

As Easy as CBA

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Limitations of Time-Driven Activity Based Costing, from a Contribution Based Activity™ perspective

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Executive Summary

The paper is about two activity based approaches developed during the past twenty years, namely Activity Based Costing (abc), now upgraded to Time-Driven Activity Based Costing (tdabc) and Contribution Based Activity™ (cba).

That they both demonstrate positive outcomes is surprising, given the polarisation of methodology:

- tdabc treats operational expenses as fluid; cba treats all expenses as fixed;
 - tdabc assigns operational expenses to various activity drivers; cba relates all expenses plus profit to one activity driver.
 - tdabc leaves a question mark over the ‘fluidity’ of assignable expenses, eschewing a cost basis upon which mark-ups can be applied to cover non-operational expenses + profit; cba treats costs of goods sold plus freight as the only variables to which expenses + profit per unit of activity are added to establish market price.
 - tdabc establishes a standard time per minute of activity against which real time is measured; cba establishes a target average gross profit per unit of activity against which actual gross profit per quote / price / product / job / order / sale / customer, is measured.
 - tdabc diagnoses capacity utilisation, service, product and customer profitability in a process that, depending on complexity, can take days or weeks; cba completes the diagnosis to an acceptable level of confidence, in minutes.
 - Both tdabc and cba reveal weaknesses in capacity utilisation systems and processes, opening the door for a more in depth tdabc-type review.
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Time-Driven Activity Based Costing from a Contribution Based Activity™ Perspective

A recent working paper by Kaplan and Anderson² (K&A) presents Time-Driven Activity Based Costing (tdabc) as a ‘*new approach for implementing activity-based costing that is simpler, faster, cheaper, more flexible and more easily maintained than the traditional approach*’.

An example of the traditional ABC process will help. A customer service department performs three activities, handling customer orders, processing complaints and credit checks. The cost of operational resources performing these activities is \$560,000 and there are 9,800 orders, 280 customer complaints and 500 credit checks. Based on the percentage of time absorbed by the three activities the \$560,000 is assigned as follows.

Activity	%	Assigned Cost	Driver Quantity	Driver Rate
Handle orders	70%	\$392,000	9,800	\$ 40/order
Process complaints	10%	56,000	280	\$200/complaint
Check credit	<u>20%</u>	<u>112,000</u>	500	\$224/credit check
Total	100%	\$ 560,000		

Orders per customer are accumulated for a period along with any complaints and credit checks providing an overview of cost per customer. However, with no cost differential between small or large, simple or complex orders, attempts to differentiate resulted in a potentially exponential number of activities to which costs could be assigned. The process became unduly burdensome.

Moving away from a percentage apportionment of costs to activities, Time Driven ABC is based on a cost per minute of personnel time per activity. For example, assuming that at 80% capacity utilisation, activities costing \$560,000 were calculated to absorb 700,000 minutes, the unit cost would work out at \$0.80c a minute. The \$40 per order could then be adjusted depending on size and complexity by adding or subtracting \$1 a minute for additional personnel time. An added advantage is the ability to more easily identify capacity utilisation by comparing assigned times to total personnel time available. Assuming 10,200 orders, 230 complaints and 540 credit checks, then

Activity	Quantity	Unit Time	Total Time	Unit Cost	Total Cost Assigned
Handle Customer Orders	10,200	40	408,000	\$ 32	\$ 326,400
Process Complaints	230	220	50,600	176	40,480
Perform Credit Checks	540	250	<u>135,000</u>	200	<u>108,000</u>
Total Used			593,600		\$ 474,880
Total Supplied			700,000		\$560,000
Unused Capacity			106,400		\$ 85,120

Once management is aware of under utilisation and cost per customer, action can be taken to improve inefficiencies increase the size of small and unprofitable orders and so forth. Practical examples of tdabc in action, have resulted in the positive outcomes indicated below:

- *twenty-five percent of customers in one company were unprofitable*
- *the company could not make a profit on any order selling for less than 20 percent gross margin (25% mark-up) - regardless of order size*
- *several entire distribution routes were unprofitable... with those less than 50 miles away proving lot less costly than those 200 miles away.*

- sales persons had been trying for years, unsuccessfully, to increase order volume with apoints to their margin but by knowing which items to sell.
- One company was targeting a profit improvement of more than \$700,000 annually

There are several points to be made about these positive outcomes:

- the application of time driven assignable expenses per activity appears to have had the beneficial effect of focusing management on gross profit margins, without reference to which, the positive outcomes could not be identified
- by extracting the key variable of goods plus shipping costs from the overall sale price, unprofitable orders due to distant locations would have become obvious from the outset.
- intent on assigning expenses to activities, K&A exclude non-assignable (non-operational?) expenses as well as profit. And yet activities identified as ‘drivers’ must ultimately bear the weight of both operational and non-operational expenses plus profit, i.e. the gross profit of the company as whole.
- As the following example will show, management provided with a gross profit benchmark, against which profitability of quotes or prices can be measured, would be immediately alerted to the problems of small and unprofitable orders due to low gross margins.

Contribution Based Activity™ (CBA)

Assuming the same operational or assignable expense of \$560,000 and adding \$140,000 to cover non-operational expense plus profit, the target gross profit would be \$800,0000. Assuming a target number of sales of 10,000, the target average gross profit per sale would be \$80. Cba refers to this \$80 as the Target Average Rate Index or TARI™ to emphasis its benchmark status and distinguish it from a cost.

Based on 50 week year, the average number of sales would be 200 per week (10,000/50), giving a average weekly gross profit target of \$16,000 (200sales x \$80). It then a matter of tracking each invoice along the following lines.

Week no 3 for period ending

Inv No.	No.of Sales	Sale price	Cost of gds + freight	Gross profit	GP %	+/- Tari™ \$80:
597		370	250	120	32	+40
598		190	150	40	21	-40
599		430	320	110	26	+30
600		380	304	76	20	-4

Wk's Total	190	61,600	46,200	15400	25	81
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10 weeks for period ending

Total to Date	1840	625,600	469,200	162,656	26	88
Target	2000	640,000	480,000	160,000	25	80
Variance	-160	+14,400	+10,800	+2,656	+1	+8

On the grounds that it is possible to catch up on a poor week, but far more difficult to catch up on a poor month, the number of orders and resulting average gross profit contribution are summarised weekly and accumulatively for comparison with target.

The data invites the question, ‘why did 597 do so well and yet 600, an order of similar size do so poorly?’ While the poor performance of 600 may be due to inept quoting, discounting, higher shipping costs or bad buying, there is no evidence that even if tdabc were operative, internal juxtaposition of costs to activities would have made any difference to the outcome. The addition of \$3 for more lines per invoice or \$6 for difficult packaging or \$200 to cover a credit check³,

would have no impact on a gross profit based on the difference between market price and cost of goods.

Tdabc doesn't indicate how market price is calculated, but it is most unlikely it's authors would suggest adding \$200 to the cost of goods for say, handling a complaint by the customer in question.

More important for management is the need to minimize repeats of 598 and 600 and optimize orders such as 597/9.

The positive variance after 10 weeks is consistent with cba experience at the coal face of numerous businesses across the spectrum of resale, manufacturing, service or the professions. Once management is provided with a clear focus such as TARI™, improvement flows in the first instance from an increase in the gross profit per sale. Improvement in numbers of sales takes more time, generally because more is involved in changing internal systems and processes. It is at this point that a tdabc approach can play an important role in sorting out causes of inefficiencies.

The above example relates to businesses engaged in reselling activities, such as wholesale-distribution and retail, where the key driver is seen to be the number of sales and gross profit per sale. Without a time factor however, capacity utilization is not so easily measured as in manufacturing, trades, service, contracting, professions etc.

When time is the key driver

Apart from the clothing industry where time is measured in minutes, cba identifies man or machine hours as the key activity driver. There are 4 steps:

1. *Invoice analysis*: identify the average gross profit per hour actually charged to jobs by selecting a representative sample of at least 6 invoices (some prefer 10 invoices, others 50) and extracting the cost of materials plus any outsourced work.

Invoice No	Sales	Purchases + outsourced work at cost	Gross profit	Gross profit %	No. of Hours	Average GP per Hour
126	2,000	500	1,500	75	20	75.0
138	1,700	500	1,200	71	30	40.0
167	900	200	700	78	25	28.0
183	3,000	900	2,100	70	22	95.0
196	2,500	700	1,800	72	30	60.0
210	1,400	400	100	71	28	36.0
Total	11,500	3,200	8,300	72	155	53.5

Apart from giving a close approximation of the average gross profit per hour, the sample also reveals a wide range in contribution per hour, from \$95 down to \$28.

CBA experience across a wide spectrum of businesses indicates that the range of contributions comes as a complete surprise to 98% of management. This is primarily due to the method by which cost and prices have been developed over the years, varying from standard manufacturing costs and percentage add-ons to material, to a multiple of 3 or 4 times hourly rates. The revelation is a point at which a process of re education often begins.

To those commenting that higher contributions are due to mark-ups on jobs using more material than jobs with little or no material input, we make the point that whatever costing system they care to use, jobs with a higher than average contribution per man-hour contribute more to the bottom line than jobs with lower than average. Providing allowance is made in expenses for loss or damage, mark-ups on materials or goods has no

divine mandate.

2. *Time charged to jobs*: divide the average gross profit per hour into overall gross profit to get a close approximation of the hours charged to jobs/products:

A	Sales for past period	\$924,000
B	Materials/purchases at cost	260,000
C (A - B)	Gross Profit (72%)	664,000
D	Average gross profit per hour	\$53.50
E (C / D)	Approx. hrs charged to jobs	12,411 hrs

3. *Capacity utilization*: divide the hours charged to jobs by the hours available to be charged. Available hours will normally be hours paid less time for breaks and vacation etc. Multiplying percentage productivity by 8 hours will give a more meaningful results of hours charged out per person per 8 hour day, eg:.

F	Hours available for charging	20,000 hrs
G (F/G)	Productivity	$\frac{12,411 \text{ hrs}}{20,000 \text{ hrs}}$
		62%
H (G x 8 hrs)	Charged hours per person per 8hr day	4hrs 58mins

4. *Looking ahead*: target ongoing performance following the same process as for wholesale/distribution, using target chargeable hours instead of number of sales/orders. In this case, we would target additional net profit as well as an increased number of chargeable hours to deliver a TARI™ very close to the average gross profit of \$53.50 previously achieved.

$$\frac{\text{Target gross profit}}{\text{Target chargeable hrs (70\% x 20,000hrs)}} = \frac{\$750,000}{14,000\text{hrs}} = \$53.50$$

$$\text{Average weekly target (14000/50wks)} = \$53.50 \times 280 \text{ hr}$$

Practical Application of CBA

The following 5 examples demonstrate the application of CBA in both resale and time related activities.

Ships' Providore

With \$50m turnover and 19% gross profit margin, 12 branches and 60 sales representatives, the company showed nil profit at the time of a management buy-out.

In response to a query about 'average sale' management was of the opinion there was no such thing in a company that supplied the QE2 with \$150,000 orders and a tugboat with \$50 of bread and milk. However, accepting that it would difficult to improve an unknown amount, management cooperated by analysing a random sample of sales to reveal an average sale of \$5000, which divided into \$50m indicated approximately 10,000 sales. Given a 19% gross margin, the average gross profit per order was \$950.

The immediate objective was to improve the gross margin from 19% to 25%, and target an average gross profit (TARI™) of \$1250.

Sales representatives were made responsible for costing their own orders, a task previously carried out by office personnel. Branches were instructed to transmit weekly reports showing the number of sales made along with the gross profit per sale and per representative.

Quarterly meetings of branch managers focused on ways and means of improving product mix and adding value per order. One branch, using brochures from a local jeweller sold opals to ships' crews, adding value to the food and other supplies. Another branch arranged a deal with a local video outlet and sold videos.

By the end of the financial year, 10.5 months following the management buy-out, net profit had blossomed from nil to \$2.5m. (Equivalent in effect, to 10,000 sales x \$250 added value per sale).

Jeweller

The jeweller was persuaded to maintain weekly reports of the sales, gross profit and number of sales as recorded on the cash registers.(A cash ring-up of several items counted as one sale). A CPA processed the reports and handed back a weekly comparison of the average gross profit per sale with TARI™ as well as a comparison of the number of sales with target. Profit increased from a break-even situation to a net of \$80,000 within 6 months. In response to our request for what the jeweller had to say, he sent us the following:

- **he liked the idea of having a benchmark by which to gauge performance on a weekly basis**
- **it helped identify whether the contribution was above or below the TARI benchmark when developing product mix**
- **it provided immediate feedback on the effectiveness of advertising**
- **it gave more understanding of the cycles impacting his business.**

The ensuing three illustrations demonstrate the application of time based drivers

Kitchen Utensil Plant - customer contribution.

The CEO had recently spent \$500,000 on an IBM AS400 plus consulting input on a full blown costing system. Given the profusion of information pouring out of the system, he felt unable to see the wood for the trees and with a gut feeling all was not well, called for help. In the conference room of the plant, in answer to the writer's questions, the following was written up on the white board:

A	Annual Gross profit	\$20,000,000
B	Man-hours charged to jobs	250,000 hrs
C = A/B)	Average GP,per hour (TARI™)	\$80

A sample of invoices from a customer buying 55% of the output revealed the following:

Inv No	Inv Price	Cost of Matl's	Gross Profit	Hrs	Ave GP per hour	TARI™ \$80
5374	100,000	70,000	30,000	1,000	30	-50
6894	350,000	247,000	103,000	3,000	34	-46
7925	270,000	183,000	87,000	2,800	31	-49
Total	720,000	500,000	220,000	6,800	32	-48

By taking 55% of the output at a average gross profit per hour of \$32, the major customer contributed only \$4.4m of the \$20m gross profit. It was highly unlikely the required contribution of \$15.6m could be achieved from the remaining 45% of customers.

The simple analysis took less than 20 minutes and would have taken less, had the information been more easily accessible.

Leading Furniture Manufacturer - product contribution.

An international consulting group had been working with this company for six months, concentrating on production and marketing. Knowing the consultant in charge of the assignment, the writer asked if they had tried CBA? The answer was no, because the company was well set up with standard costing and able to identify any variances arising. Apart from that, productivity was running hot at 75%, due mainly to a newly designed suite that was in great demand on the continent.

However the consultant did agree to cooperate in pinpointing the average gross profit contribution per hour, which turned out to \$130:

Because the costing system did not give the gross profit per hour for each product, it was necessary to write a simple program to extract that information. With the data processing section employing 26 staff, all busy with other projects, it was a good two weeks before it was possible to review the range of contributions from each of 150 products.

The gross profit contribution per hour ranged from \$225 to \$57, with the product in high demand and driving productivity showing up at \$81. Noting with some alarm that the products contributing \$225 and \$195 were in fact disused, the consultant claimed there must have been an undetected change in product mix. It was to his credit that he immediately referred the findings to senior management.

A meeting of key players spent the following days brainstorming how to improve the contribution from the \$81 product along with several other low contributors, primarily by improving efficiency and reducing material usage without impacting quality. Cba software was installed to monitor progress.

Within three months, the downturn in the bottom line began to level out and within six months it was on a steady rise. It proved to be a salutary lesson for all concerned. From that time on, all new designs had to pass the contribution test before proceeding.

Fabricator - job contribution

Posting a loss of \$133,000 for the previous financial year and \$80,000 for the seven months to January 31, the company commenced applying cba. Later that year, the CPA who had introduced them to the concepts, told us that from February through September, the firm had made a net profit of \$138,000. The writer asked the accountant to find out what his client had to say about this dramatic turnaround. He came back with the following:

“I developed confidence in quoting - because I knew the contribution compared with TARI™

I got my weekly results each Friday and monthly results in four days instead of six weeks”.

Summary:

- positive outcomes relating to customer and product profitability described by K&A are substantially available to all business, large or small without the installation of a time-driven activity based costing system, helpful though that process may be as a means of improving efficiency and capacity utilisation.
- the assumption underlying tdabc⁴ that the majority of expenses are fluid and can be assigned to time driven activities appears to (i) fight shy of non-assignable expenses and profit, (ii) overlook the basis of cost upon which mark-ups are applied in those cases where no market price already exists and (iii) bypass the fixed nature of assignable expenses such as complaints (eg \$176 each) and the need to spread them across total available time. The sum of which, calls into question the extent of ‘fluidity’ of assigned expenses and the consequent impact on profitability.
- the only expenses treated as ‘fluid’ in CBA are the cost of goods/materials sold plus any obviously direct variables such as shipping costs and outsourced work. While not excluding any overtly direct costs that may from time to time occur, all other expenses are, for all practical purposes, treated as fixed, to be adjusted up or down as expenses rise or fall. Whilst these findings run contrary to the basic tenets of tdabc, the advantages become apparent in the application.
- tdabc calls for a categorisation of activities and an assessment of time per category in order to get a close approximation of time-driven costs. It is a process that depending on complexity, could take days and even weeks. Once established, several more weeks may be required to assess capacity utilisation.
- by comparison, cba is able to establish capacity utilisation along with an overview of contribution of services, products and customers, in a matter of minutes from a sample of invoices.
- the target average rate index, TARI™ in conjunction with a targeted volume lies at heart of cba. Along with a weekly comparison of results with targeted gross profit, the two together provide a focus at the point of quoting / pricing / invoicing and a benchmark for monitoring performance that provides early alert for relevant and timely correction.
- application of cba, in no way excludes the need for tdabc once it becomes apparent that capacity utilisation and expenses need more in-depth attention.

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² Time Driven Activity Based Costing, a Working Paper, Robert S. Kaplan & Steven R Anderson, Nov 2003

³ “For example, at Maines Paper and Foodservice, the algorithm for Customer Service adds three minutes for special orders, another three minutes if a credit memo is required...” Ibid p10.

⁴ “I believe that all but a very small portion of organization expenses are not ‘fixed’ and indeed can be assigned rationally and meaningfully to products, services and customers. This is the entire foundation of activity-based costing....” excerpt from correspondence to the author by Robert Kaplan, 12/11/03