The development and application of a unique percentage-based allocations formula at the University of Windsor

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ABSTRACT

This article summarizes the literature concerning allocation formulas and outlines the development and application of a percentage-based allocation formula as part of the monograph budget at the University of Windsor. It outlines the elements of the formula, the rationale for selecting those elements and a review of the allocation formula after the first year of implementation. Unique to our formula are two elements: we selected to use the actual book price paid and to use circulation data from the actual book funds.

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1. Introduction

The University of Windsor is a mid-size comprehensive university in Southwestern Ontario, Canada. Established in 1857 as Assumption College, a religious institution, it became a public institution in 1963 comprising several formerly independent colleges. The Leddy Library serves as the main library for more than 140 undergraduate and graduate programs across nine faculties as well as nine co-operative education programs available to over 16,000 full and part-time students. A second library on campus, the Paul Martin Law Library, serves faculty and students in the Faculty of Law. The budgets for the two libraries are separately administered, and this paper deals only with activities in the Leddy Library.

Until the mid-1980s, the Leddy Library's budget was administered by the faculty members in the various academic departments. When responsibility for the budget was transferred to the Library, the process of allocating budgets along departmental lines was maintained. The budget was broken down into two main budget lines, monographs and serials, which were then each subdivided by academic departments roughly reflecting the academic departments of the University. Monographs are further subdivided into three separate funds for firm orders, standing orders, and approval plans. Not all subject areas have approval plans, and it is at the discretion of the subject specialist how the area's monograph budget is distributed among the three funds. Academic programs and departments have grown and changed as the institution transformed from a small, liberal arts college into a comprehensive university with a focus on three pinnacle areas for research: automotive engineering, environmental science, and social justice. In the mid-1990s, the Library created a third main budget line for electronic resources that was not directly tied to any one subject discipline. At first small, the electronic budget has now grown to make up approximately three-quarters of the Leddy Library's allocations budget.

Over the years, only minor adjustments have been made to the allocations budget in response to these institutional and environmental changes. Motivated in part by a perceived discrepancy between the Library's budget and the current needs of the campus, the Leddy Library's Strategic Plan 2005–2009 mandated a thorough review of the library's collection budget. The primary reason for the review was to ensure that the budget was being spent in the most effective manner possible to meet the teaching and research needs of faculty and students and consequently to help fulfill the mission of the Leddy Library and the University.

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More specifically, there was a recognized need for accountability and transparency for the budget process, there was a need to identify and address historical inequities and allocation problems as there have been major shifts in the University's programs and enrolment, and there was a need to address the overall fund structure. There have also been major shifts in the publishing and distribution of scholarly information. All of these factors necessitated a thorough review of the budget allocations process for the Leddy Library.

2. Budget allocation working group

In February 2005, librarians with collections responsibilities selected members to serve on the Budget Allocation Working Group who would conduct the review and report back to the librarians and administration with recommendations for the budget process. The membership of this group comprised librarians with collections responsibilities in the Arts and Humanities, Economics and Business, the Sciences, and the Social Sciences. The Group commenced its work in March 2005 and worked throughout the summer. A member of the group had been earlier assigned to conduct a review of the relevant literature concerning budget allocations with a particular focus on the use and applicability of allocation formulas. This review was presented to all librarians with collection responsibilities in January 2005, prior to the selection of the Group members. Consequently, the literature review served as a starting point for discussion.

3. Literature review

There is extensive literature on the topic of budget allocations and the applicability of allocation formulas in libraries. Research topics have ranged from the generic question of how many libraries allocate by a kind of formula to comprehensive reviews on the different formulas to research regarding the development and implementation of specific formulas at individual institutions.

3.1. Formula use

In the early 1940s, Muller explored the question of the extent to which academic libraries incorporated allocation formulas into their operations and found 73.3% apportioned the budget among academic departments; in the early 1970s, Greaves' survey of academic libraries in the Southeastern U.S. found that 67.5% of respondents reported allocating funds to departments (quoted in Budd and Adams) [1]. While the second figure is slightly smaller, Budd and Adams note that both surveys "indicate that a majority of academic libraries were, in past years, using allocation formulas of some sort" (p. 382). Budd and Adams surveyed 834 academic libraries (with minimum expenditures of $100,000 a year) and inquired if many of them used an allocation formula and if they were pleased with it. They had a relatively low response rate (42.8% or 357 responding libraries) and financial constraints precluded more than one mailing of the survey; however, 40.6% of the respondents indicated that they used "some sort of formulation" (p. 384). The question of satisfaction with formulas was answered in the affirmative by 77.5% of respondents while 22.5% indicated dissatisfaction. A notable feature of this study was the range of institutions included in the survey as respondents ranged from very small (enrolment of less than 1000) to large institutions (enrolment exceeding 30,000).

3.2. Formula factors

Budd and Adams' study also traced the history of allocation formulas in academic libraries, starting with Hekhuis's paper of 1936 which proposed a formula based on student hours (both junior and senior) and courses offered by academic departments, weighted in terms of dependence on library resources. Stetson followed Hekhuis and suggested similar factors but altered the weightings (quoted in Budd and Adams, p.382). Indeed much of the discussion and debate in the literature focusses on what formula best achieves objectivity and what are the appropriate variables/factors to include in a formula.

Tuten and Jones [13] aimed to identify common elements in allocation formulas and to provide guidelines for their implementation in small university and college libraries. To this end, they surveyed over 273 college and small university libraries (with a student population range of 1000 FTE–5000 FTE) and received a 70% response rate with 40% of reporting institutions using some kind of allocation formula while others were in the process of developing one. Their survey also measured: the portion of budget/availability of funds allocated by formulas; public/institutional knowledge of formulas; use and elements of formulas (noting the common elements of various formulas); and revision frequency. Additionally, this publication included actual examples of the various formulas in use at the reporting institutions. Several studies also noted the importance of library use by discipline/subject; the use and importance of serials and monographs by academic discipline and the number and levels of degrees awarded by discipline [3,12,9].

In addition to these surveys, numerous articles discuss the development and implementation of formulas in individual institutions, ranging in size from small to large libraries. The article by Donna Packer [7] is an example of such a study and is also useful as she provides a table that succinctly summarizes several case studies and outlines the various variables, the problem model (e.g. linear, multiple correlation), funding units (e.g. departments, disciplines) and materials covered by the formula (e.g. books only, books and serials). Most recently, an article by Kitti Canepi [2] aimed "to determine whether common elements in published fund allocation formulas could be used to articulate 'best practices' available for fund allocations in libraries" (p. 13). Her

research analyzed 28 allocation fund formulas to determine the statistically significant elements within these formulas and found that the most frequent components of the formulas were: enrolment/number of students, cost/price of the materials, use/circulation followed by the number of faculty (p. 17).

3.3. Advantages and disadvantages

Common in the literature are discussions of the relative advantages and disadvantages of using allocation formulas. Critics note the following problems associated with formulas: Schad [10] says they fail to identify specific collection needs and to develop long-term plans to meet them; they are designed without sufficient attention to their distributional impacts; their component variables may be arbitrary or based upon weak theoretical grounds [11]; they may not work well to satisfy accreditation agencies, they do not resolve the issue of which fund should pay for interdisciplinary titles, and they may not adequately address library collections for new programs or classes [14]. Wall also notes that allocation formulas may not accommodate the purchase of an expensive set and may not be flexible enough to allow for block purchases.

Proponents of formulas counter these claims by outlining the following advantages: they are pragmatic; they provide a way to demonstrate accountability in specific and quantifiable terms that meaningfully relate the goals of the library to the goals of the university; they ensure objectivity and consistency by measuring each department against the same criteria [5,11,4]. As such, the annual application of formulas can allow the library's allocations to better reflect changing conditions within the University; facilitate inter-institutional and/or interdepartmental comparisons; allow for comparisons from year to year and encourage reasonable planning for collection development [11,4,3]. The flexibility critique is countered by noting that the formula need not be viewed as absolute and fixed; instead, it should be seen as a set of initial allotment figures to which justifiable alterations may be made [8]. Sweetman and Wiedemann [12] further suggest formulas could accommodate extreme allocations through the "introduction of constraints on the formula and/or allocations outside the formula" (p. 275). As Rein et al. [9] note, these constraints "are shaped by an acknowledgement of political considerations involved in changing the status quo" (p. 30). Methods to counter negative distributional impacts include applying the formula only to funding increases [6], applying the formula to a percentage of the budget or by placing limits on how much a fund can be decreased through the formula's application [4].

Additionally, the literature review also revealed three prominent types of formulas: unweighted, weighted and percentage-based. An unweighted formula consists of variables judged to be of significant and equivalent importance. An advantage with this is all items are assigned equality of value; a disadvantage of this approach is that all variables may not be perceived as of equal and significant importance. For a weighted formula, the variables are assigned coefficients or constants indicating weight. The coefficient is adjusted according to the importance of each variable, as perceived by those implementing the formula. The major advantage is that libraries implementing the formula can assign importance to variables deemed valuable to a particular institution. A disadvantage is that, in order for it to be a successful tool, all parties involved in the use and implementation must agree to the weights assigned. A percentage-based formula is effectively a weighted formula in which the variables are assigned specific portions or percentages of the budget. The advantages and disadvantages of percentage-based formulas are identical to those for weighted formulas.

4. Monographs formula

From the outset, it was clear that an allocations formula could be applied only to the Leddy Library's monographs budget. Like many other libraries, our print serials are in a state of transition. For a number of years, the Leddy Library has cancelled print serials where electronic is available. The majority of our electronic journals are purchased through large packages, and these are paid out of the electronic resources fund, so as a result it is no longer possible to connect single titles back to specific funds.

As we began work on a possible monograph allocations formula, it was necessary first to exclude certain monograph funds that are not connected to specific departments on campus: reference, rare books and special collections, government documents, and general monographs. General monographs fund collects in the areas of library science and higher education, as well as picking up titles that might not otherwise be selected by a discipline-focussed collection librarian. The working group recommended that the allocations for these four funds be set on an annual basis under advisement from the collections librarians. A fifth such fund, for Canadian materials, has since been created.

The remainder of the Library's monographs budget would then be distributed among the discipline specific funds according to the formula as developed; however, subject specialists would retain responsibility for determining how to divide their departmental budgets among the firm order, standing order, and approval plan funds. In developing the monograph allocations formula, we opted to use a percentage-based formula. It was felt that percentage-based would allow the flexibility of a weighted formula with the advantage of being relatively simple to implement and understand. Five factors were identified for inclusion: undergraduate, graduate student, and faculty population, use of the collection, and book price.

4.1. Undergraduate population

Undergraduates as a group are by far the heaviest users of the library, although as individuals their use is inconsistent. We were able to look at three possible measures for the undergraduate population: head counts, full-time equivalents (FTEs), and student

equivalency units (SEUs). The first two measure enrolment in programs, whereas SEUs measure enrolments at the course level. It was felt that SEUs might be a better predictor of library use, on the basis that library use for undergraduates is primarily driven by the demands of coursework. Undergraduate SEUs were included in the formula and given a weight of 35%, calculated on a five-year rolling mean.

4.2. Graduate student population

Graduate students make up approximately 10% of the student body at the University of Windsor, but as individuals are significantly heavier library users than undergrads. The University does not collect SEU data for graduate students, so we were left to choose between head counts and FTEs to represent grad students in our formula. We elected to use FTEs, and assigned a weight of 10%, calculated on a five-year rolling mean.

4.3. Faculty population

While relatively small in numbers compared to students, faculty can be expected to be relatively heavy users of the library, and will also have a strong interest in the library in terms of their research and teaching needs. We chose to include only full-time faculty members, weighted for 5% of the formula, calculated on a five-year rolling mean. Although 5% seems small, it is larger than the student values as a proportion of the total population. The three population-based factors account for a total of 50% of the formula.

4.4. Use of the collection

While user populations certainly provide one measure of expected library use, it is understood that different disciplines use the library differently. Circulation data should account for differences in use. However, our initial inclination, to evaluate circulation data based on LC classification, proved unworkable. Too many areas of the library do not correspond to any of the departmental areas represented by our funds, and by the same token, a number of departments are interdisciplinary in ways not anticipated by LC classification such that relevant materials are distributed throughout other areas of the collection. As a result, the decision was made to use circulation data tied back to the specific fund which purchased the item. Further, rather than use the raw number of circulation counts tied to a specific fund, which we felt would privilege those funds that had historically been better endowed, we opted to use the number of circulation counts per title purchased by a fund. This has the advantage of basing this element of the formula on actual experience, and arguably can provide one measure of evaluating the success with which librarians are collecting relevant materials for their areas. Use of the collection was given a weight of 40% within the formula, calculated on an eight-year rolling mean. The decision to use an eight-year rolling mean for this factor was based in part on the data available and in part on the desire to give books purchased a sufficient period of time to come to the interest of our patrons.

4.5. Book price

It was also recognized that book prices vary widely among disciplines. A number of methods for establishing book prices by discipline were examined. For example, a number of book vendors provide data of this nature. However, we opted to base this factor on our own experience, using the actual prices paid for individual titles in calculating the book price value. We elected to use the median price paid within the last 5 years, to be calculated on a rolling basis going forward. Median price was selected to offset any anomalies introduced by the occasional purchase of very expensive or (more often) very inexpensive items. Book price was given a weight of 10% within the formula.

Finally, within each factor we evaluated a number of methods of determining the allocation to each department: raw numbers, rankings, quartiles, and percentage of the whole. The last of these was selected as the option providing the greatest flexibility and nuance.

4.6. Mitigating factors

To evaluate the impact of the numerous variables in our formula, we developed a spreadsheet that allowed for a variety of models to be tested. In doing so, we noticed that, while changing any of the variables naturally led to changes in the output, the general trends were the same regardless of the model that was applied. Specifically, certain funds (notably Mathematics, Computer Science, and the five Engineering funds) would receive significant increases whereas as others (English, History, Languages) would have been hit with very significant decreases. It was further noticed, when reviewing the various models, that the funds most volatile were generally the smallest. This was most extreme in the case of the five funds that served the different departments within the Faculty of Engineering, all of which were quite small. Combining these funds into one for the purposes of the formula was found to have a considerable calming effect on the numbers in this area, such that although Engineering still received a significant boost in the final analysis, the numbers were much more in line with what we were seeing in other areas.

In a further attempt to mitigate the potential negative distributional impacts that would have resulted with a strict application of the formula, it was decided that there would be no decreases to the base allocation of any fund for the first fiscal year (base allocation from the 2005/06 fiscal year). Only funds that, according to the formula, should have base budgets greater than their

2005/06 base allocation received increases for the 2006/07 fiscal year. This was achieved by first calculating a theoretical base allocation as predicted by a strict application of the formula. For each fund, the change over the previous year's allocation was then determined. For those funds that would have received a decrease, the change was re-evaluated to zero. Available funds were then distributed to those funds designated for an increase according to the size of the fund's theoretical increase as a proportion of the actual funds available.

Finally, it was recognized that the impact of the formula as developed would be relatively slow, and that this might present challenges for areas in which new programs are being developed. For a number of years, there has existed a pot of money, somewhat arbitrarily set at $38,000, that has been made available as one-time funding. Strictly speaking, it has been spent at the discretion of the University Librarian, but on the basis of recommendations made by the collections librarians. The Working Group recommended that the 38 K fund be continued to support new programmes or, where appropriate, one-time expensive purchases.

5. Conclusion

One further recommendation of the Working Group was that, for the first year of the formula implementation, a significant increase of $100,000 (19%) be made to the Library's monograph funds. For a number of years, monograph funds had been frozen, in part because of the pressures placed on the budget by spiralling serials and electronic resource costs. The $100,000 would not only make up some of the lost ground, it would also go some way towards redistributing funds to traditionally underfunded areas without radically altering the focus of the Library's monograph allocations and without disadvantaging areas that have traditionally been, and remain, well funded. It was further recommended that, for future years, 20% of any overall acquisitions budget increase would be added to the monographs base budget. Normally, this would mean an increase to the monographs budget of approximately 5%. Future increases would be distributed as determined by the application of the formula, allowing for a gradual shift in the focus of the monographs budget to reflect the desired inputs more accurately.

The Working Group's report also recommended establishing an Allocations Advisory Committee whose members would review the monographs budget formula towards the end of the first year of implementation (March 2007) and determine if some fine tuning of the formula is required for 2007/2008. This preliminary review was completed, resulting in no significant change to the formula. The implementation of the formula has been deemed a success after its first year, and the second year's implementation is going forward as planned. A full review will be conducted for the second year (March 2008) and, if the recommendations are implemented for the long-term, the monographs budget formula will be reviewed every 5 years.

Going forward, the Allocations Advisory Committee will need to consider other developments in collection development that affect the budget allocation process. The rapid growth in digital content and the trend towards consortial purchases have enormous budgetary impacts. At Leddy, the percentage allocation of the budget to consortial purchases (both nationally or provincially) has grown considerably in recent years. As a result, collection development decisions move from an individual to an institutional level, and there are a number of possible models for determining how the decisions are made at an institutional level with subject-specialist input. Until very recently, the large majority of consortial purchases have been for complete journal packages — desirable to most academic institutions although such suites may include titles that the library may not normally purchase. Publishers are now beginning to offer similar "big deal" packages in e-books. Leddy Library has had several thousand netLibrary and Safari titles for a number of years and, in 2007, we enlarged our holdings of e-books by purchasing several titles on the MyiLibrary platform. For the most part this purchasing has been title-by-title, and the number of titles purchased annually has been relatively small compared to our print purchases. However, the potential for growth in e-books, the increasing number of available packages in which a large, interdisciplinary suite of titles is available, and the difficulties inherent in comparing e-books with print (for example, in the area of use statistics) will pose significant challenges for a formula-based approach to monograph allocations.

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