A NOTE ON THE IMPORTANCE OF PRODUCT COSTS IN DECISION-MAKING

John A. Brierley, Christopher J. Cowton and Colin Drury

ABSTRACT

This paper uses the results of a questionnaire survey to conduct exploratory research into the importance of product costs in decision-making. The results of the research reveal that product costs are at least important in selling price, make-or-buy, cost reduction, product design, evaluating new production process and product discontinuation decisions. Product costs that were used directly in decision-making were more important than those that were used as attention directing information and they were more important in product mix, output level and product discontinuation decisions in continuous production processes manufacturing. In general, the importance of product costs in decision-making did not vary between the methods used to allocate and assign overheads to product costs, and it was not related to operating unit size, product differentiation, competition and the level of satisfaction with the product costing system.

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INTRODUCTION

Only a limited amount of research has examined the importance of product costs in decision-making. Some researchers have considered the importance of cost information, in general, without referring specifically to product costing. For example, in the USA, Emore and Ness (1991) found that cost information had a critical role in pricing, make-or-buy, cost control and product/market strategy decisions. In Belgium, Kerremans, Theunisse, and Van Overloop (1991) observed that cost information was rated as at least very relevant for decisions relating to sales strategy, investment and evaluating the efficiency of the production process. In addition, it was less relevant for production strategy decisions. In Finland, Virtanen, Malmi, Vaivio, and Kasanen (1996) noted the most important use of cost information was for product mix decisions followed by make-or-buy and pricing decisions, but it was not important in cost reduction decisions. In New Zealand, Hoque (2000) observed that cost information was important to management. It was important in pricing decisions, but the research did not subsequently consider its importance in other types of product-related decisions.

Four studies have considered the importance of product cost information and all of these have confirmed the importance of product costs in pricing decisions. In the USA, Cooper and Kaplan (1987) found that product costs were important in decisions relating to the pricing, introduction, discontinuation and the amount of effort given to selling products. In Finland, Lukka and Granlund (1996) observed that product cost information had its greatest importance in pricing, tendering and cost reduction decisions. Similarly, in Italy, Cescon (1999) noted the most important uses of product costs were in cost reduction, pricing, make-or-buy and investment decisions, and its least important role related to decisions about distribution channels. In Australia, Joye and Blayney (1990) found product costs were of major importance in the pricing decisions of the majority of companies.

Given the limited quantity of research into the importance of product costs in decision-making more research is needed to confirm the results of this descriptive research. In addition, there is a need to extend research to conduct exploratory research to assess the relationship of importance with other product costing and operating unit constructs. As a consequence, this paper uses the results of a questionnaire with qualified management accountants working in operating units in British manufacturing industry to conduct exploratory research to identify the importance of product costs in different types of decisions. We then develop a series of propositions about the extent to which the importance of product costs in decision-making varies between

the methods used to allocate and assign overheads to products, between the use of product costs as either attention directing information or directly in decision-making, and between discrete part and assembly manufacturing and continuous production process manufacturing. In addition, we develop further propositions which consider whether the degree of importance of product costs in different decisions is related to the size of the operating unit, the degree of product differentiation of the products produced by the operating unit, the level of competition in the marketplace and management accountants' satisfaction with the product costing system.

The remainder of the paper is organized in the following way. The second section develops a series of research propositions. The third section describes the research method in terms of a questionnaire survey. The fourth section presents the research results and the final section concludes the paper.

RESEARCH PROPOSITIONS

Introduction

Given the exploratory nature of the research, the research objectives derived from the questionnaire are described in terms of seven propositions, rather than hypotheses, relating to the importance of product costs in decision-making. As this is exploratory research all of the propositions are expressed in null form.

Allocation and Assignment of Overheads

There are a number of methods that can be used to allocate and assign overheads to product costs. A number of organizations simplify the process of allocating and assigning overheads by calculating a blanket (or plant-wide) overhead rate for a factory or a group of factories irrespective of the production departments in which products were produced. Product costs calculated using blanket overhead rates, however, may not be accurate enough for decision-making. Drury and Tayles (1994) argue that it is difficult to justify the use of blanket rates because the availability of information technology allows firms to allocate and assign overheads to products at a relatively low cost using either production department overhead rates or production and service/support department overhead rates. An alternative method of incorporating overheads into product costs is to use activity-based costing (ABC) systems, which emerged in the mid-1980s to meet the

demand for more accurate cost information. The potentially arbitrary nature of allocating and assigning overheads to products has led to some companies adopting direct (or variable) costing, whereby indirect overheads are excluded from product costs.

These methods of allocating and assigning overheads to products can be listed in order of decreasing detail and accuracy as an ABC system, the use production and service/support department rates, the use of production department rates, the use of a blanket rate and not assigning overheads to products by using direct costing. Given that Karmarkar, Lederer, and Zimmerman (1990) argued that the higher the importance of costs the more sophisticated should be the costing system, it is possible that operating units using more detailed methods to allocate and assign overheads to products and hence calculate more accurate product costs are more likely to place a higher level of importance on this cost information in decision-making than those using less detailed methods. Hence:

P1. The importance of product costs in decision-making does not vary with the methods used to allocate and assign overheads to products.

The Use of Product Cost Information in Decision-Making

Cooper and Kaplan (1991) argue that it is not practicable to generate the different relevant costs to use directly in each decision because of the large number of possible decisions, and hence the large number of possible costs that can be applied in those decisions. In this situation, it is necessary for organizations that sell many products to use product cost information as attention directing information to highlight those products for which special studies are required prior to a decision being made about those products. The special studies are used to estimate the incremental costs of decisions involving changes in the shared resources of support activities for each product or group of products. Thus, in this situation product cost information should not be used directly in decision-making. To the authors' knowledge there has not been any empirical research that has considered the importance of product cost information and the application of product costs as either attention directing information or directly in decision-making. Hence:

P2. The importance of product cost information in decision-making does not vary with the use of product cost information as attention directing information or directly in decision-making.

Discrete-part and Assembly Manufacturing and Continuous Production Process Manufacturing

Most discrete-part and assembly manufacturing are convergent manufacturing processes, whereby parts are manufactured into sub-assemblies that are combined to form the finished product. Reeve (1991) argues that the overhead costs relating to this type of manufacturing are high and can be as high as direct material costs, which explains why some of the initial efforts to describe the application of ABC were in this environment. Continuous manufacturing processes are divergent manufacturing processes. Here common raw materials enter the production process and by the end of production this input is divided into many different products with differing colors and sizes. Reeve (1991) argues that the differences between convergent and divergent manufacturing lead to problems accepting ABC in the latter environment. Specifically, Reeve (1991) notes that in continuous production process manufacturing overheads relating to, for example, raw material management and procurement do not make up a large proportion of overheads and hence it is less important to understand the cost drivers of these activities. Krumwiede (1998) and Ittner, Lanen, and Larcker (2002) have empirically tested Reeve's arguments and obtained the opposite result; namely that ABC is less likely to be adopted in discrete-part and assembly manufacturing environments. Research, however, has not considered whether the level of importance of product cost information in decision-making varies between these two types of manufacturing. Hence:

P3. The importance of product costs in decision-making does not vary between discrete-part and assembly manufacturing and continuous production process manufacturing.

Operating Unit Size

It has been argued that larger firms have the range and depth of facilities and resources to employ the skilled and qualified workforce to adopt innovations (Damanpour, 1992). In the context of management accounting, prior research has shown that larger companies have the resources to adopt innovative techniques, such as ABC (Booth & Giacobbe, 1998; Krumwiede, 1998; Clarke, Hill, & Stevens, 1999). Following on from this, it is possible that larger operating units will find product costs to be more important in decision-making. When the size of an operating unit is defined as its turnover and number of employees this leads to the following propositions.

P4a. The importance of product costs in decision-making unrelated to the turnover of the operating unit.

P4b. The importance of product costs in decision-making is unrelated to the number of employees in the operating unit.

Product Differentiation

Johnson and Kaplan (1987) note that the increasing automation of the production process has led to companies expanding the range of products they produce. To meet customer demand companies are able to produce differentiated products, as well as standardized products. The production of differentiated products has led to an increase in support department costs associated with their production and, associated with this, the need to record these costs accurately in product costs. It is possible that product cost information may be more important in these circumstances. Hence:

P5. The importance of product costs in decision-making is unrelated to the degree of product differentiation.

Competition

A firm that is in an increasingly competitive environment is likely to require a more accurate cost system for decision-making (Kaplan & Cooper, 1998). If not, competitors are likely to take advantage of incorrect decisions made from data obtained from an inaccurate cost system. The higher the level of competition, the higher will be the degree of exploitation by competitors arising from a company making incorrect decisions after using an inaccurate cost system. Thus, operating units facing a high level of competition may regard product costs as being more important in decision-making because of the need to make correct decisions. Hence:

P6. The importance of product costs in decision-making is unrelated to the level of competition facing operating units.

Satisfaction with the Product Costing System

The more satisfied management accountants are with the accuracy of costs produced by their product costing systems, it is possible that product cost information will be more important in decision-making because

management accountants will have more confidence in its accuracy and appropriateness in decision-making. Hence:

P7. The importance of product costs in decision-making is unrelated to the management accountants' satisfaction with the product costing system.

RESEARCH METHODS

A questionnaire was used as part of a wider research project about product costing in manufacturing industry to obtain information about the importance of product costs in decision-making.[1] Potential questionnaire respondents were obtained from a list of 854 members of the Chartered Institute of Management Accountants (CIMA) in Great Britain with job titles of cost, management or manufacturing accountant, and employed in British manufacturing industry. An introductory letter was posted to all potential respondents explaining the research objectives and informing them that they would receive a questionnaire in two weeks time. The questionnaires were accompanied by a covering letter, which assured them of the confidentiality of responses, and a stamped-addressed envelope. Any non-respondents to the mailing of the questionnaire were posted a follow-up letter two weeks later, and a further follow-up letter, questionnaire and stamped-addressed envelope were posted to non-respondents four weeks after the questionnaire had been sent out. After identifying potential respondents who worked in the same operating unit, operating units which had closed down, potential respondents who had left their operating unit and those who were not involved in manufacturing industry or product costing, the total working in independent operating units declined to 673. A total of 280 usable responses were received (effective response rate = 41.6%) of which 274 used product costs in decision-making.

The operating units of the 274 respondents that used product costs in decision-making had a mean turnover of £138.0 m (standard deviation = 431.1), a 5% trimmed mean of £63.1 m and a median of £30.0 m (useable $n = 271$). Also, these operating units had a mean number of employees of 715.5 (standard deviation = 1,372.4), a 5% trimmed mean of 483.5 and a median of 340 employees (useable $n = 266$).[2]

Information about the importance of product costs in decision-making was obtained by asking respondents to rate the importance of product costs in each of selling price, make-or-buy, cost reduction, product mix, output

level, product design, evaluating new production process and product discontinuation decisions with responses of: 1 = very important, 2 = important, 3 = neither important nor unimportant, 4 = unimportant, 5 = very unimportant and 6 = do not make this type of decision. By identifying the respondents who did not make a particular decision it was possible to determine the extent to which product costs were important when a particular decision was taken, and these scores were reverse scored for data analysis.

Information about the allocation and assignment of overheads to products was obtained by responses to a question asking how each operating unit calculated overhead rates with responses of using a blanket overhead rate, production department rates, production and service/support department rates, ABC and direct (or variable) costing. Details of how product cost information was used in decision-making was obtained from a single question with responses of used as attention directing information, as a guide to whether further investigations should be conducted; used directly in decision-making and other. A single question asked respondents to specify the type of manufacturing undertaken with responses of discrete-part and assembly manufacturing, continuous production process manufacturing and other.

Two separate questions asked respondents to indicate their operating unit's size by specifying the approximate turnover and the approximate number of employees working at their operating unit. The three psychometric constructs measured the level of product differentiation, competition and satisfaction with the product costing system were developed by the authors and consisted of two-item measures with responses on a five-point Likert scale. The measure of product differentiation required responses to two questions, with responses to one question ranging from 1 = virtually all customized products to 5 = virtually all standardized products, and the other ranging from 1 = at least 95% of products produced are unique and produced to satisfy individual customer's orders to 5 = at least 95% of products are identical products produced in large quantities. The measure of competition asked for responses to two questions about the general level of competition in the marketplace. Responses to the first question ranged from 1 = very intense to 5 = very slack, and to the second question from 1 = very high to 5 = very low. Satisfaction with the product costing system was measured by responses to two questions with possible responses ranging from 1 = very satisfied to 5 = very dissatisfied. The responses to each of the psychometric constructs were summed and reverse scored for data analysis.

The discriminant validity of the three psychometric constructs was confirmed first by a factor analysis of the six items making up the psychometric constructs using a principal components analysis with a varimax rotation.

This confirmed that the six items loaded into a pure three-factor solution relating to each of the three proposed two-item constructs. The second method of confirming discriminant analysis involved calculating the product moment correlation coefficients between the factors and these confirmed that they were not related significantly and appear to be measuring different constructs.[3] The reliability of the three psychometric constructs was confirmed by Cronbach's (1951) α and these were all satisfactory. The α were for product differentiation ($\alpha = 0.95$, useable $n = 266$), competition ($\alpha = 0.84$, useable $n = 271$) and satisfaction with the product costing system ($\alpha = 0.90$, useable $n = 274$).

RESULTS

Table 1 shows the levels of importance that questionnaire respondents attached to the use of product costs in different decisions. Over 75% of the respondents felt product costs were either important or very important in selling price, cost reduction and evaluating new production process decisions. Just over half felt it was at least important in make-or-buy, product design and product discontinuation decisions. It was particularly important in selling price decisions with 81.0% of respondents stating that product costs were at least important in this decision. The respondents indicated that product costs were of least importance in product mix and output level decisions.

The results of the Kruskal–Wallis tests in Table 2 show there is no significant difference ($p \geqslant 0.05$) in the level of importance of product cost information in decision-making between the methods used to allocate and assign overheads to product costs.[4] Table 3 shows the results of the independent sample t-tests comparing the level of importance of product costs in decision-making when the information is used as attention directing information and when it is used directly in decision-making.[5] In all cases product cost information is more important when it is used directly in decision-making, and this difference is significant ($p < 0.05$) in selling price, make-or-buy, cost reduction, product mix and product design decisions.

Table 4 reveals there are no significant differences ($p \geqslant 0.05$) between the importance of product costs in decision-making between operating units in discrete-part and assembly manufacturing and continuous production process manufacturing for selling price, make-or-buy, cost reduction, product design and evaluating new production process decisions.[6] For product mix, output level and product discontinuation decisions the level of importance

Table 1. The Importance of Product Costs in Decision Making.

Level of Importance	Type of Decision															
	Selling Price		Make-or-buy		Cost Reduction		Product Mix		Output Level		Product Design		Evaluating New Production Process		Product Discontin-uation	
	N	(%)	*N*	(%)	*N*	(%)	*N*	(%)	*N*	(%)	*N*	(%)	*N*	(%)	*N*	(%)
Very important	112	(44.0)	67	(29.2)	87	(33.5)	33	(14.0)	22	(9.0)	59	(23.1)	75	(28.6)	60	(24.5)
Important	111	(43.7)	130	(56.8)	125	(48.1)	80	(33.9)	69	(28.4)	128	(50.0)	136	(51.9)	97	(39.6)
Neither important nor unimportant	21	(8.3)	21	(9.2)	36	(13.8)	80	(33.9)	83	(34.2)	41	(16.0)	41	(15.7)	48	(19.6)
Unimportant	7	(2.8)	9	(3.9)	11	(4.2)	31	(13.1)	52	(21.4)	21	(8.2)	9	(3.4)	29	(11.8)
Very unimportant	3	(1.2)	2	(0.9)	1	(0.4)	12	(5.1)	17	(7.0)	7	(2.7)	1	(0.4)	11	(4.5)
Total making this decision	254	(*100.0*)	229	(*100.0*)	260	(*100.0*)	236	(*100.0*)	243	(*100.0*)	256	(*100.0*)	262	(*100.0*)	245	(*100.0*)
Do not make this decision	15		30		7		36		27		16		10		26	
Total useable respondents	269		259		267		272		270		272		272		271	
Median[a]	4.00		4.00		4.00		3.00		3.00		4.00		4.00		4.00	
Mean[a]	4.27		4.10		4.10		3.38		3.11		3.82		4.05		3.68	
Standard deviation[a]	0.82		0.78		0.82		1.05		1.06		0.97		0.78		1.10	

[a]The statistics represent the importance of the decision for those making the decision based upon a five-point scale ranging from 5 = very important to 1 = very unimportant.

Table 2. Kruskal–Willis Tests of the Differences of the Importance of Product Costs in Decision Making between the Methods of Allocating and Assigning Overheads.

Type of Decision	Chi-square	*P*
Spelling price decisions	4.681	0.322
Mark-or-buy-decisions	5.149	0.272
Cost reduction decisions	1.154	0.886
Product mix decisions	1.863	0.761
Output level decisions	1.337	0.855
Product design decisions	6.341	0.175
Evaluating new production process decisions	4.325	0.364
Product discontinuation decisions	0.720	0.949

Table 3. Independent Sample *T*-Tests of the Difference in the Importance of Product Costs in Decision Making between the Use of Product Cost Information in Decision Making.

Type of Decision	Use as Attention Directing Information			Use Directly in Decision Making				
	N	Mean[a]	Standard Deviation[a]	*N*	Mean[a]	Standard Deviation[a]	*t*	*p*
Selling price decisions	112	4.04	0.86	121	4.46	0.76	3.920	0.000
Make-or-buy decisions	99	3.83	0.86	114	4.32	0.67	4.653	0.000
Cost reduction decisions	113	3.96	0.84	125	4.27	0.73	3.103	0.002
Product mix decisions	103	3.23	0.98	115	3.56	1.09	2.297	0.023
Output level decisions	106	3.02	1.10	118	3.23	1.04	1.488	0.138
Product design decisions	110	3.65	0.92	126	3.98	1.00	2.555	0.011
Evaluating new production process decisions	114	3.96	0.75	127	4.13	0.79	1.796	0.074
Product discontinuation decisions	108	3.57	1.10	120	3.81	1.09	1.619	0.107

[a]The statistics represent the importance of the decision based upon a five-point scale ranging from 5 = very important to 1 = very unimportant.

Table 4. Independent Sample T-Tests of the Difference in the Importance of Product Costs in Decision Making between Discrete-part and Assembly Manufacturing and Continuous Production Process Manufacturing.

Type of Decision	Discrete-part and Assembly Manufacturing			Continuous Production Process Manufacturing				
	N	Mean[a]	Standard Deviation[a]	*N*	Mean[a]	Standard Deviation[a]	*t*	*p*
Selling price decisions	98	4.19	0.97	120	4.29	0.73	0.850	0.396
Make-or-buy decisions	92	4.09	0.77	103	4.08	0.83	0.081	0.935
Cost reduction decisions	100	4.15	0.69	121	4.03	0.92	1.079	0.282
Product mix decisions	88	3.14	1.11	114	3.53	1.03	2.581	0.011
Output level decisions	95	2.87	1.07	112	3.20	1.09	2.138	0.034
Product design decisions	100	3.93	0.96	118	3.71	0.92	1.717	0.087
Evaluating new production process decisions	102	4.02	0.76	124	4.03	0.81	0.121	0.904
Product discontinuation decisions	98	3.42	1.19	111	3.86	1.00	2.907	0.004

[a]The statistics represent the importance of the decision based upon a five-point scale ranging from 5 = very important to 1 = very unimportant.

of product costs in decision-making was significantly ($p<0.05$) higher in continuous production process manufacturing.

In general, there is no relationship between the importance of product costs in decision-making and operating unit size, product differentiation, competition and the level of satisfaction with the product costing system. An exception is the selling price decision where there is a significant and negative correlation between importance and operating unit turnover ($r=-0.185$, $p=0.004$, useable $n=245$) and number of employees ($r=-0.138$, $p=0.033$, useable $n=239$),[7] and a significant and positive correlation with product differentiation ($r=0.144$, $p=0.023$, useable $n=248$) (see Table 5). This result shows that product costs are more important in selling price decisions in smaller operating units than larger operating units, and in operating units selling differentiated products.

Table 5. Product Moment Correlation Coefficients between the Importance of Product Costs in Decision Making and Operating Unit Size, Product Differentiation, Competition and Satisfaction with the Product Cost System.

Type of Decision	Operating Unit Size		Product Differentiation	Competition	Cost System Satisfaction
	Turnover	Number of Employees			
Selling price decisions	$r = -0.185$[a]	$R = -0.138$[b]	$r = 0.144$[c]	$r = 0.048$	$r = 0.072$
	($n = 245$)	($n = 239$)	($n = 248$)	($n = 251$)	($n = 254$)
Make-or-buy decisions	$r = 0.044$	$r = 0.055$	$r = -0.033$	$r = 0.079$	$r = 0.091$
	($n = 220$)	($n = 216$)	($n = 221$)	($n = 226$)	($n = 229$)
Cost reduction decisions	$r = 0.065$	$r = 0.101$	$r = -0.049$	$r = -0.040$	$r = 0.053$
	($n = 250$)	($n = 244$)	($n = 252$)	($n = 257$)	($n = 260$)
Product mix decisions	$r = -0.093$	$r = -0.017$	$r = 0.016$	$r = -0.005$	$r = 0.019$
	($n = 229$)	($n = 223$)	($n = 230$)	($n = 234$)	($n = 237$)
Output level decisions	$r = -0.006$	$r = 0.023$	$r = 0.057$	$r = 0.006$	$r = 0.113$
	($n = 236$)	($n = 230$)	($n = 237$)	($n = 241$)	($n = 244$)
Product design decisions	$r = 0.035$	$r = 0.024$	$r = 0.019$	$r = 0.087$	$r = 0.057$
	($n = 247$)	($n = 241$)	(n = 248)	($n = 253$)	($n = 256$)
Evaluating new production process decisions	$r = -0.095$	$r = -0.094$	$r = 0.093$	$r = -0.031$	$r = 0.107$
	($n = 254$)	($n = 248$)	($n = 254$)	($n = 259$)	($n = 262$)
Product discontinuation decisions	$r = -0.024$	$r = -0.046$	$r = 0.094$	$r = -0.025$	$r = -0.053$
	($n = 238$)	($n = 232$)	($n = 237$)	($n = 242$)	($n = 245$)

[a] $p = 0.004$.
[b] $p = 0.033$.
[c] $p = 0.023$.

CONCLUSION

This exploratory research has used a questionnaire to examine the importance of product costs in decision-making. Product cost information was found to be at least important in selling price, make-or-buy, cost reduction, product design, evaluating new production process and product discontinuation decisions. Product cost information was significantly more important when used directly in decision-making than when used as attention directing information in pricing, make-or-buy, cost reduction, product mix and product design decisions. This may be because product cost information may be regarded as being more important when it is actually being used in a decision rather than as a guide for possible future decisions. Product cost information may be significantly more important in continuous production process manufacturing than in discrete-part and assembly manufacturing for product mix, output level and product discontinuation decisions because continuous production processes lead to the production of many different products for which a variety of product related decisions will need to be made.

In general, the importance of product costs in decision-making did not vary with the methods used to allocate and assign overheads to products and was not related to operating unit size, product differentiation, competition and the level of satisfaction with the product costing system. Exceptions to this were a significant and negative correlation between the importance of selling price decisions with operating unit size and a positive correlation with product differentiation. Product cost information may be more important in smaller operating units because this may be one of the few pieces of information they have when making pricing decisions. As a consequence, this product cost information is more important in a smaller operating unit than in a larger operating unit that may have access to a wider variety of information, including market-based information. Similarly product cost information may be more important in the selling price decisions of operating units producing a variety of products because of the need to record accurately the profit of each product as a means of assisting with the pricing decision.

The limitations of this research stem primarily from the use of a questionnaire, which may mean that the results suffer from non-response bias, question misinterpretation etc. Furthermore, the measures of importance in each decision were measured by a single item for which the reliability could not be assessed. Given the dearth of prior research that has examined the importance of product costs in decision-making there is a need to replicate this research. There is a need to extend the research to consider whether the

importance of product cost information varies between different manufacturing industries.

In addition, there is a need to consider whether the frequency of use of product costs in decision-making varies for different types of decision and to examine the relationship between the frequency with which product costs are used in each type of decision and the importance of product costs in that decision to confirm whether or not costs which are used frequently in decision-making are also important in decision-making. Also, the research should consider whether the importance of product costs varies with other constructs like different types of competition (Khandwalla, 1972), competitive strategy (Miles & Snow, 1978) and perceived environmental uncertainty (Milliken, 1987).

Research should also consider the extent to which non-accountants, such as production, marketing and general managers use product costs in decision-making and the relative importance they give to product cost information compared to other information. For example, Tornberg, Jämsen, and Paranko (2002) found that product designers in a Finnish manufacturing company regarded cost information as important in product design decisions but less important than quality, durability, performance and meeting customers' specifications.

This paper represents an exploratory examination into the importance of product costs in decision-making. It is hoped that the paper will be of interest to other researchers to conduct further research in this area in the future.

NOTES

1. A copy of the questionnaire is available from the first author.
2. As the distributions of the turnover and number of employees were positively skewed, the 5% trimmed mean and median turnover and number of employees are also reported. The 5% trimmed mean excludes the largest 5% and smallest 5% of observations from the distributions of turnover and number of employees.
3. The results of the factor analysis and the correlations between the constructs are available from the first author.
4. The low sample sizes especially for operating units using ABC ($n = 7$) means that a non-parametric Kruskal–Wallis test is used instead of a parametric one-way ANOVA.
5. Operating units that use product costs both as attention directing information and directly in decision making are not included in the analysis because it is not known whether product costs are used in each of the decisions as either only attention directing information, only directly in decision making or in both of these ways.

6. Operating units that use either both of these or other types of manufacturing are excluded from the analysis.

7. As the distributions of both measures of operating unit size are positively skewed the correlation between importance and of operating units size is based on a $\log_{10}$ transformation of the size measures.

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