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Fred Reich

University of Wollongong, reich@uow.edu.au

A. Abraham

University of Wollongong, aabraham@uow.edu.au

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ACTIVITY BASED COSTING AND ACTIVITY DATA COLLECTION: A CASE STUDY IN THE HIGHER EDUCATION SECTOR

**Fred Reich
Financial Services
University of Wollongong
Australia**

**Anne Abraham
School of Accounting and Finance
University of Wollongong
Australia**

Abstract

This paper presents a non-traditional method of collecting staff activity data at an Australian university for the purposes of more accurately and completely identifying costs for use in an activity based costing (ABC) model. A discussion of the use of ABC in the nonprofit sector, with particular emphasis on higher education, is followed by a description of the research site and the previous data collection method. Four alternate methods are compared and analysed in the light of various selection criteria, with the revolving door workshop (RDW) being the preferred alternative. The paper reports on the implementation of the RDW and concludes that it is an effective method in the critical process of staff activity data collection as part of broader activity-based management in universities.

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ACTIVITY BASED COSTING AND ACTIVITY DATA COLLECTION: A CASE STUDY IN THE HIGHER EDUCATION SECTOR

INTRODUCTION

A significant body of literature exists suggesting that activity-based costing (ABC) is a useful method for determining product costs while avoiding the cost distortion that is an inherent failing of traditional methods of costing [1, 2, 3, 4, 5, 6]. The strength of ABC is its capability of handling overhead and support costs that are substantial in service industries and, increasingly, in manufacturing environments. Activities are central to the application of ABC [7] and hence the requirement for detailed activity data is an important component of the success of ABC models. While much has been written extolling the virtues of ABC [8, 9, 10], little information is available on activity data collection; one of the cornerstones of the advanced capabilities of ABC. Further, few ABC studies have focussed on the nonprofit sector, and in particular universities. The peculiar requirements of universities make this topic particularly important to university administrators considering the implementation of ABC [11]. This paper addresses these two gaps in the accounting literature by examining a non-traditional process of collecting activity data at a regional Australian university for the purposes of more accurately and completely modelling costs using ABC.

ABC is a methodology used to express the consumption of organisational resources by the firm's activities, and the subsequent consumption of those activities by either other activities or the firm's products or customers. ABC is used to cost a variety of things for a variety of purposes; for example, activities that are performed in carrying out work in organisations can be costed on a unit basis ("cost per invoice produced") which can then be used as a measurement basis in examining efficiency and making improvement efforts. Profit determination for products, however remains as the pre-eminent use of ABC [12]. For not-for-profit organisations (NPOs), ABC supports managers in making more fact-based decision-making [13, 14, 15] emphasising resource allocation and cost recovery [16].

Much of the NPO sector focuses on funding versus profitability. Stakeholders of NPOs, often taxpayers, need to know that the funds they provide are wisely used. Funding resources are limited and this gives rise to competition amongst NPOs for those funds. As a result, many NPOs turn to the private sector to borrow funds [17]. ABC is used by managers in many of these organisations to link program inputs and outcomes, improve service, describe funds use, and more recently, outsourcing and benchmarking [18, 19, 20].

Shared services (often termed overheads) are the central services groups that exist in most medium and large organisations across all sectors. These services are often prime targets for outsourcing [21]. The fact-based data that ABC can provide helps NPOs manage this process by either putting the existing service on a path to become more like its external counterparts or to prove that the service is at a suitable level of competitiveness. Where outsourcing is not the chosen option, ABC can be used to support cost recovery and recharging within the organisation [22]. In fact, ABC's precision costing capabilities make it useful for costing for internal and external purposes. For example, health care providers in the United States use ABC to determine the cost of procedures where reimbursement can be from multiple payers and may depend all or in part on an estimate of costs to provide services [16]. However, case studies of two Finnish hospitals reveal that while "adopting ABC was seen as a sign of accurate pricing", the actual product costs obtained as a result of the project "were not put to use in pricing" [23, p. 44].

Nevertheless, the methodology is still in the formative period as sector usage is by no means pervasive. This paper adds to the existing literature by specifying a method of staff activity data collection that could be of use for organisations yet to implement ABC.

ABC IN THE HIGHER EDUCATION SECTOR

Managers in the higher education sector in the United Kingdom started using ABC in the mid-1980's. However, the rate of implementation was not high with Cropper and Cook [24] reporting that only nine percent of institutions surveyed had implemented ABC. In the face of funding rationalisations, managers of European universities have also recognised the need for a new approach to strategic management whereby a holistic view of their activities is required [13, 25]. In the United States, the majority of the sophistication found in management accounting in the higher education sector consisted of strict line item budgeting at the organisational unit level [26].

ABC has also been used in the higher education sector to inform the examination of the plausibility of charges for support services that were otherwise free [27]. Further, validation that different student groups may have drastically different cost profiles has been underpinned using ABC [11, 28].

Despite these reports of improving utilisation of ABC in the higher education sector, there is very little practical guidance on the collection of staff activity data. Indeed,

Costing initiatives have met with limited success, in part because insufficient attention has been paid to the allocation of staff time to activities, with a proliferation of methods ranging from the limited use of timesheets to the arbitrary percentage apportionments based on the analysis of individual diaries [24, p. 36].

A number of Australian universities have recently introduced ABC. Ernst & Young [29], reporting on the trial introduction of ABC into three universities: RMIT University, Murdoch University and Charles Sturt University, asserted that the past deficiency in accurate cost information was of little concern to the universities since they had been operating in a relatively non-competitive environment. However, this has now changed, since "in light of the increasingly competitive environment and the numerous other challenges that are currently facing the sector, universities must have timely, accurate and precise knowledge of all their costs" [29, p. 7]. Nevertheless, the data has been removed from the section headed "Data Collected and Reported" because data "trials were restricted in scope and duration and there was some doubt about the veracity of the data" [29, p. 17].

In 2002, as the initial phase of the development of a strategic management cost framework, Monash University used ABC to identify and cost support service activities using an agreed cost driver [30]. This allowed the university's existing focus on revenue distribution to be replaced by a new focus on the management of identified costs. This in turn led to improvements in value delivered and quality of service. In 2003, Edith Cowan University (ECU) introduced ABC "to assist management with information for strategic issues analysis, development of unit pricing and predictive costing" [31]. However, neither Monash nor ECU provide any information on the activity data collection phase.

This study provides a timely and cogent solution to some of the problems associated with the collection of staff activity data in universities. The next section of the paper describes some

of the problems encountered by the University of Wollongong (UOW) associated with the critical part of ABC of collecting activity data from people.

THE RESEARCH CONTEXT

The UOW is an Australian regional institution with 15 000 full-time equivalent student load (EFTSL) and 1600 full-time equivalent (FTE) staff. UOW's research intensity twice earned the institution Australian University of the Year Award, and in 2005, UOW was named the country's number one teaching university. Less heralded is its strong financial administration, having recorded surplus results for twelve of the last thirteen years. One component underpinning its financial management strength is its use of ABC to enhance cost consciousness throughout the institution.

TABLE 1
FINANCIAL YEAR 2003 AUSTRALIAN UNIVERSITY EXPENSE PROFILE
COMPARISONS

Item	Total New South Wales as a % of total expense	Total Other as a % of total expense	All Institutions as a % of total expense
Academic Employee Benefits	29.7%	31.0%	30.6%
Non-Academic Employee Benefits	28.1%	26.2%	26.8%
Depreciation and Amortization	7.2%	7.0%	7.1%
Buildings and Grounds	3.1%	4.7%	4.2%
Bad and Doubtful Debts	0.4%	0.4%	0.4%
Borrowing Cost	0.2%	0.4%	0.3%
Other Expenses	31.4%	30.3%	30.6%

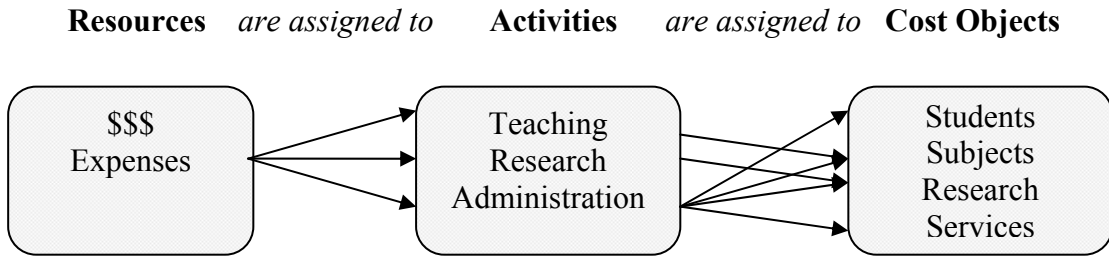
Activities are a central component of ABC (as shown in Figure 1). Thus, collection of activity data is one of the most critical parts of assembling a cost model using ABC [24, 31, 32]. Without careful planning, a number of issues may arise with activity data collection which have the capability of derailing an institution's cost modelling efforts.

ABC requires multiple information sources, the materiality of which determines the level of modelling effort. Table 1 confirms the magnitude of employee costs in higher education in Australia with total benefits representing 57.4% of total expenses.

The table also shows that Non-Academic Employee Benefits represents a large expense category for the sector, and thus requires attention with regard to cost modelling.

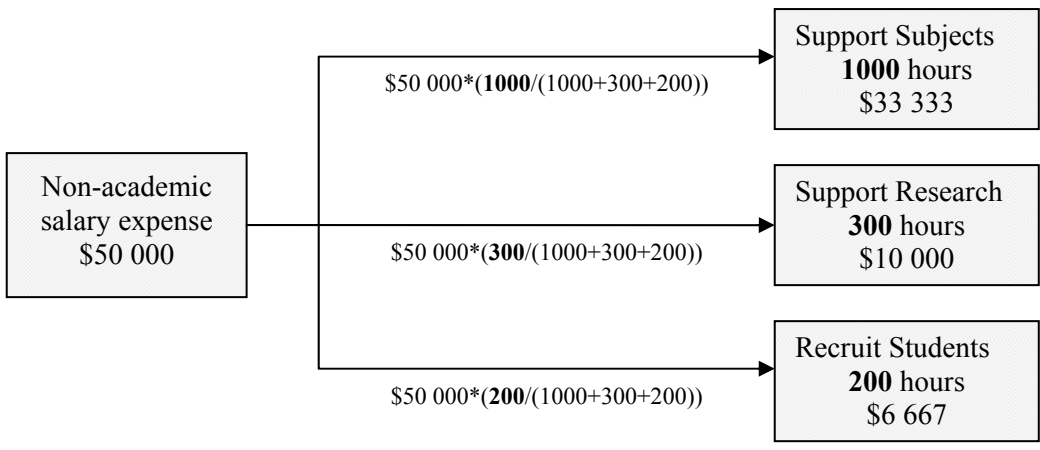
To avoid this, university employees need to understand the objectives of collecting activity data in order to allay any suspicions [11]. Secondly, the staff activity-collection process should be managed carefully and include communications with the human resource department and staff union bodies.

**FIGURE 1
BASIC OPERATION OF ABC**



A cost assignment is the apportionment or distribution of cost from a source object to a destination object based on the consumption of the source object by the destination object. The degree of the observation of the consumption relationship determines if the assignment method is known as *direct tracing*, which is directly observable or *driver tracing*, the term for consumption that is not directly observable [33, p. 34]. For example, in Figure 2 the activities Support Subjects, Support Research, and Recruit Students consume non-academic salary expenses in proportion to the amount of time spent on each activity as depicted and are therefore direct tracing where directly observable.

**FIGURE 2
THE MECHANICS OF A COST ASSIGNMENT**



This mechanism relies on a causal relationship between the source and destination objects and availability of data for destination objects. Many sources of information in universities are readily available, such as general ledger expenses, course and subject data, and library lending information. However, non-academic staff activity data does not typically reside in system databases making collection challenging given the range and depth of tasks performed by non-academic staff members. A clear, logical, and documented list of the activities performed by non-academic personnel is a premise for any method of accumulating activity data.

ACTIVITY DATA COLLECTION AT UOW

PREVIOUS DATA COLLECTION METHOD

Until recently, the UOW ABC model relied heavily on position descriptions for non-academic staff activity data. Driver tracing, using assignment of non-academic salary expense in academic units to activities used a position category weighted by salary level and FTE, was used. Assignment of faculty non-academic salary expenses utilised a multi-stage assignment scheme. Employee benefits were first assigned to position categories, then to an associated activity, and finally the associated activity was then reassigned to relevant activities or cost objects as shown in Table 2. In addition, the assignment of non-academic salary expenses in academic departments hinged on assumptions about activities related to position titles.

DEFICIENCIES IN PREVIOUS DATA COLLECTION METHOD

Although assumptions of the previous collection method were logical, known deficiencies existed. One example was that computer systems officers perform a number of activities *in addition* to systems maintenance, and the end consumers of the activities performed by these staff members were not limited to students (as specified in Table 2). Secondly, the assignment of the cost of administrative assistants and faculty officers was on the same basis as the academic staff members in their departments, despite the fact that there was not validation for this assumption. Thirdly, substantive work was required to distinguish between professional and technical officers with respect to tasks and identity, with academic record management unlikely to be the only activity in which these staff members were engaged. Further data collection may delineate other consumers of these individuals and activities including research.

For the activities non-academic staff performed, the model reflected a low level of granularity and thin hierarchical structure. Explaining the modelling of non-academic staff costs was difficult because the assignments lacked substance. Accordingly, non-academic staff cost assignment bases needed refinement and improvement. Consequently, the collection of non-academic staff activity data was required. The first step, described in the following section, was to select the most appropriate activity collection method.

SELECTION OF THE NEW ACTIVITY COLLECTION METHOD

Preparation of a plan for collecting activity data needed careful consideration as the perception of the staff population and the validity of the data collection were equally important to the ongoing success of the cost modelling efforts of UOW.

Four parameters were used to assess and consider collection methods. First, data had to be collected within three months in order to accommodate other operational requirements, ABC reporting, and the timeliness of the data once collected. Secondly, the project's cost needed to fit both within the departmental budget constraint and within a reasonable overall cost limit. Thirdly, specification and definition of the activity structure was part of the requirement for the project as the activities currently used were unsatisfactory. Finally, the method of collection needed to fit the staff culture in a positive way that would enhance the visibility, transparency, and image of the institutions costing efforts. Four methods of data collection were considered: electronic surveys, interviews, timesheets and the revolving door method.

TABLE 2
STAFF ASSIGNMENT METHODOLOGY AT UOW UNDER PREVIOUS SYSTEM

Position Category	Associated activity	Associated activity assignment
Administrative assistants	Human relations	To academic activities on the basis of academic staff hours
Computer systems officers	Systems maintenance	Students cost object on the basis of EFTSU
Finance officers	Financial record management	Subject admin activity and research activities based on academic staff hours
International officers	International student recruitment	International student recruitment activity
Faculty officers	Business process development	To academic activities on the basis of academic staff hours
Laboratory managers	Facilities operating costs (student services)	Evenly assigned to laboratory subjects
Professional and technical officers	Academic record management	Students cost object on the basis of EFTSU

Electronic Surveys

The two principal forms of electronic surveys are email and online database types, with the strengths of the methods including re-usability, and efficiency. However, by using electronic methods there would be a struggle to meet the three-month deadline, principally because of the time-consuming requirement to prepare the activity listing. Difficulty in representing the activity structure effectively would detract from the validity of results as respondents would likely tend to regard the exercise as too difficult and tend to take the easiest path to completion. Further, the response rate for electronic methods tended to be a function of the level of direction to participate, a variable that was difficult to predict in advance. Accordingly, the electronic survey response rates expected could be low. Finally, the clinical and non-personal nature of e-surveys did not suit this type of collection because of the negative perception that could ensue.

Interviews

Three different forms of interviews were considered: individual, work-centre supervisor, or corporate knowledge-holder. Although holding the potential for the greatest learning about actual activities performed, individual interviews would be very expensive and due to the extensive time commitment involved, would be unlikely to meet the time deadline. Although the work-centre supervisor or the corporate knowledge-holder formats were strong in the cost and staff development areas, the lack of an activity listing would challenge the time-frame constraint. The interview alternative ranked above the electronic option, as they were personal, although not public. Nevertheless, interviewing corporate knowledge-holders or work-centre supervisors could be viewed as inequitable as treatment between departments might not be assumed to be the same.

Timesheets

Recording timesheets for a two-month period represented the worst political alternative because of the stigma attached to them. Additionally, if specified activities were disregarded, the expected cost could vary significantly and results might be invalid. The timesheet method would also have difficulty achieving the three-month completion parameter, due to the additional time required for derivation of the activity list.

Revolving Door Workshop

Finally, a non-traditional method called the revolving door workshop¹ (RDW) was considered. Three strengths the RDW method were that it included an activity list used and tested by other institutions, it could be concluded within three months, and it was not only personal but also very public. Thus, the RDW method was adopted since it best met all selection criteria, as summarised in Table 3.

**TABLE 3
COMPARISON OF DATA COLLECTION METHODS
AGAINST SELECTION CRITERIA**

Method / parameter	Timeliness	Cost	Culture
Electronic survey	☑	☑	☒
Individual interviews	☑	☒	☒
Supervisor interviews	☑	☑	☒
Corporate knowledge-holder interviews	☑	☑	☒
Timesheets	☑	☒	☒
Revolving door method	☑	☑	☑

Furthermore, the revolving door workshop method was the only method to have satisfied the organisational culture test, and although not the least costly method (see Table 4), it rated much higher due to its public and open nature.

THE REVOLVING DOOR WORKSHOP

The RDW is an innovative approach to capture staff effort spent on activities. Workshops are conducted in a large area such as an examination hall or a foyer of a large building. Participants are provided with a sheet of coloured stickers upon arrival at the venue. The workshop environment is prepared with a number of large “activity sheets”, each measuring approximately one metre by sixty centimetres and representing a distinct activity, for example, “Manage Student Enrolments.” Sheets also include the function the activity belongs to, for example, “Provide Student Support Services” as well as examples of individual tasks associated with the activity, for example, provide transcripts services, citizenship, residency changes, or provide reinstatement services. Participants are assisted in placing their stickers among activity sheets consistent with assessment of their job over the previous year. The average length of time participants spend completing the workshop is fifteen minutes.

¹ The Revolving Door Workshop method was first developed by Steve Robertson of Campus Consulting, Australia

TABLE 4
COST COMPARISON OF DATA COLLECTION METHODS

Method / parameter	Cost Magnitude¹	Cost Rank
Electronic survey	1.1	3
Individual interviews	2.4	5
Supervisor interviews	1.1	2
Corporate knowledge-holder interviews	1.0	1
Timesheets	11.3	6
Revolving door method	1.3	4

¹ The magnitude of the least costly method was set a '1' and appropriate relevant values were calculated for each of the other methods

IMPLEMENTATION OF RDW AT UOW

Timing of the workshops was a function of the availability of suitable space and workshop personnel, lead times required for communications and printing, and fitting in with other scheduled university events. Preparation for the UOW workshops included staff and union communication, site preparation, materials design and printing, design and layout of activity sheets, and preparation of staff listings and stickers.

Once organised, the workshop infrastructure ran without difficulties and was designed to be re-useable. Stickers were integral to the success of the workshops, with each sticker representing five percent of one FTE staff member's effort. Full-time employees therefore received twenty stickers. Each participant received stickers that were one of four colours, each signifying a different salary level. Codes were printed on each sticker representing the accounts from which participants were paid. Participants were marked off a list to preclude duplication; however, the allocation of their stickers was anonymous.

COLLECTION OUTCOMES OF RDW

The workshop attracted 202 FTE staff members across five days, representing 23 percent of the total FTE non-academic staff.

Two departments provided activity data separately for a further fifty one FTE part-time and full-time staff activity data. One department maintained a timekeeping database for thirty one personnel for management purposes and was enthusiastic to share the information and save staff the time of attending a workshop. Another department had thirty nine part-time employees that all performed the same task and would likely be unable to attend a workshop. The manager of the area was eager to include the information in the survey and provided the data accordingly.

Overall there was a 23 percent direct response to RDW by attendance at the workshop. This data then informed subsequent indirect extensions which supplemented the workshop results (as shown in Table 5). This involved developing a process for interviewing corporate knowledge-holders. Selected non-academic staffs considered "corporate knowledge-holders" were interviewed in order to attribute activity data for those in their departments who were unable to attend the workshop. A small number of FTE staff were assigned to activities

without assistance ('desk audit' in Table 5) using in effect the 'previous method' of activity attribution.

One of the principal strengths of the revolving door workshop method was the transparency and direct involvement staff members had made available to them with respect to ABC. This is a critical component of any successful implementation of ABC, and is of particular significance in the higher education and public sector given the obstacles identified with obtaining this data [11, 24, 34]. Secondly, the data collected provides for an increased level of accuracy in the cost model and adds an ownership dimension to the results as a consequence of the RDW.

**TABLE 5
RESPONSES TO RDW**

Collection method	FTE	Response rate
Direct		
Workshops	202	23%
Indirect		
Department. Submissions	51	6%
Interviews	556	64%
Desk audit	<u>59</u>	<u>7%</u>
Total	<u>868</u>	<u>100%</u>

CONCLUSION

This paper focussed on the use of ABC as a management tool in the higher education sector with particular emphasis on the process of staff activity data-collection. Motivation arose from the gap in the management accounting literature in the area of the process, method, and issues associated with staff activity data-collection techniques.

The setting for the study was established by describing the previous method of data collection used at UOW and explaining the deficiencies existing in the method. The requirement for a new method was outlined and a set of selection parameters presented from which an assessment of the methods was made, and the RDW method selected. Presentation of the UOW experience with the RDW was presented in some detail along with an assessment of the response rate, follow-up action, and strengths and weaknesses of the method.

The use of ABC as a management tool for universities is a relatively new practice. Nevertheless, where it has been used in the sector, the impacts have been positive, particularly in the area of resource allocation decision-support. However, as ABC is adopted by more universities, the literature on practical methodologies for successful implementation will need to be further developed. Of particular concern is the issue of staff activity data collection, which is significant in the higher education sector from both materiality and political standpoints.

Furthermore, the collection of university staff activity-data is essential to both the acceptance of the use of ABC in these institutions and the validity of the modelling of ensuing costs. Accordingly, this paper demonstrates that the RDW is an effective method of the critical process of staff activity data collection as a part of the broader topic of activity-based management in universities.

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