# HOW DO SELF-CHECKOUT KIOSKS IMPACT PUBLIC LIBRARIES

by

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Abstract

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The public library always utilizes new technology for the benefit of the patron. Nowadays, instead of sifting through a card catalogue shelf, one simply has to peruse the online database attached to the library website, using the KOHA system to keep track of materials and patron accounts. Patrons are also able to checkout their materials without the interaction with a staff member at the front desk. What benefits do these self-checkout kiosks bring to the library and the patron? This independent research study is going to look the quantitative data found through the Middleton, Wisconsin Public Library. This study will research the history of technology utilized by the library, leading to the use of self-checkout kiosks, how the library staff needs to be trained with new technology, the role of the patron in such a new form of library transaction, the logistics that go into the planning and implementation of such devices on the library floor, and this will collect quantitative checkout data provided by the Data Services Consultant of the South Central Library System of Wisconsin, as well as the Middleton, Wisconsin Public Library monthly board reports to compare the data to see which format of checkout is preferred by the patron. The data is solely comprised of quantities found for public use through the website under the “library board” tab where the monthly reports are located.

TABLE OF CONTENTS

# LIST OF TABLES

## Introduction

Libraries always utilize new technology to the benefit of the patron. The card catalogue is non-existent thanks to the online catalogue. Without card catalogues shelves, there are now online databases that can be accessed from home, as well as from the computer terminals at the public libraries. Many libraries use radio frequency identification (RFID) chips to assist in security measures so that materials are less likely to be stolen. The RFID chip passes through the library's front gate and an alarm blares when the materials don't go through a magnetic swipe to disengage the security. Currently, more and more public libraries are compiling kiosks in their locations to allow patrons to check out materials on their own, without the interaction at the front desk to disengage the security. Patrons are taught how to disengage the security at the self checkout kiosks. With this new method of checkout, several questions arise: What brought about the use of self-checkout kiosks? Do the checkout kiosks make an impact on the traffic numbers? What were the library traffic numbers at libraries prior to the installation of the kiosks? What were the traffic numbers of libraries after installation? What assumptions are made concerning a public library utilizing automated checkout kiosks? Does this change in traffic impact personnel/staffing/training? How is the library traffic data observed to show which method of checkout is utilized more? The purpose of this study is to attempt to answer these questions, explore the history of these self-service checkout kiosks, and look at the impacts these machines have on public libraries, utilizing one location: The Middleton Public Library of Middleton, Wisconsin. Adding a substantial machine such as these kiosks requires logistical research and planning prior to the actual purchasing and implementation of the device. Not only do board members have to be convinced, but the patron needs training for operational use, to show the positives of the addition of such a machine. The annual director's report of the Middleton Public

Library (2018) states that the location is "the busiest in the SCLS" (p. 3), and I aim to prove this statement with this research I will conduct.

## Research Questions

1. What is the history of self-service checkout kiosks?
2. How do self-service checkout kiosks impact libraries?
3. What were the circulation numbers prior to the implementation of the self-service checkout kiosks?
4. Why are the specific locations selected for the kiosks?

## Methodology

The history of the self-service checkout kiosks will mainly be researched in the literature review. The core data for this study will be extrapolated by an interview with the Data Services Consultant of the Wisconsin South Central Library System (SCLS). This will be ethically sound, as the desired data is only library traffic numbers from the checkout desk before and the numbers from after the installation of self-service checkout kiosks in the building, not specific patron data. This portion of the study will not require private patron information, only quantitative data to compile and compare. I will also perform data analysis to determine which format of checkout (front desk or self-service) wields more traffic numbers at the location. This will offer empirical data to compile to show either an increase or decrease in library traffic. These will also reveal whether library traffic increases or decreases after the installation of the self-service checkout kiosks. This study will use the empirical data to have a data analysis to compare the circulation data of front desk checkout versus self-checkout. The tables with the information will show the percentage differences between formats. An email interview

will be conducted with the Middleton Public Library director to find the year that the self-checkout kiosks were installed.

## Literature Review

First, the study will look to the history of the self-reference checkout kiosk, and the technology used in these machines to keep track of library materials from within and without. According to Emmett Erwin and Christian Kern (2005), libraries have started utilizing radio frequency identification (RFID) as a form of security measure to prevent the theft of materials. The writers discuss how "A library RFID system can keep track of user history, the life cycle of a book, and hence enables the librarian to keep better inventory and better security control of the library" (p. 21). This is the technology the librarian uses to swipe across a magnetic device at the front desk to prevent the activation of a sensor at the front door. Typically, patrons that set off the alarm at the gate have to go back to the front desk to determine whether or not the materials were checked out or not. This is figured by comparing the items checked out to the items in the patron's account or receipt. After the material is swiped again, the sensors will not activate and the patron is allowed to leave with the materials. This looks to be the starting point where the patron plays more of a role in the checkout interaction. By that, I mean that the patron is now required to ensure all materials are present during checkout to prevent alarms being set off thanks to the implementation of the RFID security. Mark Dehmlow (2017) depicts how many in the library occupational field feel about new technology utilized in library settings. He discusses how "Technologically-driven change regularly outpaces generational personnel turnover in libraries, and given that technological change continues to grow exponentially, it is clear we need a flexible workforce and an organizational commitment to training and professional growth" (p. 5). This looks to the staffing aspect when these technological overhauls come into play.

Librarian staff members have to learn about their new machines to be able to teach the patron how to expertly utilize the machines. Constant learning is one of the impacts these machines bring to the libraries on the staffing side of the front desk. With new technology, librarians always have to learn and understand more about the new technology in order for the patron to accomplish quicker and smoother self-checkout transactions. With self-checkout kiosks, most patrons need to learn how to operate the machine appropriately, so that the RFID security is properly swiped. Patrons learn from the set of instructions set next to the kiosk, or the kiosks have the instructions laid in the screen as part of the checkout process, as installed by the library staff.

To continue the theme of "continued education," these new technologies bring automation to the library in order to give the patron more responsibility with the library's materials. However, this also places more responsibility on the staff members to understand the technology to be able to teach the patron how to fully understand the technology. John Abdul Kargbo (2009) shows how academic librarians need to continue their own education as well when their buildings utilize new technology when he states "To keep up with these challenges, therefore, academic librarians are attempting to become experts in computer and telecommunication systems, databases, and a host of other technologies that are today commonplace in their libraries and the parent institutions they serve" (p. 44). Not only is this technology applicable to public libraries, this is for any type of library: academic, law, etc. In order to better serve the patron with the new technology, the staff members have to have more than a passing knowledge of their machines for the patron to understand how to operate the new technology. This is but another impact these kiosks bring to the library staff members, which raise new areas of study: Are there library positions solely for the maintenance of these kiosks

with new technology always popping into libraries? Is the annual budget trimmed to afford these machines, or do libraries perform fund-raisers to avoid red tape with federal funding? Do these machines require specific training for the staff members for repairs, or is there a third party involved with fixing the machines when they are down? Continued education can only bring so much knowledge to implement, but regulations and contracts cannot be altered on a whim. Would the library staff void any warranties on the machines by attempting repairs to the machine on their own? Again, this emphasizes the notion that implementing any new technological changes brings both positives for the patron and staff to the table as well as a different set of problems to contend and deal with.

Despite these self-checkout kiosks popping up at libraries, there are numerous managerial factors that have to be considered before the purchase and implementation the device(s) at the library location. Lori Driscoll (2005) points out the list of requirements staff members need to enact prior to making the purchase of such a kiosk. The requirements are self-explanatory and simple to understand. For example, the "space, cost, marketing, placement location and staff impacts" (86) are just a handful of the common sense requirements researched prior to purchasing a kiosk. The list is so detailed that even the placement of barcodes on the library materials are taken into consideration, as well as how much time, money and effort needs for such an endeavor to implement a self-service checkout kiosk. The placement location needs to be able to be seen across the library, to show the patrons a separate location for checking out materials, while not obstructing other patrons or library operations. The Middleton library typically has the self-checkout kiosks located around the front desk, near the entrance, near the restroom, and even near the front desk, but never obstruct traffic.

Lori Ayre (2016) looks to the use of these kiosks. She makes a point to note that "Self-service technologies, including self check-out and self check-in systems, allow patrons to handle the transaction work of circulation so library staff can focus on other needs of patrons" (359). This shows some of the positives of the implementation of this device in a library setting. The staff is allowed more time to work on daily tasks and projects for the library, while the kiosks maintain transaction quantities. For example, the automated system that checks in materials means that library staff do not need to sit at a computer to manually scan each barcode, and allows the staff to operate more on the library work floor.

A library, or any organization for that matter, needs to go through the logistics of adding or subtracting something to the building, and how that change will affect the building and the workers. Adding a self-service checkout kiosk has the potential of increasing library traffic when the front desk is busy with more patrons. More veins of checkout traffic look to be beneficial for a library's checkout traffic numbers. Already, the Middleton Public Library (2018) posts monthly figures for material checkouts, with January's figures revealing that the three self checkout kiosks were responsible for 49.4% of total circulation (p.1).

Nowadays, libraries are starting to be designed with new technology, such as the self-service checkout kiosks, already implemented and integrated to have the floor plan ready for ease of library traffic. Peter Gisolfi (2014) looks at the ways libraries are using new technologies and the reasoning behind the decisions. Two of the "nine new ways we use libraries" (p. 24) include the use of automated self-service technology. The writer shows that "Automated self-checkout reduces or eliminates the circulation desk… automated materials handling systems in larger libraries free up staff and shorten wait times" (p. 24). These machines bring positive changes to the libraries that also bring their own set of differences to sort out. The staff needs to

be quicker to help patrons, due to increasing library traffic, population sizes and patron satisfaction. Time becomes less of a factor when self checkout kiosks are used by the patrons, increasing traffic numbers while cutting time attached to checkout interactions. This means that the productivity for the staff needs to be reorganized to ensure that operations do not lose time attached to the different tasks with the added time created by the kiosks.

The library staff wants to help the patron. The journal "Library Technology Reports" (2016) shows how the library places an emphasis on the patron through the use of "Ranganathan's 1931 laws" (p. 6). The fourth rule is "to save the time of the reader" (p. 6). This shows how the library, as an institution, is around for the benefit of the patron. Utilizing self-service checkout kiosks allows users another avenue to check out their library materials when the front checkout desk is busy. Look to the past implementations of technology. The computer systems/online catalogue, the use of free Wi-Fi in the library, and these kiosks all exist to benefit the patron in some form. Patrons can use the computers for multiple reasons, such as filling out work applications, studying and learning in general. The free Wi-Fi allows users internet access for their mobile devices. The self checkout kiosks allow patrons a quicker transaction and exit with their materials.

According to Edwin S. Thompson and Joana Pwadura (2014) bring up the problems that automation can bring to a library. While their study concerns an academic library in Africa, the problems encountered are ones that any automated library can encounter. The main problems include "power outages, maintenance culture, technical skills, security, and financing" (pp. 73-75). While all of these problems involve money in some form, the financing would be the high priority problem in any library, due to the strict annual budget. Making room for the machine on the library floor, the training of the staff, remaking barcodes that operate with

the checkout machine, and how much power it draws on a daily basis would need to be analyzed and scrutinized right down to the penny to ensure the fiscal feasibility of utilizing such a technology. Implementing any new device is a costly measure that will have financial drawbacks. These setbacks may even be enough to scare board members away from purchasing such an item without an itemized list of all of the logistics attached to such a machine and how its installation would affect the library in question. Security would be the second priority in a world where private information can be hacked from a server without the patron's knowledge. Library cards have a barcode number attached to one's library account, so a checkout places the item in the patron's account. One of the cornerstones of the American Library Association is allowing private information, information from one's library account, to remain private. This can get a bit tricky, especially in the age of the US Patriot Act and the Freedom of Information Act. Checking out in either format, front desk or self-service kiosk, changes the information in one's account, and should only visible to those that have access: This includes the librarian administering the checkout, and the patron with the account. Technical skills and maintenance culture go hand-in-hand, due to the nature of continuing education on the part of the library staff. Librarians don't just sit behind the front desk and shush people for being too loud. Librarians are active in their methods of assisting patrons in their endeavors, be they for material searches, or in learning how to operate the computer systems to search for information. Librarians are also taught how to operate the computer systems to repair simple problems, so that the computer can still operate correctly after the problem is solved. Power shorts and outages, while still important in the case of the patron and the library, are last on this list. Power outages are a problem that can be rectified by ensuring the wiring in the building and the machines are safely constructed and protected from typical wear-and-tear, and accidental damage. However, if a library cannot

maintain power with new technology one would need to examine the bigger problem with the location and figure out how to repair such a situation, or whether or not the device can be properly implemented in the location. Patrons don't want their checkouts interrupted because the station and library lights go out.

Kylie Lacey (2014) brings up interactivity blending with automation in the library activity. The writer points out that "when schools talk to vendors, the conversation should be about how automation software can facilitate easy learning" (p. 57). This shows how the patron is emphasized in the decision to implement these devices. The product must be quick and easy to use so that patrons do not get frustrated and give up on the new technology. This is why librarians train with the new checkout technology prior to unveiling the machines on the library floor. Without the patron, the library is nothing; therefore, the patron is to be assisted in learning the operations of new technology, which includes the self-service checkout kiosk. The staff maintains the kiosks by having the appropriate knowledge, tools and staff to correctly service the devices. Machines, much like vehicles, need regular cleaning and maintenance to operate optimally. A simple cleaning routine can keep the electronic kiosk dust-free and prevent electrical accidents involving dust particles. The staffing portion of this subject calls attention to the budget issues. Should there be staff trained solely for the maintenance of such a device, or does the staff need to contact the manufacturing company to send a maintenance worker to repair the device?

With this automation used in libraries there is a different form of interaction between users and libraries. Matt Enis (2017) looks to how digital libraries are paving the road for checking out materials through smart phone applications (app). There is a digital library known as OverDrive that allows users to checkout digital copies of e-books and digital copies of audio

books. Enis notes that OverDrive, a prominent digital library connected to many library systems across the country, is starting to branch out with a new "libby" card sign up (p. 24). The Overdrive library currently operates similarly to a physical library. There are popular items that numerous people want to check out. However, the digital library places arbitrary user holds over the digital file, when that is an antiquated and unnecessary concept for a digital library. Instead of anybody being able to check out, download, read/listen, and the file is automatically removed after a set time, the digital library places a hold on the item in question if there are more people wanting access to that information. Another way to help "save the patron time" would be to allow a broader amount of access to the digital files. This means allowing the patron to checkout a title for a set period of time without the wait time for holds, and allowing the file to be accessed by all at any time.

## Limitations

The data will be compiled from only one library, the Middleton Public Library, as this is the sole library location of the city. This is also due to personal financial restraints so only one location can be selected. This library location is also the only library branch that I have found that publicly posts its board meeting minutes and monthly reports with the required checkout figures. This data will not utilize figures from the year 2016, as the library had to be shut down between February and March due to roof maintenance and that skews checkout data. That year did not have "typical" checkout quantities due to the traffic impact caused by the closure. This will look at the impacts made to one single library location. This is not a research study for the entire seven surrounding counties of the South Central Library System (SCLS), as that would stretch resources and give more data than is necessary. The time frame of study will occur between 6/25/18 – 8/13/18. This study will compare two sets of a three-year progression: recent

data will be looked at between 2013 through 2015, while the second set will look at three years prior to the installation of the self-checkout kiosks, 2001 through 2003. There will be very few interviews with the location's staff members, as the bulk of information will come from the Data Services Consultant, Jodi Hoesly, of the SCLS to determine the library traffic of the Middleton Library prior to and after the implementation of self-service checkout kiosks. This study will also only utilize traffic numbers obtained from the monthly board meeting director's reports and from the interview with Jody Hoesly. The pre-installation data will be comprised of yearly quantities. This is due to how the information was collected and sent by Jody Hoesly. There will be no written surveys to contribute to qualitative data, as the bulk of this study will mainly comprise of the checkout figures. Finally, there are notable differences in combined total checkout quantities for the years of 2014 and 2013. According to the monthly board reports, the total checkouts for the year 2014 is supposed to be 723,897 checkouts, while the math only adds up to 723,847, and the report shows the total for 2013 to be 774,215, while the math reveals a total checkout quantity of 774,255. I will be comparing the checkout quantities with the checkout data I compile through the math: I will use 774,255 for 2013 and I will use 723,847 for 2014 because that is what the math tells me the totals should be. I find the front desk checkout data by subtracting the self-checkout monthly data from the total monthly data. In order to ensure that the quantities add up correctly, I will use the 2013 and 2014 totals I found through compiling the data, which show differences from the monthly board reports. I was not able to locate the missing 50 checkouts for 2014 nor could I find the reason for the 40-checkout discrepancy for 2013. While this study will show the impact of on traffic quantity at this specific location, this will not speculate numbers made without the kiosks, as different factors affect how and when people checkout materials from a library.

## Research Data Compilation

I am first utilizing the monthly checkout quantities of the Middleton, Wisconsin Public Library from January 2018 through June 2018 to show the current totals between the two formats of checkout represented in Table 1, in order to give a current, half-year example of the multiple forms of checkout data. Tables 2 through 4 show the front desk checkout data, the self-checkout data, the combined monthly amounts, and the percentage differences between the self checkout quantities compared to the total quantities across 12 months for years 2013 through 2015. All quantity data can be located at the Middleton, Wisconsin Public Library website under the monthly library board reports. Table 5 contains the checkout data from a period of three years (2001 through 2003) to show quantities made prior to 2004. An email correspondence with the Middleton Public Library Director, Jocelyn Sansing, revealed that the self-checkout kiosks were installed in 2004. The data for Table 5 was collected by the Data Services Consultant, Jody Hoesly, of the SCLS.

**Table 1: 2018** (so far)

| Month | Front Desk Total (A) | Self checkout Total (B) | Total Quantity (C) | % Difference B/C |
|---|---|---|---|---|
| January | 30,912 | 30,580 | 61,942 | 49.4% |
| February | 28,803 | 26,914 | 55,717 | 48.3% |
| March | 32,352 | 32,861 | 65,213 | 50.4% |
| April | 29,775 | 29,072 | 58,847 | 49.4% |
| May | 29,030 | 28,640 | 57,670 | 49.7% |

| | | | | |
|---|---|---|---|---|
| June | 32,626 | 36,993 | 69,619 | 53.1% |
| Total | 183,948 | 185,060 | 369,008 | 50.2% |

**Table 2: 2013**

| **Month** | **Front Desk Total (A)** | **Self checkout Total (B)** | **Total Quantity (C)** | **% Difference B/C** |
|---|---|---|---|---|
| January | 36,959 | 28,323 | 65,282 | 43.4% |
| February | 33,473 | 26,077 | 59,550 | 43.8% |
| March | 37,922 | 30,097 | 68,019 | 44.3% |
| April | 36,469 | 27,611 | 64,080 | 43.1% |
| May | 31,690 | 27,613 | 59,303 | 46.6% |
| June | 35,462 | 33,733 | 69,195 | 48.8% |
| July | 39,489 | 35,684 | 75,173 | 47.5% |
| August | 37,424 | 32,596 | 70,020 | 46.6% |
| September | 33,777 | 26,505 | 60,282 | 44.0% |
| October | 35,035 | 29,010 | 64,045 | 45.3% |
| November | 33,568 | 28,113 | 61,681 | 45.6% |
| December | 33,357 | 24,268 | 57,625 | 42.1% |
| Total | 424,625 | 349,630 | 774,255 | 45.2% |

**Table 3: 2014**

| Month | Front Desk Total (A) | Self checkout Total (B) | Total Quantity (C) | % Difference B/C |
|---|---|---|---|---|
| January | 36,353 | 27,476 | 63,829 | 43.1% |
| February | 31,986 | 25,869 | 57,855 | 44.7% |
| March | 35,735 | 29,215 | 64,950 | 45.0% |
| April | 32,134 | 26,971 | 59,105 | 45.6% |
| May | 29,934 | 25,494 | 55,428 | 46.0% |
| June | 32,040 | 29,688 | 61,728 | 48.1% |
| July | 36,404 | 33,192 | 69,596 | 47.7% |
| August | 33,312 | 29,661 | 62,973 | 47.1% |
| September | 30,269 | 26,138 | 56,407 | 46.3% |
| October | 32,027 | 28,076 | 60,103 | 46.7% |
| November | 30,396 | 25,808 | 56,204 | 45.9% |
| December | 30,783 | 24,886 | 55,669 | 44.7% |
| Total | 391,373 | 332,474 | 723,847 | 45.9% |

**Table 4: 2015**

| Month | Front Desk Total (A) | Self checkout Total (B) | Total Quantity (C) | % Difference B/C |
|---|---|---|---|---|
| January | 31,898 | 27,205 | 59,103 | 46.0% |

| | | | | |
|---|---|---|---|---|
| February | 29,091 | 25,113 | 54,204 | 46.3% |
| March | 32,754 | 27,780 | 60,534 | 45.9% |
| April | 29,863 | 25,868 | 55,731 | 46.4% |
| May | 30,127 | 24,625 | 54,752 | 45.0% |
| June | 34,524 | 32,492 | 67,016 | 48.5% |
| July | 36,954 | 32,178 | 69,132 | 46.5% |
| August | 34,177 | 31,700 | 65,877 | 48.1% |
| September | 31,297 | 27,377 | 58,674 | 46.7% |
| October | 31,717 | 27,363 | 59,080 | 46.3% |
| November | 30,083 | 27,418 | 55,501 | 49.4% |
| December | 29,847 | 25,209 | 55,056 | 45.8% |
| Total | 382,332 | 332,328 | 714,660 | 46.5% |

**Table 5: Pre-installation checkout quantities**

| Year | Checkout Quantity |
|---|---|
| 2001 | 491,793 |
| 2002 | 520,440 |
| 2003 | 527,939 |
| Total | 1,540,172 |

## Results and Analysis

The results reveal that self checkout kiosk quantities contribute to approximately 41 percent to 51 percent of checkouts at this library location, when compared to the total combined checkouts. Patrons conducting their own checkouts assist in increasing circulation traffic, when compared to the yearly quantities prior to the installation of the kiosks. However, despite the inclusion of self-checkout kiosks, the quantities from the units rarely exceed the front desk checkout data. There is almost always a range of 2,000 to 8,000 checkouts in terms of difference between the formats, with the front desk interactions being the primary form of checkout among patrons. The board meeting director's reports reveal the difference in checkout usage of front desk versus self checkout kiosk. The combined total checkout quantities for 2013 through 2015 show 2,212,762 total checkouts (both formats) over the course of those three years, while 2001-2003 only show a total of 1,540,172 checkouts made with only the front desk format. The 2001-2003 total is 69.6 percent of the 2013-2015 total checkout data, which shows how much the library traffic has grown with the installation of these kiosks. One bit of information came as a surprise: Despite the checkout quantities for 2013-2015 being higher than the 2001-2003 numbers, the former data indicates a slow decline in checkout quantities, while the latter shows an increase as time progresses. The combined totals begin in 2013 with 774,255 checkouts, while 2014 shows 723,847 and 2015 rounds up with 714,660 total combined checkouts. That is a 7.7 percent drop of 59,595 checkouts over the course of three years, despite the inclusion of self-checkout data. This revelation can bring up a new topic of study: Why does the recent yearly total checkout data show a decline despite the inclusion of self-checkout kiosks? This can branch into studies of population growth/decline affecting checkout quantities, to show the affect population has to library operations. This location is one point in a seven-county area with

multiple city library locations, and this study can look to which locations receive more traffic and why.

## Conclusion

This study looks at the impacts to the library from the implementation of automation in the form of self-service checkout kiosks. The history has shown how the public library has always utilized new technology for the benefit of the patron, right down to the form of security on the materials. The library staff and patron experience a short portion of time dedicated to transition with the installation and staff training to ensure the patron can operate the new technology smoothly. Libraries are starting to have these devices implemented in the designing and planning of a library location, to plan out a better work floor flow with the devices in place on paper. As with any new form of technology installed, there are benefits, as well as new challenges to contend with that the library staff members will be trained to deal with in the daily operations of new resources, and the patrons have to learn the new forms of checkout. In addition to the self-checkout kiosks, there are also new forms of checkout and new forms of material to checkout. With the creation of OverDrive, libraries are joining the digital library to allow patrons to checkout digital materials on their device of choice, and interact with the materials in a new fashion, such as through one's smart phone or tablet. The data collected has shown that the implementation of self-checkout kiosks has increased the checkout traffic when compared to the pre-installation data. However, there was a new form of information that was discovered that was not part of the intended study. The total checkout data of the three recent years reveals that the checkout traffic is slowly declining, despite the installation of the kiosks. This discovery opens up new veins of checkout data study to determine the cause of this slow decline. The quantities are still better than the pre-installation numbers, but the declining yearly

totals offer new study topics. There are many factors that can affect checkout quantities and library traffic, but those are for another study.

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