Ege Akademik Bakış / Ege Academic Review
10(3) 2010: 751-771

AN EVALUATION ABOUT THE IMPORTANCE OF CRITERIA DETERMINING THE ALLOCATION SEQUENCE IN STEP-DOWN ALLOCATION OF MANUFACTURING OVERHEAD COSTS*

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ABSTRACT

In today's business environment, one of the most popular methodologies used to allocate manufacturing overhead cost (MOC)s on products is "*Step-down Allocation Method*". In this methodology, transferring of manufacturing overhead costs from supplementary cost centers to primary cost centers are made considering specific rules (Can, 2003:92). Also, after manufacturing overhead costs accrued in one of the supplementary cost centers are allocated to other cost centers, they can not again be allocated again (Üstün,1994:251). Consequently, sum of manufacturing overhead costs is gathered all together in primary cost centers to be allocated (Altuğ, 2001:225). However, in these situations, from which of cost center to start allocation becomes an important subject. Here, the sequence of allocation plays two important roles and has two different effects. The first effect of sequence of allocation is on cost centers by means of cost planning and control. The second effect is on product parties by means of production planning and product costing&pricing.

In this study, the sequence of allocation of manufacturing overhead costs is tried to be presented by a hypothetical application.

Keywords: Manufacturing overhead costs, Step-down allocation methodology, Cost center.

* This article has previously been presented in 7th International Social Sciences Conference in Turkish World (9th-11th June, 2009 - Celalabat, Kyrgyzstan).

1. INTRODUCTION

As known, one of the fundamental aims of cost accounting is to determine total and/or per-unit product costs. Cost accounting focuses on cause-effect relationship between costs and products in sequence to allocate production costs to products. In situations in which this relationship naturally exist or can be determined without any problem, costs are allocated to products directly. So, these kinds of costs are called as *direct costs*. The other costs related with production but remaining out of direct costs are called as *manufacturing overhead costs*. Manufacturing overhead costs (MOC) are mostly heterogeneous and progressive costs, and because of this reason they are unstable, difficult to plan and control.

The allocation of manufacturing overhead costs such as direct material and direct labor costs on products are made by using cost centers and rational allocation bases (ABs) related with these cost centers in a few stages. In the first stage, a connection between manufacturing overhead costs and cost centers are established via allocation bases and manufacturing overhead costs are allocated to primary cost centers (PCCs) where the production is made, and to supplementary cost centers (SCCs) where production is supported. This stage is called as *first allocation*.

The allocation of manufacturing overhead costs on products can only be made via primary cost centers. Because products subject to main operating area of any production company are actually produced in primary cost centers. However, supplementary cost centers indeed refer to only back-up operations and/or services required for a healthy production. So, manufacturing overhead costs accrued in supplementary cost centers have to be transferred to primary cost centers by any means in a rational way. This stage, in brief, is called as *second allocation*. In literature, there are several allocation methodologies such as (i) simple (direct), (ii) step-down, (iii) mathematical and (iv) planned allocation method (Bursal and Ercan,1997:207; Akdoğan, 2006:364).

The fundamental point of these methodologies is that when the easiness of the application of the methodology increases, its sensitivity in cost allocation decreases.

For example, as to be come out of its title, the easiest methodology to be applied is the simple (direct) allocation methodology (Barfield et al.,1994:225). However, in simple allocation, the turnovers of benefits and services between supplementary cost centers definitely are not considered and manufacturing overhead costs are directly transferred to primary cost centers (Garrison at al.,2008:169). However, in mathematical allocation methodology, the complexity of application increases. In this methodology, manufacturing overhead costs are allocated by considering the turnovers of benefits and services between supplementary cost centers via simultaneous equations.

So, it is possible to mention that mathematical allocation methodology is relatively hard to apply, but gives more accurate results and here the allocation is more sensitive. This sensitivity has important effects on evaluation of success of products, product and cost center planning&control. Also, the application of such a complex methodology may have greater importance especially in corporations that have many cost centers and have a wide range of production.

In this study, one of the above mentioned allocation methodologies; "Step-down allocation methodology" is discussed.

2. DETERMINING THE ALLOCATION SEQUENCE IN STEP-DOWN ALLOCATION

As step-down allocation methodology is not included in ERPs and in cost accounting modules in software packages related with accounting, and/or because of the difficulty in determining an appropriate sequence about costs for each cost calculation period, application related with step-down allocation is mostly rare.

"Step-down allocation methodology" is more sensitive considered to simple (direct) allocation methodology. Step-down allocation methodology considers the turnovers of benefits and services between supplementary cost centers. The reason why this methodology is called as step-down is that it allocates manufacturing overhead costs to primary cost centers not directly and at one time, but step by step. So, it is not easy to apply this methodology such as simple allocation methodology. In step-down allocation methodology, the allocation of costs is made according to specific rules as mentioned below :

- ✓ The accrued manufacturing overhead costs in supplementary cost centers are allocated only one-time. The allocated manufacturing overhead cost remains "out of the game" (Can,2003:92).
- ✓ Supplementary cost center does not participate manufacturing overhead costs of itself(Horngern at al.1999:148).

In step-down allocation methodology, it is so important to choose the supplementary cost center from which the allocation will be started. In here, the last remaining supplementary cost centers participate manufacturing overhead cost share from the firstly allocated supplementary cost centers. So, the firstly allocated supplementary cost centers will not participate manufacturing overhead share of themselves from last remaining supplementary cost centers as they are out of the game, as mentioned before. The sequence of allocation of costs and an accurate choice of supplementary cost centers play a very important role in this methodology.

Though the rational determination of allocation sequence in step-down allocation method is so vital, it is obvious that this problem is mostly ignored in literature of cost accounting. In most of the related published books and articles,

there is only a little bit or a very limited piece of information about the allocation sequence of costs.

The fundamental criteria determining the allocation sequence in step-down allocation methodology is given below:

- ✓ *Amount of manufacturing overhead cost* criterion: According to this criterion, the allocation of supplementary cost centers starts from the cost center that has the highest amount of manufacturing overhead cost and this sequence continues till the end of the allocation (Büyükmirza, 2003:212; Karakaya, 2004:322).
- ✓ *Number of cost centers* criterion: According to this criterion, the allocation of supplementary cost centers begins with the supplementary cost center that serves the most benefit and service to the other cost centers (Howe, 1969:108; Dearden, 1973:29; Horngern, 1982:420; Hacırüstemoğlu, 1995:170; Yükçü, 2007:261; Gürsoy, 1999:121; Atamanalp et al., 2000:222; Civelek, 2000:130; Küçüksavaş, 2002:190; Kartal, 2003:109; Karakaya, 2004:322; Akdoğan, 2006:374;Haftacı,2009:194;Barfield et al.,1994:225 Horngern et al.,1999:148,) and the allocation goes on considering this criterion till the allocation ends.
- ✓ *Combined* criterion: This criterion determines the allocation sequence considering the two above mentioned criteria, respectively. It can be applied in two different ways:
    - o The allocation sequence is tried to be determined according to the number of cost centers (Yükçü, 1998:216; Atamanalp et al., 2000:222; Kartal, 2003:109). In presence of any equivalence in number, the sequence of allocation is then determined by taking the -highest- amount of manufacturing overhead costs into consideration.
    - o In situations in which the amounts of manufacturing overhead costs are equal –that this possibility is very low-, the decision is made according to any other criteria mentioned here.
- ✓ *Percentaged weights* criterion: According to this criterion, benefits and services that supplementary cost centers receive from each other are taken into consideration in percentages. Percentaged weights criterion can be applied in two different ways as horizontal and vertical percentages:
    - o The horizontal sums of percentages represent the total amount of manufacturing overhead costs shares of supplementary cost centers that are to be allocated to other supplementary cost centers. The allocation sequence here is made beginning from the highest percentage to the lowest one (Horngern, 1982:421; Civelek, 2000:130).

- The vertical sums of percentages represent the shares of manufacturing overhead costs of that the supplementary cost centers will receive from the other supplementary cost centers. Here, the allocation sequence is opposite of the horizontal percentages, that is the allocation begins from the lowest percentage to the highest one.

✓ *Allocation effect* criterion: This criterion refers to a little bit more complicated and subjective process. Firstly, an allocation simulation is formed in sequence to see the effects of various allocation sequences. Then, according to the results, the sequence of allocation that is thought to have the most powerful allocation effect is preferred.

3. AN APPLICATION ABOUT STEP-DOWN ALLOCATION METHODOLOGY

In CAN Production Company that has four supplementary cost centers (SCCs) and three primary cost centers (PCCs), three kinds of products named X, Y and Z, respectively, are produced. The Company's total sum of actual manufacturing overhead costs in November is 42,750,950 TL. The allocation of manufacturing overhead costs to cost centers as the result of 1st allocation are given below:

Table 1: 1st Allocation

SUPPLEMENTARY COST CENTER		PRIMARY COST CENTER		
1st SCC	6,755,920 TL	**PCC A**	5,690,900 TL	
2nd SCC	9,766,190 TL	**PCC B**	6,713,470 TL	
3rd SCC	3,957,810 TL	**PCC C**	4,317,280 TL	
4th SCC	5,549,380 TL			
TOTAL	**26,029,300 TL**		**16,721,650 TL**	**42,750,950 TL**

The benefits and services that supplementary cost centers produce and/or support are expressed by allocation bases (ABs) and measures:

Table 2: Bases for 2nd Allocation

SCC	AB	1st SCC	2nd SCC	3rd SCC	4th SCC	PCC A	PCC B	PCC C	TOTAL
1st SCC	m^3	3,780	91,200	64,600	-	186,700	175,300	168,200	689,780
2nd SCC	%	5%	-	-	15%	30%	10%	40%	100%
3rd SCC	kw/hr	-	2,370	4,295	7,685	8,960	19,250	14,780	57,340
4th SCC	m^2	360	1,190	390	550	930	890	1,240	5,550

The capacity volumes of primary cost centers are as given below:

Table 3: The Capacity Volumes of Primary Cost Centers

PCC	Operating Measure	Product X	Product Y	Product Z	TOTAL
A	Direct Labor Hour (DLH)	6,190 DLH	19,111 DLH	8,750 DLH	34,051 DLH
B	Machine Hour (MH)	91,360 MH	8,276 MH	48,760 MH	148,396 MH
C	Operation Hour (OH)	8,220 OH	1,465 OH	4,740 OH	14,425 OH

And the amount of sales (net), actual direct costs, production and sales quantities of the products are as mentioned below:

	Product X	Product Y	Product Z
Sales (net)	26,950,000 TL	36,280,000 TL	25,000,000 TL
Actual Direct Costs	7,457,600 TL	25,958,000 TL	11,736,500 TL
Production and Sales Quantities	25,000 units	20,000 units	10,000 units

In this example of application it is assumed that:

- Cost centers are perfectly fictionalized,
- The allocation bases are chosen among the most rational and appropriate bases that reflects the relationships between manufacturing overhead costs and cost centers, and
- The 1st allocation of manufacturing overhead costs to cost centers is made very properly.

3.1. Cursory Allocation

If step-down allocation methodology is conducted cursory, that is without considering any allocation sequence; the conclusion is as given in Table 4.

In the Table 4, cost allocation, the allocation of supplementary cost centers has not been made according to any criteria and not any rational assumptions have been made. The allocation has been made in sequence of 1-2-3-4. Most of published books and articles about step-down allocation methodology depict the subject like this.

Table 4: Cursory Allocation

	Allocation Measure	1st SCC	2nd SCC	3rd SCC	4th SCC	PCC A	PCC B	PCC C	TOTAL
1st Allocation		6,755,920 TL	9,766,190 TL	3,957,810 TL	5,549,380 TL	5,690,900 TL	6,713,470 TL	4,317,280 TL	42,750,950 TL
1st SCC	m^3		91,200	64,600	0	186,700	175,300	168,200	686,000
		6,755,920 TL	898,163 TL	636,199 TL	0 TL	1,838,674 TL	1,726,403 TL	1,656,481 TL	**6,755,920 TL**
2nd SCC	%			0	15	30	10	40	95
			10,664,353 TL	0 TL	1,683,845 TL	3,367,690 TL	1,122,563 TL	4,490,254 TL	**10,664,353 TL**
3rd SCC	kw/hr				7,685	8,960	19,250	14,780	50,675
				4,594,009 TL	696,694 TL	812,281 TL	1,745,134 TL	1,339,900 TL	**4,594,009 TL**
4th SCC	m^2					930	890	1,240	3,060
					7,929,919 TL	2,410,073 TL	2,306,414 TL	3,213,431 TL	**7,929,919 TL**
2nd Allocation						**14,119,618 TL**	**13,613,985 TL**	**15,017,346 TL**	**42,750,950 TL**
PCC A	DLH					34,051			
PCC B	MH						148,396		
PCC C	OH							14,425	
Allocation Ratio						414.66 TL	91.74 TL	1.041.06 TL	

3.2. Allocation According to the Amount of Manufacturing Overhead Costs

In situation in which step-down allocation methodology is conducted according to criterion of amount of manufacturing overhead costs, the allocation should be made beginning from the supplementary cost center with the highest amount of manufacturing overhead costs to the lowest one as presented below:

In the Table 5, above allocation, supplementary cost centers are allocated in sequence of 2-1-4-3; that is from the highest amount of manufacturing overhead costs to the lowest one. As obviously seen, both shares of manufacturing overhead costs and calculated manufacturing overhead costs' allocation ratios in cost centers differ.

3.3. Allocation According to the Number of Cost Centers

If step-down allocation methodology is conducted according to the number of cost centers, the below given result is achieved:

In the Table 6, the underlying reason about the allocation sequence of 4-3-1-2 is that the 4th cost center produces benefits and services to other cost centers the most in number. However, most of the time it is not possible to make judgments considering just only this criterion. So, in alike situations it is recommended to refer other criteria in determining the cost allocation sequence.

3.4. Allocation According to the Combined Criterion

Allocation according to the combined criterion necessitates the usage of 3.2. and 3.3. criteria. However, first of all it has to be decided to choose one of these criteria. The example of application of the study can be conducted according to the combined criterion as given in Table 7-8
In the Table 7-8, as seen, the sequence of allocation is as 4-1-3-2. This sequence is because of that the 4th supplementary cost center provides benefits and services to other supplementary cost services the most in number. However, as the 1st and 3rd supplementary cost centers provide benefits and services to other cost center equally in number. After this point, the allocation sequence has been determined according to the amount of manufacturing overhead costs of cost centers (1st SCC and 3rd SCC, respectively).

Table 5: Allocation According to the Amount of Manufacturing Overhead Costs

	Allocation Measure	2nd SCC	1st SCC	4th SCC	3rd SCC	PCC A	PCC B	PCC C	TOTAL
1st Allocation		9,766,190 TL	6,755,920 TL	5,549,380 TL	3,957,810 TL	5,690,900 TL	6,713,470 TL	4,317,280 TL	42,750,950 TL
2nd SCC	%		5	15	0	30	10	40	100
		9,766,190	488,310	1,464,929	0	2,929,857	976,619	3,906,476	**9,766,190**
1st SCC	m^3			0	64,600	186,700	175,300	168,200	594,800
			7,244,230	0	786,781	2,273,870	2,135,026	2,048,553	**7,244,230**
4th SCC	m^2				390	930	890	1,240	3,450
				7,014,309	792,922	1,890,814	1,809,488	2,521,085	**7,014,309**
3rd SCC	kw/hr					8,960	19,250	14,780	42,990
					5,537,513	1,154,132	2,479,579	1,903,802	**5,537,513**
2nd Allocation						**13,939,572**	**14,114,183**	**14,697,196**	**42,750,950**
PCC A	DLH					34,051			
PCC B	MH						148,396		
PCC C	OH							14,425	
Allocation Ratio						409.37 TL	95.11 TL	1,018.87 TL	

Table 6: Allocation According to the Number of Cost Centers

	Allocation Measure	4th SCC	3rd SCC	1st SCC	2nd SCC	PCC A	PCC B	PCC C	TOTAL
1st Allocation		5,549,380 TL	3,957,810 TL	6,755,920 TL	9,766,190 TL	5,690,900 TL	6,713,470 TL	4,317,280 TL	42,750,950 TL
4th SCC	m^2		390	360	1,190	930	890	1,240	5,000
		5,549,380	432,852	399,555	1,320,752	1,032,185	987,790	1,376,246	**5,549,80**
3rd SCC	kw/hr			0	2,370	8,960	19,250	14,780	45,360
			4,390,662	0	229,406	867,291	1,863,321	1,430,643	**4,390,662**
1st SCC	m^3				91,200	186,700	175,300	168,200	621,400
				7,155,475	1,050,176	2,149,867	2,018,595	1,936,838	**7,155,475**
2nd SCC	%					30	10	40	80
					12,366,525	4,637,447	1,545,816	6,183,262	**12,366,525**
2nd Allocation						**14,377,689**	**13,128,991**	**15,244,270**	**42,750,950**
PCC A	DLH					34,051			
PCC B	MH						148,396		
PCC C	OH							14,425	
Allocation Ratio						422.24 TL	88.47 TL	1,056.80 TL	

Table 7: Allocation According to the Combined Criterion

	Allocation Measure	4th SCC	1st SCC	3rd SCC	2nd SCC	PCC A	PCC B	PCC C	TOTAL
1st Allocation		5,549,380 TL	6,755,920 TL	3,957,810 TL	9,766,190 TL	5,690,900 TL	6,713,470 TL	4,317,280 TL	42,750,950 TL
4th SCC	m^2		360	390	1,190	930	890	1,240	5,000
		5,549,380	399,555	432,852	1,320,752	1,032,185	987,790	1,376,246	**5,549,380**
1st SCC	m^3			64,600	91,200	186,700	175,300	168,200	686,000
			7,155,475	673,825	951,282	1,947,416	1,828,506	1,754,447	**7,155,475**
3rd SCC	kw/hr				2,370	8,960	19,250	14,780	45,360
				5,064,486	264,613	1,000,392	2,149,280	1,650,201	**5,064,486**
2nd SCC	%					30	10	40	80
					12,302,837	4,613,564	1,537,855	6,151,419	**12,302,837**
2nd Allocation						**14,284,457**	**13,216,900**	**15,249,593**	**42,750,950**
PCC A	DLH					34,051			
PCC B	MH						148,396		
PCC C	OH							14,425	
Allocation Ratio						419.50 TL	89.07 TL	1,057.16 TL	

Table 8.: The Allocation Order

SCC	Allocation Measure	Manufacturing Overhead Costs	1st SCC	2nd SCC	3rd SCC	4th SCC	Number of Cost Centers	Refined
1st SCC	m^3	6,755,920 TL	3,780	91,200	64,600	-	3	2
2nd SCC	%	9,766,190 TL	5%	-	-	15%	2	2
3rd SCC	kw/hr	3,957,810 TL	-	2,370	4,295	7,685	3	2
4th SCC	m^2	5,549,380 TL	360	1,190	390	550	4	3

3.5. Allocation According to the Percentaged Weights Criterion

As mentioned before, allocation according to this criterion can be conducted basically in two ways. As seen in the table below, the sequence of allocation is as 4-1-2-3 according to the sum of refined horizontal percentages and as 1-3-4-2 according to the sum of refined vertical percentages. Refining process can be made in two ways:

1. After calculating the percentages, if there is, the own percentage of each supplementary cost center is subtracted and refined value is calculated. This is the most practical way.
2. Before calculating the percentages, if there is, the own share of each supplementary cost center is subtracted and the refined values are calculated from the start point of refined shares. Though this is not so practical, it gives more healthy results.

Table 9: Allocation Bases in Percentages

	1st SCC	2nd SCC	3rd SCC	4th SCC	TOTAL	Refined
1st SCC	0.55%	13.22%	9.37%	0.00%	**23.13%**	**22.59%**
2nd SCC	5.00%	0.00%	0.00%	15.00%	**20.00%**	**20.00%**
3rd SCC	0.00%	4.13%	7.49%	13.40%	**25.03%**	**17.54%**
4th SCC	6.49%	21.44%	7.03%	9.91%	**44.86%**	**34.95%**
TOTAL	**12.03%**	**38.80%**	**23.88%**	**38.31%**		
Refined	**11.49%**	**38.80%**	**16.39%**	**28.40%**		

According the refined horizontal percentages, the cost allocation is as below:

Table 10: Allocation According to the Refined Horizontal Percentages

	Allocation Measure	4th SCC	1st SCC	2nd SCC	3rd SCC	PCC A	PCC B	PCC C	TOTAL
1st Allocation		5,549,380 TL	6,755,920 TL	9,766,190 TL	3,957,810 TL	5,690,900 TL	6,713,470 TL	4,317,280 TL	42,750,950 TL
4th SCC	m^2		360	1,190	390	930	890	1,240	5,000
		5,549,380	399,555	1.320,752	432,852	1,032,185	987,790	1,376,246	**5,549,380**
1st SCC	m^3			91,200	64,600	186,700	175,300	168,200	686,000
			7,155,475	951,282	673,825	1,947,416	1,828,506	1,754,447	**7,155,475**
2nd SCC	%				0	30	10	40	80
				12,038,224	0	4,514,334	1,504,778	6,019,112	**12,038,224**
3rd SCC	kw/hr					8,960	19,250	14,780	42,990
					5,064,486	1,055,543	2,267,768	1,741,175	**5,064,486**
2nd Allocation						**14,240,378**	**13,302,312**	**15,208,261**	**42,750,950**
PCC A	DLH					34,051			
PCC B	MH						148,396		
PCC C	OH							14,425	
Allocation Ratio						418.21 TL	89.64 TL	1,054.30 TL	

According the refined vertical percentages, the cost allocation is as below:

Table 11.: Allocation According to the Refined Vertical Percentages

	Allocation Measure	1st SCC	3rd SCC	4th SCC	2nd SCC	PCC A	PCC B	PCC C	TOTAL
1st Allocation		6,755,920 TL	3,957,810 TL	5,549,380 TL	9,766,190 TL	5,690,900 TL	6,713,470 TL	4,317,280 TL	42,750,950 TL
1st SCC	m^3		64,600	0	91,200	186,700	175,300	168,200	686,000
		6,755,920	636,199	0	898,163	1,838,674	1,726,403	1,656,481	**6,755,920**
3rd SCC	kw/hr			7,685	2,370	8,960	19,250	14,780	53,045
			4,594,009	665,566	205,256	775,989	1,667,163	1,280,035	**4,594,009**
4th SCC	m^2				1,190	930	890	1,240	4,250
				6,214,946	1,740,185	1,359,976	1,301,483	1,813,302	**6,214,946**
2nd SCC	%					30	10	40	80
					12,609,794	4,728,673	1,576,224	6,304,897	**12,609,794**
2nd Allocation						**14,394,212**	**12,984,744**	**15,371,995**	**42,750,950**
PCC A	DLH					34,051			
PCC B	MH						148,396		
PCC C	OH							14,425	
Allocation Ratio						422.73 TL	87.50 TL	1,065.65 TL	

As it is seen, even the application of the criterion of percentaged weigths may give different results in itself.

3.6. Allocation According to the Allocation Effect Criterion

As mentioned before, this criterion refers to a more complicated and subjective process. Firstly, an allocation simulation is formed in sequence to see the effects of various allocation sequences. Then, according to the results, the sequence of allocation that is thought to have the most powerful allocation effect is preferred and allocation is made according to this sequence.

In below, the allocation sequence is determined as 3-4-2-1 and allocation has been conducted according to this sequence. However, as a specification of this criterion, it is not possible that the allocation sequence choice is objective. Here, how the choice of allocation sequence is made can be explained by subjective judgments of decision-makers. Also, this choice may be a result of company's expectations and interferences. This allocation methodology is extremely subjective. However, as the simulation shows the effects and consequences of allocation previously, it is definitely not casual, but a very rational choice and prevents possible surprises.

Table 12.: Allocation According to the Allocation Effect Criterion

	Allocation Measure	3rd SCC	4th SCC	2nd SCC	1st SCC	PCC A	PCC B	PCC C	TOTAL
1st Allocation		3,957,810 TL	5,549,380 TL	9,766,190 TL	6,755,920 TL	5,690,900 TL	6,713,470 TL	4,317,280 TL	42,750,950 TL
3rd SCC	kw/hr		7,685	2,370	0	8,960	19,250	14,780	53,045
		3,957,810	573,396	176,831	0	668,526	1,436,287	1,102,770	**3,957,810**
4th SCC	m^2			1,190	360	930	890	1,240	4,610
			6,122,776	1,580,500	478,134	1,235,180	1,182,054	1,646,907	**6,122,776**
2nd SCC	%				5	30	10	40	85
				11,523,521	677,854	4,067,125	1,355,708	5,422,833	**11,523,521**
1st SCC	m^3					186,700	175,300	168,200	530,200
					7,911,908	2,786,030	2,615,914	2,509,964	**7,911,908**
2nd Allocation						**14,447,762**	**13,303,434**	**14,999,755**	**42,750,950**
PCC A	DLH					34,051			
PCC B	MH						148,396		
PCC C	OH							14,425	
Allocation Ratio						424.30 TL	89.65 TL	1,039.84 TL	

4. THE COMPARISON OF CRITERIA DETERMINING THE ALLOCATION SEQUENCE

The above results of step-down allocation according to different criteria are compared below. In this comparison, only the results calculated according to allocation effect criterion are not included because of the subjectivity of this criterion. As seen in the table below, the differentiation of criteria determining the allocation sequence affects the allocation results and shares received by cost centers from manufacturing overhead costs. So, it is possible to conclude that this situation may have important effects on cost planning, cost controlling and performance measurement and evaluation.

Table 13.: Comparison of Cost Centers

COST CENTER	*Cursory Allocation*	*Allocation According to the Amount of MOC*	*Allocation According to the Number of Cost Centers*	*Allocation According to the Combined Methodology*	*Allocation According to the Horizontal Percentage*	*Allocation According to the Vertical Percentage*
1st SCC	6,755,920 TL	7,244,230 TL	7,155,475 TL	7,155,475 TL	7,155,475 TL	6,755,920 TL
2nd SCC	10,664,353 TL	9,766,190 TL	12,366,525 TL	12,302,837 TL	12,038,224 TL	12,609,794 TL
3rd SCC	4,594,009 TL	5,537,513 TL	4,390,662 TL	5,064,486 TL	5,064,486 TL	4,594,009 TL
4th SCC	7,292,919 TL	7,014,309 TL	5,549,380 TL	5,549,380 TL	5,549,380 TL	6,214,946 TL
TOTAL	29,307,201 TL	29,562,242 TL	29,462,042 TL	30,072,178 TL	29,807,566 TL	30,174,669 TL
PCC A	14,119,618 TL	13,939,572 TL	14,377,689 TL	14,284,457 TL	14,240,378 TL	14,394,212 TL
PCC B	13,613,985 TL	14,114,183 TL	13,128,991 TL	13,216,900 TL	13,302,312 TL	12,984,744 TL
PCC C	15,017,346 TL	14,697,196 TL	15,244,270 TL	15,249,593 TL	15,208,261 TL	15,371,995 TL
TOTAL	42,750,949 TL	42,750,951 TL	42,750,950 TL	42,750,950 TL	42,750,950 TL	42,750,950 TL

Allocation overhead rates calculated for primary cost centers according to different criteria are given below:

Table 14.: Allocation Rates

COST CENTER	*Cursory Allocation*	*Allocation According to the Amount of MOC*	*Allocation According to the Number of Cost Centers*	*Allocation According to the Combined Methodology*	*Allocation According to the Horizontal Percentage*	*Allocation According to the Vertical Percentage*
PCC A	414.66 TL/DLH	409.37 TL/DLH	422.24 TL/DLH	419.50 TL/DLH	418.21 TL/DLH	422.73 TL/DLH
PCC B	91.74 TL/MH	95.11 TL/MH	88.47 TL/MH	89.07 TL/MH	89.64 TL/MH	87.50 TL/MH
PCC C	1,041.06 TL/OH	1,018.87 TL/OH	1,056.80 TL/OH	1,057.16 TL/OH	1,054.30 TL/OH	1,065.65 TL/OH

The differentiation of allocation ratios also causes shares of manufacturing overhead costs to the product parties. The shares of product parties that will be charged of manufacturing overhead costs are given below:

PRODUCT	Cursory Allocation	Allocation According to the Amount of MOC	Allocation According to the Number of Cost Centers	Allocation According to the Combined Methodology	Allocation According to the Horizontal Percentage	Allocation According to the Vertical Percentage
X	19,505,746.30 TL	19,598,526.85 TL	19,383,384.12 TL	19,423,590.59 TL	19,444,608.16 TL	19,370,365.13 TL
Y	10,208,990.89 TL	10,103,321.79 TL	10,349,830.65 TL	10,302,947.44 TL	10,278,773.91 TL	10,364,030.82 TL
Z	13,036,212.81 TL	13,049,101.36 TL	13,017,735.23 TL	13,024,411.97 TL	13,027,567.93 TL	13,016,554.05 TL
TOTAL	42,750,950.00 TL	42,750,950.00 TL	42,750,950.00 TL	42,750,950.00 TL	42,750,950.00 TL	42,750,950.00 TL

The differentiation of shares that will be charged from manufacturing overhead costs on product parties also causes total production costs to differ:

PRODUCT	Cursory Allocation	Allocation According to the Amount of MOC	Allocation According to the Number of Cost Centers	Allocation According to the Combined Methodology	Allocation According to the Horizontal Percentage	Allocation According to the Vertical Percentage
X	26,963,346.30 TL	27,056,126.85 TL	26,840,984.12 TL	26,881,190.59 TL	26,902,208.16 TL	26,827,965.13 TL
Y	36,166,990.89 TL	36,061,321.79 TL	36,307,830.65 TL	36,260,947.44 TL	36,236,773.91 TL	36,322,030.82 TL
Z	24,772,712.81 TL	24,785,601.36 TL	24,754,235.23 TL	24,760,911.97 TL	24,764,067.93 TL	24,753,054.05 TL
TOTAL	87,903,050.00 TL	87,903,050.00 TL	87,903,050.00 TL	87,903,050.00 TL	87,903,050.00 TL	87,903,050.00 TL

As it is assumed that all products are sold in the mentioned period (November), sales profits/losses are calculated as below:

PRODUCT	Cursory Allocation	Allocation According to the Amount of MOC	Allocation According to the Number of Cost Centers	Allocation According to the Combined Methodology	Allocation According to the Horizontal Percentage	Allocation According to the Vertical Percentage
X	-13,346.30 TL	-106,126.85 TL	109,015.88 TL	68,809.41 TL	47,791.84 TL	122,034.87 TL
Y	113,009.11 TL	218,678.21 TL	-27,830.65 TL	19,052.56 TL	43,226.09 TL	-42,030.82 TL
Z	227,287.19 TL	214,398.64 TL	245,764.77 TL	239,088.03 TL	235,932.07 TL	246,945.95 TL
TOTAL	326,950.00 TL	326,950.00 TL	326,950.00 TL	326,950.00 TL	326,950.00 TL	326,950.00 TL

The results show that it is so important to properly determine the allocation sequence in step-down allocation methodology. Though the methodology remains the same, it is obviously seen that criteria used to determine the allocation sequence differentiates not only manufacturing overhead costs of cost centers but also product profitability ratios.

5. CONCLUSION

It is known that the origins of cost accounting are not as old as the origins of accounting itself. It is also obvious that the theory of cost accounting is not efficient and effective for today's contemporary businesses' needs and desires, as it is designed for the requirements of old-fashioned manufacturing companies. The cost structures of today's manufacturing companies shift from direct costs to indirect costs day by day. Consequently, the allocation of manufacturing overhead costs to products has become the major area of interest in accounting. This has led the businessmen -operating especially in capital/technology/knowledge intensive companies- to focus more on cost accounting, and the concept "cost management" has changed into a wider concept "strategic cost management".

In this study, step-down allocation methodology is discussed by an example of application. The main difficulty of the step-down allocation methodology is to determine from which supplementary cost center the cost allocation will start. For this reason, this study mostly focuses on the mentioned difficulty.

In this study, additional criteria used to determine the sequence of allocation have been developed. And the previously used and newly developed criteria have been both discusses under a numerical application. The seven different criteria in this study have been presented in the table given below:

Table 15.: Evaluation of Criteria Used to Determine the Allocation Sequence

		Allocation Sequence *(from left to right)*			
	Criteria Used to Determine the Allocation Sequence	***1st Sequence***	***2nd Sequence***	***3rd Sequence***	***4th Sequence***
1	Cursory Allocation	1st SCC	2nd SCC	3rd SCC	4th SCC
2	Allocation According to the Amount of Manufacturing overhead Costs	2nd SCC	1st SCC	4th SCC	3rd SCC
3	Allocation According to the Number of Cost Centers	4th SCC	3rd SCC	1st SCC	2nd SCC
4	Allocation According to the Combined Criterion	4th SCC	1st SCC	3rd SCC	2nd SCC
5	Allocation According to the Refined Horizontal Percentages	4th SCC	1st SCC	2nd SCC	3rd SCC
6	Allocation According to the Refined Vertical Percentages	1st SCC	3rd SCC	4th SCC	2nd SCC
7	Allocation According to the Allocation Effect Criterion	3rd SCC	4th SCC	2nd SCC	1st SCC

The application of the study reveals out two important causes and effects on cost allocation criteria:

- ✓ The above mentioned criteria have important causes and effects on cost planning and control of cost centers.
- ✓ These criteria have also important causes and effects on product costing and product pricing.

The results of this study is more important for high-tech companies of that the profit margins are relatively low; products are more differentiated; cost centers are many in number and manufacturing costs are relatively high.

In especially production companies in which profitability margins are relatively low, that have a wide range of product variety and that uses high technological equipments in production stages, the causes and effects mentioned above may be relatively vital for the survival of the company. Such companies should have to:

- ✓ First of all, manufacturing overhead costs should have to be determined properly and manufacturing overhead costs that can not be ascertained within a short period should have to be estimated in a realistic manner,
- ✓ Cost centers should have to be determined considering both cost planning (by means of planning and control) and responsibility accounting perspectives of the company, and
- ✓ Allocation bases that represent the relations in a rationalist, coherent and realistic manner should have to be chosen.

Finally, it is recommended for the production companies to understand the importance of allocation sequence of the costs that they bear in production stages properly.

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