Justifying Environmental Cost Allocation in a Multiple Product Firm: A Case Study

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This case study examines the effect of environmental cost allocation on production cost and the outcome for environmental management decisions. Using a revised cost allocation – referred to in this paper as environmental cost allocation – the paper contrasts overhead allocation between traditional cost allocation and environmental cost allocation. In addition, production cost derived from the traditional allocation of waste cost is compared with the revised environmental cost allocation. Findings indicate that a revised environmental cost allocation discloses more accurate overhead cost and hence production cost; and that management is motivated to make informed environmental management decisions if a product related environmental cost is made to reflect in the production cost of the polluting product. The paper highlights the practical significance of objective environmental cost allocation on corporate waste management, which thus creates a valuable awareness on the part of the management and accountants of firms in developing countries for the need to fine-tune the dominant traditional costing system. It also suggests avenues for further research to examine the impact of costing systems on environmental investments.

Key Words: management decision, environmental management, environmental cost allocation, waste cost allocation

JEL *Classification:* M11, M41.

Introduction

This paper examines the effect of environmental cost allocation on production costs, and its implication for environmental management decisions. Trends in globalisation have brought evolving challenges to accounting, and management accounting has a crucial role as the corporate cost information provider. There must be accurate cost information to meet growing demands for corporate environmental responsibility such as in waste management. This may not be possible without a good cost allocation system in place. However, there is still noticeable apathy and complacency on the part of some accountants and man-

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agers, mostly in developing countries, regarding environmental cost allocation. Hence, most companies in developing countries (such as the cosmetic industry used in this case study) have continued to apportion their waste costs from the traditional overhead basis, with the tendency that product-specific environmental costs are obscured. This obscurity thus stifles managerial decision and possible innovation toward more environmentally friendly manufacturing with potential cost savings (see e. g. US EPA 1995; Roberts 1995; Rogers and Kristof 2003; Burnett, Hansen, and Quintane 2007; Burnett and Hansen 2008).

Hence the paper tries to answer two major questions:

- Could environmental cost allocation affect production cost?
- What is the potential effect of environmental cost allocation on environmental management decision?

Whilst renowned authorities such as Crowther (2004), IFAC (2005) and Bebbington et al. (2001) have commonly theorised that environmental cost allocation affects product costs based on research conducted in the Western world and other developed nations, little is known about the implication of environmental cost allocation in companies located in a developing country such as Nigeria. Hence, to investigate the applicability of this theory in a developing country, the hypothesis is stated as follows:

H1 *Environmental cost allocation results in differential product costs.*

H0 *Environmental cost allocation does not impact a difference in product costs.*

The objective of this paper, therefore, is to show the effect of environmental cost allocation on production cost and the latent implication for environmental management decisions. The scope of the study is limited to Wonder Beauty Care (WBC) – a multiple product cosmetic firm in Nigeria where the case study was done; it is further limited to proper allocation of direct waste cost from the overhead costs of Wonder Beauty Care Company. This paper is significant, given the growing pressure for corporate sustainability in which accounting has come under intense criticism for not playing a satisfactory role as the information house of the firm (see e. g. FSN 2006; Chwastiak 2001; Catchpowle, Cooper, and Wright 2004). This paper is also significant considering that accounting research from developing countries focuses more on financial accounting (see Hopper et al. 2008). Little attention has been given to management accounting research in countries in Africa, resulting in a

dearth of environmental management accounting research in the sub-Saharan African countries such as Nigeria. While contemporary concepts such as environmental cost allocation may seem ubiquitous in the Western World, in Africa the environmental costing phenomenon is still nascent, and sounds absurd and unimportant to managers and accountants in Nigeria. Hence, the paper applies this concept, which has already gained impetus in the West, to create awareness for companies in Nigeria to appreciate the strategic implication embedded in environmental cost allocation, which is still unknown to them and about which they appear apathetic.

The paper is organised as follows: section two discusses the justification for environmental cost allocation. Section three presents the case study and methodology; section four discusses the data analysis, while section five outlines the findings, and section six draws conclusions.

Justifying Environmental Cost Allocation

Environmental costs are the many different types of costs which organisations incur to manage pollution or maintain cleaner production; they also include costs to comply with environmental standards, including voluntary costs expended to enhance corporate health and safety, community relations and general corporate social responsibility. Some authors have attempted to classify environmental costs, for instance, the Institute of Chartered Accountants in Australia (ICAA) (2003) classifies environmental costs as: hidden, contingent, image/relationship and internal/external. Furthermore, the United Nations Division for Sustainable Development (UNDSD) (2001) classifies environmental costs as: waste and emission treatment, prevention and environmental management, material purchase value of non-product output, and processing of non-product output. Other generic classifications come from IFAC (2005), which follows closely the UNDSD classification above. However, environmental costs differ between firms according to how each firm intends to classify and use them. Nevertheless, the crux of the matter is the ability of management to recognise the existence of such costs and to apply them appropriately in decision making, but it is difficult to recognise and apply environmental costs if the cost allocation system does not make them visible.

Environmental cost allocation is therefore significant considering that corporate environmental sustainability is no longer driven by regulation and compliance; it is now a matter of risks and opportunities such that

proactive corporations should re-strategise their business operations to minimize risk and take advantage of the opportunities. Such strategy should start from the accounting department to provide relevant environmental cost information for informed management decisions for reducing corporate environmental impacts – a sub-goal in the millennium development goals (MDGs).

Proper allocation of environmental costs would supply pertinent information needed to make decisions in compliance with evolving environmental regulations. Emerging environmental regulatory schemes such as corporate sustainability OECD (2000), extended producer responsibility OECD (1996), the International Standard Organisation's (ISO) sustainability certifications (ISO 14000s), the Kyoto Protocol and green house gas (GHG) trading schemes add green responsibility to the cost and management accounting system to supply pertinent cost information to aid corporate environmental management decisions. This increase in environmental concern has spurred the International Federation of Accountants' comments (IFAC 2005, 3):

> Environmental issues – along with the related costs, revenues and benefits – are of increasing concern to many countries around the world. But there is a growing consensus that conventional accounting practices simply do not provide adequate information for environmental management purposes.

The traditional overhead costing system pays less attention to the identity of cost items in overhead, Myerson (1995), hence a major portion of environmental-related costs are found hidden in the traditional overhead accounts (White and Savage 1995; White, Becker, and Savage 1993; Joshi, Krishnan, and Lave 2001). If, therefore, such environmental costs are allocated incorrectly, products would not get their due share, US EPA (1995). Many companies in the developed nations understand this more; for instance, according to Jean (1995), East Peoria, Illinois Plant – a famous US company – no longer dumps waste disposal cost into an overhead account. Such recognition of environmental costs results not only in pollution prevention, but could add revenue to the polluting department (Rogers and Kristof 2003; Burnett, Hansen, and Quintana 2007; Burnett and Hansen 2008). Furthermore, the traditional manufacturing system was direct cost prone, but modern manufacturing technology is dominated by overhead costs occupying a significant portion of manufacturing costs (Cooper 1989; Booth and Giacobbe 1997). A substantial amount of environmental costs are hidden within these new forms of

overhead costs, neglect of which would result in cost information distortion (see e. g. Joshi, Krishnan, and Lave 2001).

Furthermore, environmental costs deserve proper attention because many internal and external stakeholders are showing increasing interest in the environmental performance of organizations, particularly private sector companies (ICAEW 2004). Internal stakeholders include employees affected by pollution in the work environment. External stakeholders include local communities affected by corporate wastes and emissions, environmental activist groups, government regulators, shareholders, investors, customers, suppliers and others (IFAC 2005). In addition, there are growing supply chain pressures from large companies requiring their suppliers to be compliant with environmental management systems (EMS) standard of the International Standard Organization (ISO 1996). But an effective environmental management system cannot be achieved without recognising the relevant environmental costs attached to firm products. This is important since proper environmental cost allocation engenders cleaner manufacturing innovation, which, in addition to pollution reduction, also results in cost savings (see e. g. Rogers and Kristof 2003; Burnett, Hansen, and Quintana 2007). The need for modernizing the traditional costing also arises due to increasing regulations which have caused the internalisation of environmental costs that were previously regarded as externalities; this is also highlighted by (IFAC 2005, 11):

> For example, in countries with strong environmental regulatory regimes, new regulations have led to the internalization of a wide variety of additional environment-related costs. Organizations have seen costs of environmental compliance rise, including costs for required pollution and control equipment, pollution monitoring and emission fees and regulatory paperwork and reporting.

Internalisation of some previous external costs due to environmental pressure means that the costing system should track, classify and allocate these costs equitably for accountability and possible innovation. IFAC (2005, 26) further highlights that:

> Several limitations of conventional management accounting systems and practices can make it difficult to effectively collect and evaluate environment-related data. These limitations can lead to management decision making being based on missing, inaccurate or misinterpreted information. As a result, managers may well misunderstand the negative financial conse-

> quences of poor environmental performance and the potential costs and benefits of improved environmental performance.

A common method that hides environmental costs is to combine them with the overhead pool rather than use direct allocation to the product that is solely responsible for it. The inclusion of most environmental costs such as waste cost in overhead therefore stifles possible efforts to reduce such costs through preventive environmental management, because traditional overhead accounts shield the polluting products. In considering this IFAC (2005, 27) comments:

> The use of overhead accounts for environment-related costs can also be problematic when overhead costs are later allocated back to cost centres for pricing and other purposes. An example would be hazardous waste disposal costs, which might be quite high for a product line that uses hazardous materials and quite low for another that does not. In this case, the allocation of hazardous waste disposal costs on the basis of production volume would be inaccurate, as would be product pricing and other decisions based on that information.

The plant-wide method of allocating some product-specific environmental costs in a multiple product firm, such as presented in this study, distorts the real cost of production in all the products, and the polluting product is protected under this traditional scheme because its pollution cost is apportioned to other products. There is, therefore, no incentive for the management of the polluting department to embark on cost reduction through pollution reduction, because it lacks the pertinent cost information. In line with this, FSN (2006, 1) adds:

> Conventional management accounting has been criticised for ignoring the separate identification, classification, measurement and reporting of environmental information, especially direct and indirect environmental costs. Here, environmental costs such as energy, water and waste disposal are often not traced to specific production processes and are 'lumped in' with general business overheads and allocated to cost objects.

Activity based costing (ABC) has been introduced to remedy the asymmetry in overhead cost allocation of some environmental costs; this is a method that uses cost drivers to allocate indirect environmental costs (Cooper and Kaplan 1992). However, where some environmental costs – such as the waste water cost (the focus of this case study) – are directly

traceable to a product, such waste costs should be treated outside the traditional overhead by direct allocation. The treatment of waste costs outside of overhead conforms to the polluter pays principle of OECD (1972). Thus, with the direct environmental cost allocation approach, product-specific environmental costs previously concealed in overhead accounts are singled out and allocated to products that cause them (Rebecca 1992).

In addition to the preceding discussions, this case study is also anchored on three principles: the polluter pays principle OECD (1972), Extended Producer Responsibility (EPR) OECD (1996), and the responsibility accounting theory. The Polluter Pays Principle (PPP) is an OECD environmental policy guide which requires that the costs of pollution should be wholly born by those who cause it (OECD 1972). Adherence to this has also been seen as a tool to promote efficiency, justice and harmony (Bugge 1996). 'EPR is an emerging strategy being used to promote the integration of environmental costs associated with products throughout their life cycles into the market price of the products ...' (OECD 1996, 8). PPP and EPR are similar, in that they seek to promote efficiency, equity, and justice toward economic, social and environmental sustainability, and accounting is widely viewed as the epitome of these characteristics, hence the present stage in the interface between accounting and environment (see e. g. OECD 1999; IFAC 2005).

The preceding discussion is encapsulated in the responsibility accounting theory which is simply put as: managers should not be judged based on costs and revenues outside their control, but should be answerable to costs and revenues within their control (Horngren and Sundem 1995; Kaplan and Atkinson 1990). If managers are aware of the pollution costs inherent in their products through the costing system, such managers are motivated to take preventive measures to control pollution. For instance waste cost in this study is discovered to be subject to the influence of the Weavon product, the manager of the Weavon Department should therefore be held accountable to it. The following section discusses the case study.

The Case Study and Methodology

Data for this research are drawn from a case study conducted in Wonder Beauty Care Limited in Nigeria. The data were collected over a twelve month period – between January 2007 and December 2007. The company has four major products under separate departments that report performance separately: Soap, Cream, Weavon, and Perfect Finish. The

existing cost accounting system in the company uses the volume of production to allocate all overhead costs to different products. Major attention was given to the effect of volume based allocation of waste water disposal cost on the four products' production cost with particular attention on the Weavon department. The Weavon department produces assorted artificial hair for women. The department uses silk and cotton for its production. The production of Weavon requires several steps in washing the raw cotton and silky materials. Hence, it uses large quantities of water and the waste water is allowed to escape to a nearby river via the public drainage system. The other three departments have a central pit that collects their waste water which is bought weekly by a chemical company. Hence, it was discovered that the Weavon department was responsible for the heavy discharge of waste water. The company pays the local council a standard fee of ₦150,000 (Nigerian Naira) monthly for discharge of waste water into the river in addition to fines accruing from regular drainage blockage caused by fragments of cotton and silk.

The traditional overhead allocation system includes the waste water cost, and apportions it along with other overheads on the basis of volume of production. This method inflates the production cost of other products, while the Weavon department is heavily shielded because it produces the least number of products. This misallocation may have affected the performance of the other products for several years.

The methodological approach is a comparative design and analysis between the traditional overhead allocation (which included waste water cost) and a revised overhead allocation which separates the waste water cost from other overheads. Using a revised cost allocation, the waste water cost is thus separated from the overhead pool for the twelve month period and the other overhead is reallocated, with the waste water cost assigned wholly to the Weavon department outside of overhead allocation. This resulted in reduced production costs for the other three departments while the production cost of Weavon increased commensurate with its real operation costs.

Furthermore a paired sample *t*-test of difference is applied to check for possible difference in means between the overhead costs arising from the two waste cost allocation approaches for the Weavon department. A separate test for mean difference is conducted for the Weavon product, and another test is conducted for all the products put together. The separate test for Weavon is important for gauging the likely impact on its product cost, considering that it is solely responsible for the waste cost. Hence the cost comparison on the Weavon product is imperative for ascertain-

ing the degree of impact on its product cost. It is on this basis that the research hypothesis which is supported by Crowther (2004), IFAC (2005) and Bebbington et al. (2001) is tested and is restated here as:

H1 *Environmental cost allocation results in differential product costs,*

H0 *Environmental cost allocation does not impact a difference in product costs,*

and tested at a Hypothesized mean difference as: H0: $P = 0$ (see table 8).

Analysis of Data

The overhead cost data were collected over a twelve month period, and for clearer information, waste water cost was kept separately within overhead. Table 1 presents the total monthly overhead from January to December 2007 (which includes waste water cost traceable to the Weavon product) and the monthly allocation of overhead costs to products under the traditional overhead allocation. According to the accountant the allocation is based on volume of production per month. On average the Weavon department has a lower volume of production; this accounts for it having the lowest share of total overhead costs. Table 2 presents a separate picture of overhead and waste water costs, with waste water cost separated from the overhead account. With this separation table 3 reapportions the other overhead costs (excluding the waste water cost) to the four products based on the existing volume based allocation. In table 4, the total waste cost of N 2,270,000 (from table 2) is added to its share of other overheads N 760,000 (from table 3); thus a comparison is made between the overheads of the Weavon product before and after the revised allocation, showing a difference of N1,937,000 (see table 4).

With the data collected on the direct material and direct labour cost of the four products, an attempt is made to estimate the impact of the above overhead reallocation on the production cost of the products. Table 5 shows production costs under the traditional overhead costs; it shows that the Weavon department has the lowest cost of production despite its responsibility for waste disposal cost – an indication that Weavon's production cost is grossly understated. This case exemplifies the danger inherent in placing environmental costs in the overhead. It also shows that other products unduly receive a portion of waste costs that should not ordinarily have formed part of their production cost. Further to this, table 6 presents a different production cost using the overhead cost derived from the revised overhead cost allocation. Apart from the Perfect Finish product which has had high costs, the Weavon department's cost

TABLE 1 Total overhead allocated to divisions on traditional cost allocations, based on % volume of units produced (percentages indicate the proportion of units produced monthly)

Month	Soap		Cream		Weavon		Perfect Finish		Total*
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	
January	96	16	162	27	102	17	240	40	600
February	130	20	156	24	117	18	247	38	650
March	124	20	124	20	62	10	310	50	620
April	120	20	120	20	90	15	270	45	600
May	130	20	143	22	130	20	247	38	650
June	120	20	144	24	108	18	228	38	600
July	145	25	116	20	87	15	232	40	580
August	126	18	175	25	105	15	294	42	700
September	154	25	123	20	92	15	246	40	615
October	170	25	170	25	68	10	272	40	680
November	121	20	139	23	73	12	272	45	605
December	130	22	165	28	59	10	236	40	590
Total	1566		1737		1093		3094		7490

NOTES Column headings are as follows: (1) allocated overhead based on % volume production, (2) % volume of production. * Total overheads including waste costs. Data from WBC, January to December 2007.

TABLE 2 Separation of waste water disposal cost from overhead account

	J	F	M	A	M	J	J	A	S	O	N	D	Total
(1)	180	200	210	190	220	180	160	180	180	200	210	160	2270
(2)	420	450	410	410	430	420	420	520	435	480	395	430	5220

NOTES Row headings are as follows: (1) waste water disposal costs (in N'000), (2) other overheads (in N'000). Data from WBC, January to December 2007.

of production increased more than the Soap and Cream products. Table 6 shows the real cost of production if an objective allocation is used, while table 7 presents a comparative table with percentages computed to show the degree of difference in total production cost between the two methods. The Weavon department shows a huge difference of 46 percent. This informs the degree of distortion which traditional overhead allocation could cause if used for certain environmental costs.

In order to substantiate the difference in costs arising from reallocation, a *t*-test of paired two samples for means is presented in table 8. The

TABLE 3 Revised overhead allocation: Other overheads reallocated based on % volume of production

Month	Soap		Cream		Weavon		Perfect Finish		Total*
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	
January	67	16	114	27	71	17	168	40	420
February	90	20	108	24	81	18	171	38	450
March	82	20	82	20	41	10	205	50	410
April	82	20	82	20	62	15	184	45	410
May	86	20	95	22	86	20	163	38	430
June	84	20	101	24	75	18	160	38	420
July	105	25	84	20	63	15	168	40	420
August	94	18	130	25	78	15	218	42	520
September	109	25	87	20	65	15	174	40	435
October	120	25	120	25	48	10	192	40	480
November	79	20	91	23	47	12	178	45	395
December	95	22	120	28	43	10	172	40	430
Total	1093		1214		760		2153		5220

NOTES Column headings are as follows: (1) allocated overhead based on % volume production, (1) % volume of production. * Total overheads including waste costs. Computed from tables 1 and 2.

test sought for a possible difference between the means of the separate results. The case study hypothesis which is stated as: *environmental cost allocation does not impact a difference in product costs,* is thus tested at a hypothesised mean difference of zero: H0: $P = 0$ (see table 8).

Table 8 (left column) tests the mean difference for all the products. The result shows that traditional overhead cost has a mean of 624, while the revised overhead cost has a mean of 435, and therefore is significant at a t-critical of 2.07, which is greater than the hypothesised mean difference of zero (H0: $P = 0$). Lastly, table 8 (right column) presents a separate test of difference for means for the Weavon product. Overhead costs from traditional allocation show a mean of 91, whereas the overhead costs from the revised allocation show a mean of 252. This is also significant at a t-value of 2, which is greater than the hypothesised mean difference of zero (H0: $P = 0$). Thus the hypothesis that *environmental cost allocation results in differential product costs* is accepted and confirms earlier assertions by Crowther (2004); IFAC (2005) and Bebbington et al. (2001).

TABLE 4 Comparative table of weavon product: Overhead under the traditional allocation less overhead after revised cost allocation (allocated overhead + waste water cost)

Month	Overhead under traditional allocation	Overhead after revised allocation (AO + WWC = Total)	Difference
January	102	71 + 180 = 251	149
February	117	81 + 200 = 281	164
March	62	41 + 210 = 251	189
April	90	62 + 190 = 252	162
May	130	86 + 220 = 306	176
June	108	75 + 180 = 255	147
July	87	63 + 160 = 223	136
August	105	78 + 180 = 258	153
September	92	65 + 180 = 245	153
October	68	48 + 200 = 248	180
November	73	47 + 210 = 257	184
December	59	43 + 160 = 203	144
Totals	1093	760 + 2270 = 3030	1937

NOTES Calculated from tables 1, 2 and 3, where: AO – allocated overhead (from table 3), WWC – waste water cost (from table 2), difference = (total overhead after allocation) – (overhead under traditional allocation).

TABLE 5 Production costs from traditional overhead allocation, in Nigerian Naira (N'000)

Costs	Soap	Cream	Weavon	Perfect Finish	Total
Direct material	2800	2500	2000	3000	10300
Direct labour	1000	1100	800	1150	4050
Overhead	1566	1737	1093	3094	7490
Total	5366	5337	3893	7244	21840

NOTES Data from WBC, January to December 2007.

Findings

PRODUCTION COST

Findings from this study show a heavy distortion in production cost if waste disposal cost is allocated using the traditional overhead allocation method. This distortion arises due to the fact that waste cost, which should have been allocated entirely to the Weavon Department, is rather

TABLE 6 Production costs from Revised overhead, in Nigerian Naira (N'000)

Costs	Soap	Cream	Weavon	Perfect Finish	Total
Direct material	2800	2500	2000	3000	10300
Direct labour	1000	1100	800	1150	4050
Overhead	1093	1214	760	2153	5220
Waste water cost	—	—	2270	—	2270
Total	4893	4814	5830	6303	21840

NOTES Data from WBC, January to December 2007.

TABLE 7 Comparative production costs under traditional and revised overhead allocations

Product	Traditional	Revised	Difference
Soap	5366	4893	473 (8.8%)
Cream	5337	4814	523 (9.8%)
Weavon	3983	5830	1847(46%)
Perfect fit	7244	6304	940 (13%)

NOTES Computed from tables 6 and 7.

apportioned to all the products using a volume based system, hence the production cost of the other three departments – Soap, Cream, and Perfect Finish – is inflated above normal. On the other hand the production cost of the Weavon department is grossly underestimated because other products have shared the waste cost due to it. The revised cost allocation discloses the true cost of production through the allocation of waste cost to the Weavon Department. The allocation of waste cost to the Weavon Department and subsequent reallocation of other overheads caused the production cost of the Weavon Department to increase while the production cost of other departments decreased equitably. The *t*-test for means between the two overhead results in the Weavon Department disclosed a reasonable difference.

MANAGEMENT DECISION

The result of this case study which was presented to the management of Wonder Beauty Care Limited stimulated interesting environmental management decisions. The first important decision was the creation of a separate account out of overhead accounts for waste water costs relating to the Weavon department. This is a vital step since any environmental management decision must start with accurate tracking of the rel-

TABLE 8 Test of hypothesis

H1 *Environmental cost allocation results in a difference in product costs,* H1: $P \neq 0$.
H0 *Environmental cost allocation does not affect product cost,* H0: $P = 0$.

This is a two – tailed test. From the table below, the *t*-critical is significant at above 2.0 which is greater than the hypothesized mean difference of zero: H0: $P = 0$; hence H1: $P \neq 0$ is correct and accepted. This substantiates the percentage analysis above, showing that environmental cost allocation of waste cost causes a difference in the overhead costs which impact a difference in product costs.

	t-test of difference between the means of traditional overhead costs and revised overhead costs for all the products (data from tables 1 and 3)		*t*-test of difference between the means of traditional overhead costs and revised overhead costs for Weavon only (data from table 4)	
	Trad. OHC	Rev. OHC	Trad. OHC	Rev. OHC
Mean	624.1666667	435.0833333	91.08333333	252.5
Variance	1412.878788	1181.901515	503.5378788	648.4545455
Observations	12	12	12	12
Pooled variance	1297.390152		575.9962121	
Hyp. mean diff.	0		0	
df	22		22	
t stat.	12.85859674		–16.47457372	
$P(T \leq t)$ one-tail	$5.21359e^{-12}$		$3.66973e^{-14}$	
t critical one-tail	1.717144335		1.717144335	
$P(T \leq t)$ two-tail	$1.04272e^{-11}$		$7.33945e^{-14}$	
t critical two-tail	2.073873058		2.073873058	

NOTES Trad. OHC – traditional overhead costs; Rev. OHC – revised overhead costs.

evant costs. Management also decided to separate all environmental related costs from the overhead to enhance more objective and transparent costing. In addition, management decided to decentralise all investments and/or expenses relating to the environment to encourage accountability and improved environmental performance evaluation, while at the same time spurring departmental environmental initiatives and innovation. Hence additional managerial autonomy, effort, and goal congruence was put in place. These decisions contributed to stimulating efforts by the manager of the Weavon department to acquire a water treatment plant with potential for cost savings and improved revenue; including a marketing synergy between the company and a nearby construction company for the purchase of treated waste water.

This case suggests that proper environmental cost allocation results in relevant environmental cost information which engenders environmental management decisions. In addition, it points to potential benefits in environmental investment. The resulting waste management decisions also imply that the company would have a more friendly relationship with its local community and the government, due to the pollution control implicit in these innovative decisions. Hence the justification for proper environmental cost allocation.

Conclusion

This paper examined the effect of environmental cost allocation on production cost and the outcome for environmental management decisions. The paper draws from a case study conducted in the Wonder Beauty Care Company in Nigeria. Using a revised overhead cost allocation, a contrast in overhead allocation between the traditional cost allocation method and environmental cost allocation is established. This difference is achieved by separating the waste water disposal cost and allocating it directly to the Weavon department which is identified to be solely responsible for waste water cost. After this separation, the other products are released from the waste water cost. This release of unrelated costs caused a reduction in their allocated overheads. In contrast, the overhead cost of the Weavon department increased. The paper evaluated the effect of this difference on production cost, and findings show that the production cost of the Weavon department is better reflected in the revised waste cost allocation, whereas the production cost is grossly understated in the traditional method. A paired sample t-test of difference is used to ascertain if the difference in the overhead cost of the Weavon department resulting from the two methods is reasonable. Findings show a reasonable difference in overhead costs under the traditional and revised cost allocation. This implies that the traditional overhead allocation of direct environmental costs is inappropriate and therefore demands attention. This also points to the extent of cost information distortion inherent in the traditional overhead allocation method. The management of WBC took vital environmental management decisions. It decided to make a change in the costing system in order to enhance accurate tracking of environmental costs by keeping waste water costs separate from overhead, and to account for all environmental related costs separately. Management also decided to decentralise all environmental investments and expenses in order to encourage environmental initiatives and inno-

vation. This finding indicates that environmental cost allocation would enhance the supply of pertinent cost information needed for environmental management decisions. The practical implication is that management is motivated to make environmental related decisions if the relevant environmental cost is made to reflect in the production cost of the polluting product; but wrong environmental cost allocation obscures relevant cost information and stifles environmental management decisions needed for corporate sustainability. There is therefore the need for firms to fine-tune their environmental cost allocation system. The paper opens an avenue for further research to examine the impact of costing systems on environmental investment and corporate sustainability.

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