggered purchase without STL			900	100.0	100.0	905	100.0	100.0	2,124	100.0	100.0
Scenario 2/3 (what-if scenarios): 3 STLs prior to purchase	STL distribution	1 STL	6	0.7	16.2	17	1.9	29.3	75	3.5	21.8
		2 STLs	80	8.9		155	17.1		206	9.7	
		3 STLs	60	6.7		93	10.3		183	8.6	
	Purchase	3 STLs + Purchase	675	75.0	83.8	517	57.1	70.7	1,427	67.2	78.2
		STL not eligible	79	8.8		123	13.6		233	11.0	
Total			900	100.0	100.0	905	100.0	100.0	2,124	100.0	100.0

In contrast, only a small portion of the acquired e-books would stay at the STL stage in the timeframe examined. In 2012, 16.2 percent of e-books would be available for 1–3 STLs. The percentage would be at 29.3 in 2013 and at 21.8 for 2012 to May 2014, respectively. These e-books would incur less cost for STLs than purchases. Only time will tell whether these e-books on STLs will continue to receive usage and eventually be purchased.

Financial Picture of Various DDA Scenarios

To obtain a clear financial picture, the costs for different scenarios have been calculated and the results are summarized in table 2. Overall, during the twenty-nine months of KSUL's DDA program, the actual e-book usage data leads to the conclusion that the current KSUL DDA implementation offers better ROI than an STL program. This includes lower total cost, more titles owned for future free use, lower average cost per user session, lower average cost per title used, and lower average cost per title purchased.

In a specific year, an STL option may cost less in some measures. In KSUL's case, 2013 incurred less cost in terms of the total expenditure, average cost per user session, and average cost per title used. However, the year saw a lower number of e-books owned and a higher average cost per title purchased. Over time, if the e-books with STLs continued to receive usage, it would continue to cost more to own and use them. In comparison, in 2012, all measures indicate that a DDA purchase was a better option. Essentially the STL option would cost more in all measures in 2012.

The financial scenario analysis also shows that the cost of 1-day STLs would be 26–27 percent of the total expenditure and the cost of 1-week STLs would be 41–43 percent for the KSUL DDA. It is worth noting that 19–21 percent of total expenses for the 1-day STL scenario, and 30–35 percent for the 1-week STL scenario, are for pre-purchase STLs, which is an added cost compared to outright purchase and

contributes to higher average cost per title purchased in the two STL scenarios.

It is clear that for KSUL's DDA, STL is not appropriate, and in most scenarios the STL option would be more expensive as an actual expenditure, average cost per user session, average cost per title used, and average purchase price while yielding fewer number of titles owned for future free use.

Time Factor in DDA E-book Triggers and Use

Since DDA e-book triggers are based on cumulative usage, time is an important consideration when evaluating and comparing different scenarios. This study examined the time factor in e-book triggers and e-book use pattern over time.

As shown in figure 2, 44 percent of acquired e-books in KSUL's DDA program were triggered within six months of availability in the library catalog, 67 percent within one year, and 92 percent within 1.5 years. A small portion of e-books (8 percent) took greater than two years to be triggered. Overall, it took an average of 300 days from an e-book's record upload to the catalog to a purchase trigger. This result may help DDA e-book programs establish a window for weeding e-book discovery records. It should be pointed out that the number of triggered e-books annually has been about 900 in the first two years of the program, despite the fact that the number of potential e-book titles as discovery records almost doubled at the end of the second year. At this point, KSUL's DDA program has not weeded out older discovery records, as there are no established benchmarks and practices to do so, and the library is planning to look at the longitudinal usage data as the starting point.

To identify the patterns of e-book use over time, we reviewed the usage data for e-books acquired in 2012 and 2013 through KSUL's DDA program. The following usage patterns emerged:

Table 2. Costs for Different E-Book Acquisition Scenarios

Scenario	Notes	Cost	User sessions	Titles used	Titles owned	Average cost per user session	Average cost per title used	Average cost per title purchased
2012								
Scenario 1 (current KSUL DDA practice): Direct triggered purchase without STL	Actual expenditure of KSUL DDA, no STLs	$86,115.18*	10,850	2,516	900*	$7.94*	$34.23*	$95.68*
Scenario 2 (what-if scenario): Up to 3 one-day STLs prior to purchase	Estimated 1-day STL cost is @10% of list price, 4th trigger use is a purchase @ single user list price	$97,228.11 $25,268.66 (26%) on STLs) $21,654.55 (22%) on pre-purchase STLs**	10,850	2,516	754	$8.96	$38.64	$128.95
Scenario 3 (what-if scenario): Up to 3 one-week STLs prior to purchase	Estimated 1-week STL cost is @20% of list price, 4th trigger use is a purchase @ single user list price	$122,496.76 $50,537.31 (41%) on STLs $43,309.09 (35%) on pre-purchase STLs***	10,850	2,516	754	$11.29	$48.69	$162.46
2013								
Scenario 1 (current KSUL DDA practice): Direct triggered purchase without STL	Actual expenditure of KSUL DDA, no STLs	$86,724.85	12,572	3,268	905*	$6.90	$26.54	$95.83*
Scenario 2 (what-if scenario): Up to 3 one-day STLs prior to purchase	Estimated 1-day STL cost is @10% of list price, 4th trigger use is a purchase @ single user list price	$81,960.22* $22,238.74 (27%) on STLs $15,586.90 (19%) on pre-purchase STLs**	12,572	3,268	640	$6.52*	$25.08*	$128.06
Scenario 3 (what-if scenario): Up to 3 one-week STLs prior to purchase	Estimated 1-week STL cost is @20% of list price, 4th trigger use is a purchase @ single user list price	$104,198.97 $44,477.49 (43%) on STLs $31,173.80 (30%) on pre-purchase STLs***	12,572	3,268	640	$8.29	$31.88	$162.81
1/1/2012 to 5/31/2014								
Scenario 1 (current KSUL DDA practice): Direct triggered purchase without STL	Actual expenditure of KSUL DDA, no STLs	$204,632.61*	27,648	5,983	2,124*	$7.40*	$34.20*	$96.34*
Scenario 2 (what-if scenario): Up to 3 one-day STLs prior to purchase	Estimated 1-day STL cost is @10% of list price, 4th trigger use is a purchase @ single user list price	$213,601.89 $55,497.56 (26%) on STLs $44,586.67 (21%) on pre-purchase STLs**	27,648	5,983	1,660	$7.73	$35.70	$128.68
Scenario 3 (what-if scenario): Up to 3 one-week STLs prior to purchase	Estimated 1-week STL cost is @20% of list price, 4th trigger use is a purchase @ single user list price	$269,099.46 $110,995.13 (41%) on STLs $89,173.34 (33%) on pre-purchase STLs***	27,648	5,983	1,660	$9.73	$44.98	$162.11

* = best value for the column/measure among various scenarios in a specific timeframe.
** = extra cost on pre-purchase 1-day STLs.
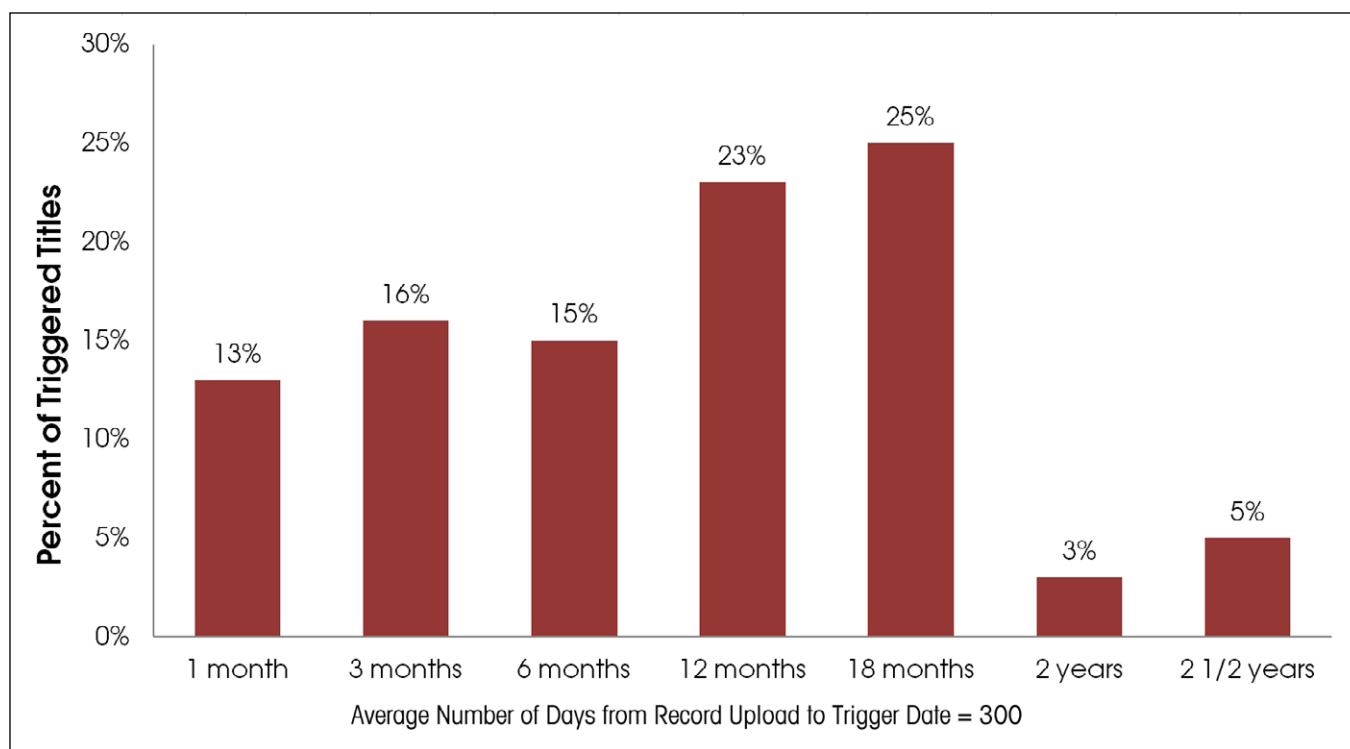*** = extra cost on pre-purchase 1-week STLs.

Figure 2. Time from Record Upload to Trigger

- The number of acquired e-books used peaks during the year in which they are triggered and decreases over time. As summarized in table 3, all e-books acquired in 2012 were used during that year, while only 42 percent were used the following year, and were used at a prorated 32 percent during the third year. E-books acquired in 2013 demonstrated a similar usage pattern for the triggers and acquiring year with some pre-trigger usage in the previous year, followed by a decreased usage ratio (39.5 percent) in the subsequent year.

- At the same time, other e-books continue to receive intense use over time as measured by successful section requests per use. Ebrary defines successful section requests as the total of the number of pages viewed, copies made, pages printed, instances of PDF downloads, and instances of full-document downloads.[20] The e-books acquired in 2012 received 85.34 section requests during that year, 47.49 section requests per used title in the subsequent year, and 75.78 section requests per used title in the third year. Of the e-books acquired in 2013, these e-books received 86.21 successful section requests per used title in the acquiring year, and 72.65 in the subsequent year. These results suggest sustained heavy usage over time for some e-books.

Discussion

This paper introduces a scenario analysis approach and illustrates how a DDA program may be evaluated under different scenarios using existing data. This data-driven simulation can help libraries understand how their DDA program would operate and perform in various scenarios without incurring actual expenses, using resources, and spending time on trial-and-error efforts. This approach may also be used to help libraries fine-tune their existing DDA programs, similar to what Grand Valley State University did to calculate the optimal number of STLs.[21] With this approach, different DDA programs can be compared and a broad evidence-based recommendation of best practice may emerge.

Results of this study clearly indicate that the current practice of KSUL's DDA program, i.e., purchasing e-books outright, is a good fit for the library based on its e-book usage. Additionally, the results show the common DDA practice of three STLs prior to purchase would not work for KSUL's DDA program. In the 29-month duration of the DDA program, 67.2 percent of the e-books purchased outright would have been purchased anyway after three STLs, which would have incurred 21 percent extra and unnecessary expenses on 1-day STLs and 33 percent extra expenses on 1-week STLs. The extra expenses would have resulted

Table 3. Usage of Acquired e-Books Over Time

Purchase timeframe	Usage timeframe	# of e-books used (percent in # of acquired)	Section requests	Section requests per used
2012	2012	900 (100%)*	76,802*	85.34*
	2013	379 (42%)	17,997	47.49
	2014 (prorated for the whole year)	285.6 (32%)	21,643	75.78
2013	2012 (pre-trigger)	99 (11%)	696	7.03
	2013	905 (100%)*	78,021*	86.21*
	2014 (prorated for the whole year)	357.6 (39.5%)	25,980	72.65

* = best value for the column/measure for the acquired cohort.

in a higher purchase price for e-books acquired in the two scenarios with STLs, a result also found in analysis of the e-book program in California State University–Fullerton's Pollak Library.[22]

The findings of this study add to the debate about STL as a general recommended practice, and challenge the notion that the STL option is necessarily more economical for academic libraries than a DDA model that uses triggered purchases only. More research on various types of libraries is needed to gain a better understanding of the conditions and context wherein STLs are a better option than triggered purchases and vice versa.

Since DDA, STL, and purchase outcomes are based on cumulative patron e-book usage, time is a key factor when evaluating and comparing DDA programs and scenarios. This study and previous studies have shown that while e-books experience decreased post-trigger usage overall, some e-books continue to receive heavy post-trigger use.[23] For a detailed assessment of e-book acquisition and collection development, it would be helpful to identify the profile of this set of e-books with sustained use. Likewise, the profile of e-books with little or no post-trigger use would also be valuable for collection assessment and development.

It should be noted that this study and most previous DDA research focuses on finances and e-book usage to evaluate DDA programs. There are other important considerations that could affect DDA implementation decisions. Other considerations and factors may include user experience and satisfaction; user needs; library services; balanced collection development; subject/discipline; technical service workflow; publishers, authors, and scholarly communication.[24] In particular, the NISO DDA recommended practice calls for a DDA model that works for publishers, vendors, aggregators, and libraries, and it is crucial that DDA models are sustainable for all e-book stakeholders involved.[25] However, it is unclear exactly how to achieve this desirable balance.

The results of this study also raise new concerns about removing the DDA "deadweight" from the catalog. That is, if 87 percent of eligible DDA e-books have never been used

and most e-books that are used are triggered within the first eighteen months of availability, further analysis of what is not used may provide insight about records that should be removed from the discovery pool. We know that factors such as an older publication date and superseded editions may be good targets for periodic weeding, but as this study has shown, other dynamics such as length of time in the catalog should also be a consideration.[26] Subject analysis and metadata associated with the discovery records need further investigation to determine what variables are important to the issues of weeding.

Conclusion

This study aimed to address key questions facing libraries with a DDA e-book program: how may a DDA program be evaluated under different scenarios, does an STL option make sense, and is the current DDA implementation a good fit for the library? A scenario analysis based on actual DDA usage data shows that for KSUL, STL does not appear to be a cost-saving option for the DDA e-books model. We know that for KSUL, time is an important variable when comparing different e-book DDA scenarios. Other factors, such as discipline and subject, need further exploration for their role in e-book model comparisons. Because of numerous variables involved in each model, such as size and parameters of the discovery pool, it is difficult to make a broad-based conclusion on KSUL data alone. Further studies could include the application of this methodology against data from similar programs. In this way, the analysis could be applied to other e-book DDA programs for a general picture of e-book DDA best practices.

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