

Case Study**Greenfield Hills
Apartments: Activity
Based Costing in a
Service Setting**

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Abstract

This case illustrates the application of activity-based costing in a service setting – a real estate management organisation. Students are given costs from an income statement and first need to distribute these costs to a set of activities. Then, costs need to be assigned from activities to apartment units and a recreation centre. Lastly, to determine the costs of various classes within the recreation centre, the recreation centre costs are allocated to the classes. The case demonstrates how multiple stages of cost assignment are necessary to arrive at various costs.

Keywords

**Activity Based Costing
ABC Case Study – Service
Cost Allocation**

Introduction

I'm concerned about the low usage of our recreation centre. Many of the residents that don't use this facility are complaining about having to bear its costs. We need to find out what it's costing us to run this recreation centre and what it's costing to run the programs there. Maybe we should charge for every use of the facility -- but if we do so, we have to know the costs.
-- Mike Plaxer, GHA General Manager

In 1989, Springhill Lake Development Corporation built the Greenfield Hills Apartments (GHA) in suburban Milwaukee, Wisconsin. It is the largest apartment complex within a 10-mile radius. GHA was designed to attract young professionals, and indeed, in 2004 over three-fourths of its resident population was between the ages of 22 and 40 with a median gross income of approximately \$56,000. Sixty percent of the heads of household were female. GHA consists of 20 apartment buildings with a total of 700 units -- 470 two-bedroom apartment homes and 230 one-bedroom apartment homes. In addition, there is an indoor recreation centre which has a swimming pool, a basketball court, a large exercise room with state-of-the-art equipment, two tennis courts, one racquetball court, and two meeting rooms. GHA has had an average occupancy rate of 85 percent since its opening and currently 1,615 tenants live in the apartment homes.

Operations

Mike Plaxer was hired in 1997 as General Manager to supervise the daily operations of GHA. Dave Herkovic, the Resident Manager, handles tenants' problems and requests and also shows apartments to prospective tenants. The recreation centre is managed by Steve Bermine, who organises various programs and classes. Bermine also schedules all of the meetings and activities that take place there. Dave Franks is the buildings and grounds supervisor. He is in charge of the maintenance workers, groundskeepers, and custodians. Aside from cleaning the recreation centre and apartments that are vacated, the custodians also provide cleaning services to tenants who pay a "maid service" fee. Colleen

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Westing is the bookkeeper who also handles vendor payments and collections of rent and recreation centre fees. Two administrative assistants, Lisa Galaty and Joanne Birney, do the receptionist, secretarial, and other clerical work.

Costing Requests

Mike Plaxer had just received GHA's income statement for the most recent fiscal year, which ended on June 30, 2004. Exhibit 1 contains the expenses which appear on that income statement. Plaxer commented to Colleen Westing:

It's fine to know things like the cost of water and supplies, but is there any way to use these costs to figure out what it costs to operate the recreation centre? I see that only about 25 percent of our residents used it this past year. Maybe it's too costly for that level of usage. Also, I keep getting flak that the rent on our two-bedroom units is 50 percent more than the rent on one-bedroom units. Do the two-bedrooms cost us 50 percent more? How can we get a handle on this?

Westing replied:

Right now, we don't have any system of figuring out the cost of the recreation centre or the apartment units. Somehow we'd have to allocate costs to get what you want, but I'm not sure of the best way to do this, so let me contact our outside accountant, Joel Martz, and see what I can find out.

She soon met with Martz, who informed her that one option would be just to choose one allocation base to assign all the costs to the apartment units and recreation centre. He cautioned that one base might not be best for all types of costs. Martz noted, for instance, that some costs might be driven by number of residents, whereas other costs might be driven more by number of units or square footage. Furthermore, he pointed out that, in addition to finding out what it costs to run the apartment units and recreation centre, it might be useful to determine the costs of various activities like landscaping or building maintenance. Martz indicated that traditional costing systems focusing on

one cost driver and not on activities would be less desirable than implementing an activity-based costing (ABC) system.

Exhibit 1: Cost Items

<i>Costs</i>	<i>Amounts \$</i>
Promotion & advertising	59,110
Maintenance & repairs	88,775
Cleaning*	82,550
Landscaping	72,950
Staff salaries	299,000
Recreation salaries	67,500
Payroll service	7,100
Motor vehicles	27,400
Water	103,650
Telephone	18,400
Supplies	15,880
Insurance	445,250
Communications	29,660
Interest	19,875
Depreciation	954,200
Heat & air conditioning	43,700
Electricity	35,900
Other	22,850
Total	<u>\$2,393,750</u>

**Note: During the year, GHA received \$20,000 from Tenants who paid "maid service fees. This is not reflected here.*

Westing reported the details of this meeting to Plaxer, who then made some phone calls to other apartment managers and obtained the name of Murray Single, a real-estate consultant who had helped to install ABC systems in several other apartment complexes in southern Wisconsin. After several discussions with Single, Plaxer hired him to develop an ABC system for GHA. Plaxer also asked Single to look into the cost of landscaping the grounds. Plaxer was debating whether to outsource this activity to TDSA Groundskeeping, Inc., which had bid \$220,000 recently.

ABC System Design

Single began his work by having a half-day group discussion session with GHA employees. Based on that, he came up with a list of nine activities that seemed to adequately describe the various operations occurring at GHA. These activities as well as brief descriptions appear in Exhibit 2.

Exhibit 2: List of Activities

1. **Building maintenance & cleaning** – maintaining and repairing the buildings; cleaning the apartments as well as the recreation centre.
2. **Landscaping** – maintaining and cleaning the grounds.
3. **Marketing** – advertising; recruiting new residents.
4. **Resident services** – handling tenants’ problems and requests.
5. **Purchasing** – dealing with all aspects of interactions with vendors and suppliers.
6. **Recreational activities** – providing recreational programs such as classes and personal training.
7. **Recreation administration** – managing the recreation centre, including scheduling and organising resident meetings and any other events that take place there.
8. **Collections & accounting** – collecting rent and fees; bookkeeping and financial record-keeping.
9. **General management** – office management, human resource management etc.

Additional discussions with Mike Plaxer revealed the following cost objects of interest:

- One-bedroom units
- Two-bedroom units
- Recreation centre
 - General recreation
 - Aerobics classes
 - Karate classes
 - Swimming classes
 - Tennis classes

The first part of the ABC cost allocation process was to distribute the cost items appearing in Exhibit 1 to the nine activities in Exhibit 2. Single asked all GHA administrative employees to fill out time sheets, estimating how they spend their time during an average work week. These estimates, which appear in Exhibit 3, served as a basis to assign the staff and recreation salaries to the various activities. As for the other expenses, some were directly assigned to one activity only. These directly assigned expenses included cleaning, promotion & advertising, interest, maintenance & repairs,

and landscaping. Electricity, supplies, communications, telephone, payroll service, and other expenses were assigned evenly to all nine activities. Based on interviews with some of the administrative personnel, Single arrived at the distributions shown in Exhibit 4 for the remaining expenses (see Exhibit 2 for the correspondence of activity numbers to activities):

Exhibit 4: Expense Distributions

<i>Expense</i>	<i>Distribution</i>
Recreation salaries	40% to activity 6 60% to activity 7
Motor vehicles	40% to activity 1 50% to activity 2 10% to activity 4
Water	20% to activity 2 60% to activity 4 20% to activity 6
Insurance	15% to activity 1 10% to activity 2 35% to activity 4 15% to activity 6 the remainder evenly to each of the other activities
Depreciation	45% to activity 4 20% to activity 6 the remainder evenly to each of the other activities
Heat & air conditioning	50% to activity 4 25% to activity 6 the remainder evenly to activities 3, 5, 7, 8 and 9

Once all of the costs were assigned to the nine activities, Single decided to re-allocate the costs that had been assigned to activity 9 to seven other activities because it was difficult to establish a good linkage between “general management” costs and the cost objects of interest. He used the following allocation percentages, based on input from Mike Plaxer:

- Activity 1 – 15%
- Activity 2 – 5%
- Activity 3 – 20%
- Activity 4 – 25%
- Activity 5 – 10%
- Activity 7 – 15%
- Activity 8 – 10%

Exhibit 3: Time Estimates

	M. Plaxer	S. Bermine	D. Herkovic	D. Franks	C. Westing	L. Galaty	J. Birney
<i>Salary</i>	<u>\$67,000</u>	<u>\$48,000</u>	<u>\$41,000</u>	<u>\$44,000</u>	<u>\$35,000</u>	<u>\$33,000</u>	<u>\$31,000</u>
Activity:							
Bldg. maintenance & cleaning	10%			55%			
Landscaping	5%			25%			
Marketing	10%	5%	20%				10%
Resident services	20%	20%	70%		15%	10%	30%
Purchasing	5%			5%		5%	
Recreational activities		10%					
Recreation admin.		60%					
Collections & accounting	10%				60%		
General mgt.	<u>40%</u>	<u>5%</u>	<u>10%</u>	<u>15%</u>	<u>25%</u>	<u>85%</u>	<u>60%</u>
Total	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>

Exhibit 5: Assignment of Activities to Cost Objects

	<u>Driver</u>	<u>Cost Objects</u>
Bldg. maintenance & cleaning	sq. footage	all three
Landscaping	sq. footage	all three
Marketing	# units	1-bedroom units, 2-bedroom units
Resident services	# residents	all three
Purchasing	# residents	all three
Recreational activities	directly assign	recreation centre
Recreation admin.	directly assign	recreation centre
Collections & accounting	# residents	all three

Afterwards, Single allocated the costs of these seven activities, as well as activity 6, to the one-bedroom apartments, two-bedroom apartments, and recreation centre using the cost drivers shown in Exhibit 5 and the cost driver data shown in Exhibit 6. The number of units was easily obtainable from GHA’s files and since square footage was uniform for all one-bedroom as well as for all two-bedroom units, Single just

measured one representative apartment of each type and used those figures to arrive at the total square footages. While number of units and square footage data would not change over time, the number of residents would constantly change. Fortunately, GHA had been tracking the number of residents by apartment type and this database was updated monthly.

Exhibit 6: Cost Driver Data

<u>Cost Driver</u>	<u>1-Bedroom</u>	<u>2-Bedroom</u>	<u>Recreation Ctr.</u>
Number of units	230	470	
Number of residents	290	1,325	405
Square footage	102,000	305,000	39,000

To obtain the costs for the five cost objects within the recreation centre, Single used the cost drivers and cost driver data shown in Exhibit 7. The square footage data was obtained by analysing the floor plans (i.e.,

architectural drawings) of the recreation centre and this took about half of one day. Single advised that this analysis should be done yearly due to changes in classes. The recreation centre manager, Steve Bermine,

provided Single with data that he had been routinely collecting on number of instructors, hours of instruction, and the number of residents using the facility.

Bermine indicated that he had been updating this information in his database on a monthly basis. Since virtually all of the cost data (i.e., Exhibit 1) and cost driver data needed for the entire ABC system was

in existence and readily available, the implementation cost largely involved the identification of activities and suitable cost drivers, as well as the time spent on interviews with GHA management and staff to determine how costs should be assigned to activities. The entire ABC development process took Murray Single four days.

Exhibit 7: Cost Drivers and Data for Recreation Centre

<u>Activities</u>		<u>Cost Driver</u>		
Bldg. maintenance & cleaning		sq. ft.		
Landscaping		sq. ft.		
Resident services		# residents		
Purchasing		# residents		
Recreational activities		hrs. of instruction		
Recreation admin.		# instructors		
Collections & accounting		# instructors		
<u>Rec. Ctr. Cost Objects</u>	<u># of Instructors</u>	<u>Hrs. of Instruction</u>	<u>Sq. Ft.</u>	<u># of Residents</u>
General recreation	2	600	27,500	265
Aerobics classes	3	1,000	1,000	60
Karate classes	2	400	1,500	22
Swimming classes	2	500	4,000	33
Tennis classes	1	300	5,000	25
TOTAL	<u>10</u>	<u>2,800</u>	<u>39,000</u>	<u>405</u>

Assignment Questions

1. Compute the total costs that should be assigned to the one-bedroom apartments, two-bedroom apartments, and the recreation centre. For both apartment sizes, provide the unit costs as well. Are these costs consistent with the current rental prices?
2. Suppose GHA had used a traditional costing system which allocated all of the costs in Exhibit 1 to the two different types of apartment units and recreation centre using number of residents as the allocation base. Perform this cost allocation and compare the results to those found with the ABC approach.
3. Determine the total costs assigned to the five cost objects within the recreation centre. Additionally, compute the costs per resident (total population) and costs per participating resident. Comment on these costs.
4. Comment on the desirability of outsourcing the landscaping activity to TDSA Groundskeeping, Inc.
5. Aside from the outsourcing decision in the previous question, for what other types of decisions or uses can the ABC system provide information?

Teaching Notes

This case develops an activity-based costing system for a service-oriented organisation. With this service setting, the case complements activity-based costing material in cost/managerial accounting textbooks, virtually all of which focus heavily on manufacturing organisations. The objective of the case is for students to understand the issues and procedures for developing a multi-stage activity-based costing system. The case also has students make an outsourcing decision where they must ascertain the relevance of costs.

The case is suitable for introductory managerial accounting classes at the undergraduate and graduate levels and has been class tested several times at both of these levels. Students should have an elementary knowledge of activity-based costing as a background for this case. Instructors should encourage (or require) students to use spreadsheet software for the computations in assignment questions 1 and 3.

Solutions to Assignment Questions

1. First, costs are assigned from the expense accounts to activities, as seen in Table 1. Then, activity 9 is allocated to seven other activities, resulting in Table 2. Now, we assign the costs from the remaining eight activities to the apartments and recreation centre, as seen in Table 3. The two-bedroom unit costs about 71 percent more than the one-bedroom unit -- not just the 50 percent more that would be implied by the relative prices currently charged to tenants. Thus, Plaxer should consider restructuring the rental fees.

The recreation centre is costing \$1,124 per apartment unit annually ($\$786,914 / 700$). This is 73% of the cost of providing a one-bedroom unit and 43% of the cost of providing a two-bedroom unit.

2. Allocation of total net costs to cost objects using number of residents as the sole cost driver:

To one-bedroom units: $\$2,373,750 \times (290/2020) = \$340,786$

To two-bedroom units: $\$2,373,750 \times (1,325/2020) = \$1,557,039$

To recreation centre: $\$2,373,750 \times (405/2020) = \$475,925$

While the total cost for one-bedroom units is close to the \$353,764 assigned under ABC, the costs for the other two cost objects are quite different from the ABC results. Traditional costing would overcost the two-bedroom units by \$323,966 ($\$1,557,039 - \$1,233,073$), which is a cost distortion of 26 percent. Additionally, traditional costing would undercost the recreation centre by \$310,989 ($\$475,925 - \$786,914$), which is a cost distortion of 40 percent.

3. Table 4 shows how the costs assigned to the recreation centre are allocated to the five cost objects within the recreation centre. The annual costs per resident, for the total population, seem quite reasonable. This cost amounts to \$487 per year ($\$786,914 / 1,615$). However, the cost per participating resident is quite high, amounting to \$1,943 ($\$786,914 / 405$). Furthermore, the annual costs per user for the individual programs are extremely high.

4. The landscaping activity was assigned a total cost of \$235,225. This is more than the \$220,000 bid received from TDSA Groundskeeping, Inc. However, in making this type of outsourcing decision, one should consider the cost savings from outsourcing and not necessarily the full cost assigned to landscaping. For instance, if outsourced, the cost savings might be only \$170,000 -- \$65,225 of the assigned landscaping cost might be unavoidable and would just be assigned to the other activities instead. In that case, it would not be worthwhile to outsource -- GHA would be \$50,000 worse off ($\$220,000 - \$170,000$).

5. The ABC costing system can be used to analyse the profitability of the apartment units. For instance, if GHA wishes to expand the number of apartment units, an ABC cost analysis can help determine whether it is more profitable to add one-bedroom or two-bedroom units. ABC can also be used to assess the profitability of the

recreation centre as well as individual classes held there. The opening quote in the case mentions that perhaps GHA should charge the residents for usage of the recreation centre. Any such fees can be based on the costs assigned to the centre by the ABC system. If costs are very high, GHA may decide to cancel high cost classes or maybe even close down the recreation centre or reduce its hours of usage. The ABC costing system is also useful for cost control decisions relating to GHA's activities. For instance, if periodic comparisons of the Purchasing activity show increasing costs, GHA may want to modify the way it does purchasing.

As alluded to in the Costing Requests section of the case, these decision objectives are generally better accomplished by an ABC system than a traditional costing system. By using different cost drivers for different types of costs rather than just one volume-based cost driver such as number of residents, ABC will tend to better capture the complexity of operations and therefore provide more accurate costs for profitability analysis or pricing. Indeed, the results described in the suggested response to Assignment Question 2 confirm this advantage of ABC. An added benefit of ABC is the ability to analyse and control costs for various activities and not just the final cost objects (i.e., apartment units, recreation centre, or classes within the recreation centre). Traditional costing does not collect costs for activities, nor does it assign costs to activities -- it merely assigns costs from the company's accounts (e.g., Exhibit 1) to the final cost objects. For a more detailed overview of ABC theory, see cost/managerial texts such as Hilton (2005, chapter 5) or Horngren, Datar & Foster (2003, chapter 5).

References

- Hilton, R. W. (2005), *Managerial Accounting*, McGraw-Hill/Irwin, New York, USA.
- Horngren, C. T., Datar, S. M., and Foster, G. (2003), *Cost Accounting: A Managerial Emphasis*, Prentice-Hall, Upper Saddle River, New Jersey, USA.

Table 1: Cost Assignment

	<u>Amounts</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
Promotion & advertising	\$59,110			\$59,110						
Maintenance & repairs	\$88,775	\$88,775								
Cleaning*	\$62,550	\$62,550								
Landscaping	\$72,950		\$72,950							
Staff salaries	\$299,000	\$30,900	\$14,350	\$20,400	\$69,550	\$7,200	\$4,800	\$28,800	\$27,700	\$95,300
Recreation salaries	\$67,500						\$27,000	\$40,500		
Payroll service	\$7,100	\$789	\$789	\$789	\$789	\$789	\$789	\$789	\$789	\$789
Motor vehicles	\$27,400	\$10,960	\$13,700		\$2,740					
Water	\$103,650		\$20,730		\$62,190		\$20,730			
Telephone	\$18,400	\$2,044	\$2,044	\$2,044	\$2,044	\$2,044	\$2,044	\$2,044	\$2,044	\$2,044
Supplies	\$15,880	\$1,764	\$1,764	\$1,764	\$1,764	\$1,764	\$1,764	\$1,764	\$1,764	\$1,764
Insurance	\$445,250	\$66,788	\$44,525	\$22,263	\$155,838	\$22,263	\$66,788	\$22,263	\$22,263	\$22,263
Communications	\$29,660			\$4,237	\$4,237	\$4,237	\$4,237	\$4,237	\$4,237	\$4,237
Interest	\$19,875									\$19,875
Depreciation	\$954,200	\$47,710	\$47,710	\$47,710	\$429,390	\$47,710	\$190,840	\$47,710	\$47,710	\$47,710
Heat & air conditioning	\$43,700			\$2,185	\$21,850	\$2,185	\$10,925	\$2,185	\$2,185	\$2,185
Electricity	\$35,900	\$3,989	\$3,989	\$3,989	\$3,989	\$3,989	\$3,989	\$3,989	\$3,989	\$3,989
Other	<u>\$22,850</u>	<u>\$2,539</u>	<u>\$2,539</u>	<u>\$2,539</u>	<u>\$2,539</u>	<u>\$2,539</u>	<u>\$2,539</u>	<u>\$2,539</u>	<u>\$2,539</u>	<u>\$2,539</u>
TOTAL	\$2,373,750	\$318,808	\$225,091	\$167,030	\$756,920	\$94,720	\$336,445	\$156,820	\$115,220	\$202,695

*Note: These costs were offset by the \$20,000 revenues generated from “maid service” fees (i.e., \$82,550 - \$20,000).

Table 2: Activity Nine Allocation

	<u>Total Costs</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
Total before allocating #9	\$2,373,750	\$318,808	\$225,091	\$167,030	\$756,920	\$94,720	\$336,445	\$156,820	\$115,220	\$202,695
% for allocating #9		0.15	0.05	0.20	0.25	0.10	0	0.15	0.10	
Activity #9 allocation	\$202,695	\$30,404	\$10,135	\$40,539	\$50,674	\$20,270	0	\$30,404	\$20,270	
Total after allocating #9		\$349,212	\$235,225	\$207,569	\$807,594	\$114,990	\$336,445	\$187,224	\$135,490	

Table 3: Cost Assignment

Activities	Costs	Cost Driver Rate	1-Bedroom	2-Bedroom	Rec. Ctr.
Bldg. maintenance & cleaning	\$349,212	\$0.78	\$79,865	\$238,811	\$30,537
Landscaping	\$235,225	\$0.53	\$53,796	\$160,860	\$20,569
Marketing	\$207,569	\$296.53	\$68,201	\$139,368	
Resident services	\$807,594	\$399.80*	\$115,942	\$529,734	\$161,919
Purchasing	\$114,990	\$56.93*	\$16,508	\$75,426	\$23,055
Recreational activities	\$336,445				\$336,445
Recreation admin.	\$187,224				\$187,224
Collections & accounting	\$135,490	\$67.07*	\$19,451	\$88,873	\$27,165
TOTAL	<u>\$2,373,750</u>		<u>\$353,764</u>	<u>\$1,233,073</u>	<u>\$786,914</u>
<i>Total cost per unit</i>			<i>\$1,538</i>	<i>\$2,624</i>	

*Note: To obtain these rates, a denominator of 2,020 (290 + 1,325 + 405) was used reflecting the total number of users, not just number of bodies.

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Table 4: Recreation Centre Cost Assignment

Activities	Assigned to Rec. Ctr.	Cost Driver Rate	General Recreation	Aerobics	Karate	Swimming	Tennis
Bldg. maintenance & cleaning	\$30,537	\$0.78	\$21,532	\$783	\$1,174	\$3,132	\$3,915
Landscaping	\$20,569	\$0.53	\$14,504	\$527	\$791	\$2,110	\$2,637
Resident services	\$161,919	\$399.80	\$105,947	\$23,988	\$8,796	\$13,193	\$9,995
Purchasing	\$23,055	\$56.93	\$15,085	\$3,416	\$1,252	\$1,879	\$1,423
Recreational activities	\$336,445	\$120.16	\$72,095	\$120,159	\$48,064	\$60,079	\$36,048
Recreation admin.	\$187,224	\$18,722.45	\$37,445	\$56,167	\$37,445	\$37,445	\$18,722
Collections & accounting	\$27,165	\$2,716.50	\$5,433	\$8,150	\$5,433	\$5,433	\$2,717
TOTAL	\$786,914		\$272,041	\$213,190	\$102,955	\$123,271	\$75,457
<i>Number of participating residents</i>			<i>265</i>	<i>60</i>	<i>22</i>	<i>33</i>	<i>25</i>
<i>Cost per participating resident</i>			<i>\$1,027</i>	<i>\$3,553</i>	<i>\$4,680</i>	<i>\$3,735</i>	<i>\$3,018</i>
<i>Cost per resident (total population of 1,615 residents)</i>			<i>\$168</i>	<i>\$132</i>	<i>\$64</i>	<i>\$76</i>	<i>\$47</i>

