

# COMPETITIVE ENVIRONMENT AND CORPORATE CONSTRUCTS OF PRICE AND COSTS IN THE UAE

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## Abstract

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Target costing is a cross-disciplinary subject with several unexplored academic dimensions besides having applied business practices and economic policy implications. In this paper, we use a unique combination of mixed methods research approach to investigate the adoption of target costing by manufacturing firms in the United Arab Emirates (UAE). The first employed method is the new Dumitrescu-Hurlin (D-H) Granger non-causality test for heterogeneous panel data, while the second is a survey. The D-H test with annual data indicates the adoption of target costing by the publicly listed manufacturing firms. When using quarterly data, but with a smaller sample of firms, the results show bi-causality between costs and sales revenues; thus target costing is possibly corroborated but within a feedback mechanism. Survey results, based on self-reported data and again on a smaller sample, show mixed results. The relationship between target costing and the intensity of competition seems moderately corroborated by the survey results. This paper contributes to the literature by employing a unique mixed methods research approach, to the best of our knowledge not found previously in the literature, and by its findings on the adoption of target costing by manufacturing firms in a relatively open and dynamic economy such as the UAE.

**Keywords:** Target Costing, UAE, Competitiveness, D-H Causality Test

**Authors' individual contribution:** Conceptualization - F.Z. and P.O.; Methodology - F.Z.; Investigation - F.Z.; Writing - Original Draft - F.Z.; Writing - Review & Editing - P.O.; Funding Acquisition - F.Z. and P.O.

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## 1. INTRODUCTION

In an increasingly competitive world, to reduce costs and adapt to market demands is a constant reality

for firms not shielded from competition due to government protection. Within many cost management techniques, target costing still has grounds to cover in particular on methodology (Ansari, Bell, & Okano, 2007; Ahn, Clermont, &

Schwetschke, 2018). Target costing adoption, or lack of it, is indicative of a firm's competitive strategy within the industry (Dekker & Smidt, 2003). During a target costing process, the vector runs from price to cost – a market-driven process. That is, the firm takes the market price of a product and then goes all the way back to the initial costs of its production to achieve the desired profit margin. This is the opposite of another pricing strategy, the popular cost-plus, also known as a mark-up or cost-based in some literature (Barfield, Raiborn, & Kinney, 2003; Guilding, Drury, & Tayles, 2005; Helms, Ettkin, Baxter, & Gordon, 2005; Kee & Matherly, 2006), in which the vector runs from cost to price. During the cost-plus process, a firm adds a desirable profit margin on top of the manufacturing cost. The cost-plus pricing strategy is symptomatic of an uncompetitive business environment.

This article's main objective is two-fold: firstly, it will conduct a quantitative test, the Dumitrescu-Hurlin Granger non-causality test (Dumitrescu & Hurlin, 2012; hereinafter D-H causality test), to identify the causality vector between the cost of goods sold/operating expenses and net sales of UAE companies; secondly, a comprehensive survey is applied to the manufacturing publicly-listed companies in the UAE to inquire on their adoption of target costing. The main question to be answered by the mixed methods is as follows: *Are UAE publicly listed firms adopting – in practice though not necessarily in a technical sense – target costing as a management approach?* In other words, how prevalent is the adoption of target costing by UAE manufacturing firms?

After initially identifying the link between pricing strategy and firms' cost management tools, it may be possible to infer whether the economic environment of the country exogenously affects firm pricing-cost strategy<sup>1</sup>. For instance, the economic environment that circumvents firms' strategy affects the level of pressure from new entrants in the market and rivalry among firms. These are key factors that may determine if a firm, to survive, has to adjust costs to the market price (target costing) or can just add a margin to the cost (cost-plus) due to the low-competitive business environment. Thus, this study, by identifying a general pricing strategy pattern of UAE-based firms, could provide insight into the country's business environment as well.

The rest of this paper is organised as follows. The next section presents a review of some extant literature in the area. This is followed by a presentation of the research hypotheses, their theoretical underpinnings, and the data. Section 4 describes the mixed quantitative and qualitative research methods and their results. Findings and future research possibilities are presented in the final section.

## 2. LITERATURE REVIEW

Costing is an essential element in the strategic thinking and positioning of every business organization. Its impact and implications vary across different organizations and have been

shown to affect organizations in different ways during different periods, such as before and after economic shocks (Hassanein & Younis, 2020). Target costing must be used during the design and planning phases, i.e., prior to the manufacturing phase. This is to avoid the situation where the costs get entrenched in the product and then can no longer be adjusted or targeted to fit the sales or the market price (Kee, 2010; Iranmanesh & Thomson, 2008; Ax, Greve, & Nilsson, 2008; Ibusuki & Kaminski, 2007; Ewert & Ernst, 1999). Such management strategy has several interdependent dimensions that can be explored separately or simultaneously. The two main ones are (Dekker & Smidt, 2003; Hibbets, Albright, & Funk, 2003; Ansari, Bell, & Okano, 2007; Ax, Greve, & Nilsson, 2008; Ahn, Clermont, & Schwetschke, 2018; Goncalves, Gaio, & Silva, 2018):

1. *Target costing adoption.* Target costing can be defined briefly as a strategy that takes the market price of an established product or the estimated price of a would-be product and uses it as a parameter that will define the feasible cost for the desired profit margin. If the market does not accept the final price, the firm might shrink its profit margin, try to re-do the manufacturing to cut costs, or – depending on the re-manufacturing feasibility and fixed and sunk costs – just stop producing the product or shut down operations.

2. *Institutional environment.* The number of firms adopting target costing (or not) is an indicator of the institutional environment of the country. If a particular country shows evidence of a substantial number of firms following one particular price strategy, it is indicative of the institutions surrounding the firm. For instance, if we observe a country with a significant portion of its industry operating and profiting within a cost-plus approach, this suggests that institutions are open to rent-seeking, i.e., rents obtained from engaging in extra-market activities or, at least, benefiting from someone who is involved in extra-market activities. For instance, if a particular firm obtains the right, that is, a monopoly, to explore a particular business line, this privilege is conducive to a cost-plus strategy by the firm. On the other hand, a country with a significant portion of the industry operating by the principles of target costing may suggest a more competitive environment, possibly involving cartel controls (formal or informal), an open economy, antitrust policy, and so on.

The adoption of target costing implies that a firm is facing a competitive environment. Therefore, it has to adjust to the market price, and it has no monopoly power to set prices; thus, it needs to reconfigure its cost structure. On the other hand, if a firm just adds mark-ups on its cost, it implies some sort of market power that may be the result of permissive, or anti-competitive, institutions. Either way, such a snapshot of the market may be valuable for policymakers to act by either regulating or deregulating some sectors of the economy. Any conjecture in this regard depends on the results of this paper. To the best of our knowledge, no other study has been carried out to investigate the

<sup>1</sup> For equity issues between public-private sector in the UAE, see Ryan (2015).

managerial behavior of publicly listed companies' in the UAE, let alone one using a mixed research approach of quantitative and qualitative methods, regarding cost management strategies, with exception of Zanella, Oyelere, and Hossain (2015).

Target costing, despite its underlying market-oriented foundation, has not been extensively studied by academicians in its various dimensions. As mentioned during the introduction, its adoption or omission provides significant evidence of the competitive environment in a country. In brief, to keep this section concise<sup>2</sup>, most studies have been conducted with the following foci:

1. Theoretical/literature review dedicated to stating the process of implementing target costing and its advantages when compared with alternative systems. Examples of such line of research are Cooper and Chew (1996), Helms et al. (2005), Forsman and Lindgren (2006), Kee (2010), Wouters, Morales, Grollmuss, and Scheer (2016), Bock and Pütz (2017), Navissi and Sridharan (2017), and Becker and Gaivoronski (2018).

2. Case studies that assess target costing system. Illustrative literature with such approach are Hibbets, Albright, and Funk (2003), Everaert, Loosveld, Van Acker, Schollier, and Sarens (2006), Ibusuki and Kaminski (2007), Reckziegel, Souza, and Diehl (2007), Filomena, Neto, and Duffey (2009), Wakefield and Thambar (2019).

3. Surveys conducted to assess the adoption of target costing. Dekker and Smidt (2003), Ax, Greve, and Nilsson (2008), Afonso, Nunes, Paisana, and Braga (2008), Yazdifar and Askarany (2011), Juhmani (2010), Marques and Rocha (2017), Rasit and Ismail (2017), Goncalves, Gaio, and Silva (2018)<sup>3</sup>, Baharudin and Jusoh (2019), Hammami, Al-Omiri, Bouraoui, and Anam (2019) are examples of this line of research.

The majority of the studies are conceptual papers on target costing or based on surveys of its practices. Surveys have many benefits and are a valid research technique. The method is employed here as a complementary robustness check. One drawback is that surveys depend on the honesty and accuracy of the respondents' memory. Furthermore, as stressed by Ansari, Bell, and Okano (2007): "While there may be fewer conceptual gaps to fill, there is a great deal of opportunity to move the area beyond self-reported survey results and single-site case studies" (p. 520). We seize upon the opportunities open by their recommendations by using disclosed accounting data, officially audited, as input in our heterogeneous panel regression model. Our proposed research differs from previous studies by inspecting the actual relationship between costs and prices, with an econometric tool, i.e., the D-H Granger non-causality test, which is presented in the next section. This allows observation - not only through self-reported data - of the factual practices and results of industry. Thus, a mixed quantitative and

qualitative approach is used to cross-check the results. With this purpose, this study focuses on 48 publicly listed manufacturing firms in the UAE. The reason for selecting publicly listed firms is that their accounting and financial statements were audited and can be easily inspected.

To the best of our knowledge, no other study on target costing has been done using a combination of methods such as D-H causality test and survey, or by focusing on the behavior of firms listed in the UAE.

### 3. HYPOTHESES, DATA AND RESEARCH DESIGN

The research proposal's main objectives are to conduct an empirical test to identify the causality vector between costs and prices in the UAE and to investigate the adoption of target costing by UAE manufacturing firms. Therefore, the proposed study will collect evidence to observe whether target costing is the predominant practice among publicly listed manufacturing firms in the UAE. More precisely, this study tests the following four hypotheses:

*Hypothesis 1 (H1): The selling price determines the production costs. That is, the relationship is single-directional from price to cost. This is the target-costing hypothesis.*

*Hypothesis 2 (H2): The cost determines the selling price. That is, the relationship is single-directional from cost to the price. This is the cost-plus hypothesis.*

*Hypothesis 3 (H3): Previous selling prices determine costs, and costs of production determine selling prices, i.e., there is a feedback mechanism. This is the hypothesis of bilateral causality or interdependence between price and cost.*

*Hypothesis 4 (H4): There is no significant statistical relationship between price and cost, inclusive of lagged values. This hypothesis suggests either independence or an undetermined relationship between the variables. This hypothesis does not suggest that there is no relationship between price and cost, only that it was not possible to distinguish a statistically significant pattern.*

Testing causality with heterogeneous panel data by the typical Granger causality test intended for time series may cause a loss of important firm-specific information. To handle such issues, the new Dumitrescu-Hurlin (D-H) Granger non-causality test was designed to address the heterogeneous causality among individuals (Dumitrescu & Hurlin, 2012; Lopez & Weber, 2017). The D-H has a normal distribution. Individual price and cost data were not available, but because both are similarly affected by quantity, the data collected then were operating expenses, cost of goods sold and net sales. This should not affect the causality test because quantity equally affects both sides of the causality model, i.e., the dependent and independent variables. Data are from Compustat - Capital IQ from Standard & Poor's through Wharton Research Data Services (WRDS). The software used was Stata 16 and the applied program was XTGcause (Lopez & Weber, 2017a).

The research targeted all publicly listed manufacturing companies in the UAE, listed either in the Abu Dhabi Securities Market or in Dubai

<sup>2</sup> For a literature review on target costing, see Ahn, Clermont, and Schwetschke (2018).

<sup>3</sup> Ax, Greve, and Nilsson (2008), Goncalves, Gaio, and Silva (2018), besides the applied survey, are unique to the extent that they employed as well a quantitative method of analysis - probit and logit regression analysis.

Financial Market - a total of 48 firms. Balance sheets and income statements disclosures were selected from 2004 to 2018 for yearly data, and from 2004 to 2019 for quarterly data considering that data for the first two quarters of 2019 were available by the time of this study. However, the D-H causality test is designed to work only with strongly balanced data. Therefore, due to some data unavailability for some

periods, the sample of the study was limited to the firms for which data were audited and fully available. Thirty-six manufacturing firms fulfilled such criteria for annual disclosures and 17 for quarterly disclosures. Estimation results are reported separately for both time windows in Table 4. The estimation models are:

H1 testing model:

$$\Delta OE_{i,t} = \alpha_i + \sum_{k=1}^k \gamma_i^{(k)} \Delta OE_{i,t-k} + \sum_{k=1}^k \beta_i^{(k)} \Delta S_{i,t-k} + \varepsilon_{it} \tag{1}$$

$$\Delta CGS_{i,t} = \alpha_i + \sum_{k=1}^k \gamma_i^{(k)} \Delta CGS_{i,t-k} + \sum_{k=1}^k \beta_i^{(k)} \Delta S_{i,t-k} + \varepsilon_{it} \tag{2}$$

H2 testing model:

$$\Delta S_{i,t} = \alpha_i + \sum_{k=1}^k \gamma_i^{(k)} \Delta S_{i,t-k} + \sum_{k=1}^k \beta_i^{(k)} \Delta OE_{i,t-k} + \varepsilon_{it} \tag{3}$$

$$\Delta S_{i,t} = \alpha_i + \sum_{k=1}^k \gamma_i^{(k)} \Delta S_{i,t-k} + \sum_{k=1}^k \beta_i^{(k)} \Delta CGS_{i,t-k} + \varepsilon_{it} \tag{4}$$

H3 and H4 testing models are identical to the H1 and H2 models described above, but the corroborated results would be distinctive due to the statistical significance of the variables, i.e., a bi-directional causality with all variables showing significance (H3) or not identifying causality in any direction when the variables are not statistically significant (H4).

Where *OE* is the operating expenses, *S* is the net sales, *CGS* stands for the cost of goods sold: all series are in log growth form, i.e.,  $\ln[OE_{i,t}/OE_{i,t-1}]$ ,  $\ln[CGS_{i,t}/CGS_{i,t-1}]$ , and  $\ln[S_{i,t}/S_{i,t-1}]$ ; *i* stands for individual firms (1,...,N). Each firm was tested for lag length based on both Bayesian and Hannan-Quinn criteria, *t* indexes time (1,..., T), with  $K \in N$ , and error terms  $\varepsilon$  are white noise; all series are stationary (see Table 3).

**Table 1.** Variables statistical summary and correlation coefficients

	<i>Operating expenses</i>	<i>Cost of goods sold</i>	<i>Net sales</i>
Mean	1687.53	1393.72	2544.16
Standard dev.	4136.28	3497.59	6954.04
N	504	504	504
Correlation matrix	=====		
Operating expenses	1.0000		
Cost of goods sold	0.9826	1.0000	
Net sales	0.9528	0.9545	1.0000

In addition to the quantitative test above, we also apply a qualitative tool, a survey (see Appendix for detailed questions) to further investigate the adoption or not of target costing by UAE manufacturing firms. Perhaps the most challenging part of a survey is the questionnaire design and its pilot application. Luckily, our questionnaire is based, largely, with permission from the authors for the replication, on the surveys of the distinguished papers of Dekker and Smidt (2003) and Ax, Greve, and Nilsson (2008) on target costing adoption.

The questionnaire was prepared in both English and Arabic. To guarantee the fidelity of the questions' meaning to the original version, we adopted back-translation. That is, first an Arabic version of the questionnaire is produced by a translator, then another translator produced an English version. Then the final version is compared to the original to secure fidelity to the intended questionnaire meaning.

The survey was applied to all 48 manufacturing firms publicly listed in the UAE (see Table 2). The

questionnaires were typically addressed to the companies' CAOs (or controller officers) or CFOs as available. Contact details (name, position, and email) were obtained through the EIKON database by Thomson-Reuters™. The questionnaire was sent to their email contacts for an online response at the surveymonkey.com™ website. The respondents had the option to access an English and an Arabic version of the questionnaire. Thirteen respondents opted for the English version and three for the Arabic one.

Because of the limited number of publicly listed firms, we manage to obtain a small number of individual responses but a significant response rate. It is important to consider that the majority of the firms were located within a relatively short distance from the University location of the researchers, i.e., a 150-kilometer radius. The firms' familiarity with our academic institution possibly positively affected the response rates. The rate of response was 16 (out of 48), thus 33.3%. However, because the survey was responded to anonymously, it was neither possible

to identify the response rate relative to the D-H causality estimation based on yearly (36 firms) and quarterly data (17 firms) nor to identify exactly the response rate proportion between CAOs and CFOs.

The first round of emails provided 13 responses, and the second round another three

responses. Due to the low number of second-round responses, it was not statistically feasible, or meaningful (due to potential false positives or negatives), to apply a non-response bias test between the two rounds of response (Armstrong & Overton, 1977).

**Table 2.** Population and sample

	<i>D-H causality yearly data</i>	<i>D-H causality quarterly data</i>	<i>Survey</i>
Population	48	48	48
Sample (% of total)	36 (75%)	17 (35.4%)	16 (33.3%)
Data source	Compustat™	Compustat™	Self-reported

*Note: Population consists of all publicly listed manufacturing firms in the Abu Dhabi and Dubai stock markets. Sample for D-H causality tests consists of firms with data available without missing values for any variable or period considering that the D-H test requires a strongly balanced data.*

#### 4. EMPIRICAL RESULTS

This section presents the results of both quantitative (D-H causality test) and qualitative (survey) research approaches.

##### 4.1. The D-H Granger non-causality test

The quantitative analysis is the product of the new

D-H Granger non-causality test for heterogeneous panel data. The data must be stationary to be used in the model. Table 3 shows two unit-root tests for double confirmatory analysis: all variables are stationary, confirmed at a 1% level by both augmented Dick-Fuller and Im-Pesaran-Shin tests.

**Table 3.** Augmented Dickey-Fuller (D-F) and Im-Pesaran-Shin (I-P-S) unit-root tests

<i>Test/Variable</i>	<i>Log operating expenses</i>	<i>Log cost of goods sold</i>	<i>Log sales</i>
D-F	398.781 (0.00)***	397.316 (0.00)***	408.519 (0.00)***
I-P-S	-9.459 (0.00)***	-9.250 (0.00)***	-9.320 (0.00)***

*Note: Within parenthesis are the Inverse chi-squared and W-t-bar probability statistics for the augmented Dickey-Fuller and Im-Pesaran-Shin respectively. \*\*\* $p < 0.01$ .*

Table 4 presents the results of the D-H Granger non-causality test for yearly ( $T = 14$ ) and quarterly ( $T = 62$ ) data. A critical point to run causality tests is to determine the number of lags since this choice is known to potentially alter the causality direction (Lopez & Weber, 2017). To increase the confidence in the choice of lags, here we applied two distinct lag length order tests, i.e., the Bayesian criteria (BIC) and the Hannan-Quinn (HQCI) criteria.

Once the lag length test results do not coincide, we run the D-H causality test with both lags results. For yearly data, both BIC and HQCI tests recommended the same number of lags, i.e., one year, so the results are presented in the same column. For quarterly data, the BIC test indicated the use of three lag lengths while HQCI indicates the use of four lag lengths. Results were reported in different columns. Although the statistics were naturally different, the choice of lag length did not alter the results of the causality test. We report both  $Z$  bar and  $\tilde{Z}$  bar tilde statistics. In only one situation did they differ from each other – in the case of causality running from operating expense to sales for yearly data. Since  $\tilde{Z}$  bar tilde outperforms the  $Z$  bar statistics with limited  $T$ , we choose the former to comment on the table results<sup>4</sup>.

For yearly data, 36 firms had complete information. Results corroborate the  $H1$ , i.e., that UAE manufacturing firms adopt target costing practices. Results, significant at 1% level, show that sales determine both the operating expenses as well as the cost of goods sold. When we tested the vector of adjustment direction from operating expenses to sales,  $Z$  bar and  $\tilde{Z}$  bar tilde gave contradictory results; thus, considering that the  $\tilde{Z}$  bar tilde outperforms  $Z$  bar for limited  $T$  and that  $\tilde{Z}$  bar tilde was not statistically significant, we concluded that the results cannot corroborate an adjustment running operating expenses to sales.

Bearing in mind that the D-H causality test requires a strong balance panel, only 17 out of the 36 firms also had complete quarterly data available. Tests were then performed using two distinct lag lengths according to BIC and HQCI criteria. Independently of the lag lengths used, results show a bi-causality between sales and operating expenses as well as between sales and cost of goods sold; thus, quarterly data supported  $H3$ .

$H2$  (cost-plus strategic management approach), and  $H4$  (no causality) were not corroborated by the tests with any choice of time or lag length.

<sup>4</sup> EvIEWS 9.5, unlike Stata 16 that provides the results of both statistics used in this paper, provides the results of only  $\tilde{Z}$  bar tilde exactly for outperforming the  $Z$  bar statistics (<http://blog.evIEWS.com/2017/08/dumitrescu-hurlin-panel-granger.html>), although EvIEWS names it as simply “Z-bar Stat” (Lopez & Weber, 2017).

**Table 4.** Dumitrescu-Hurlin (D-H) Granger non-causality test results

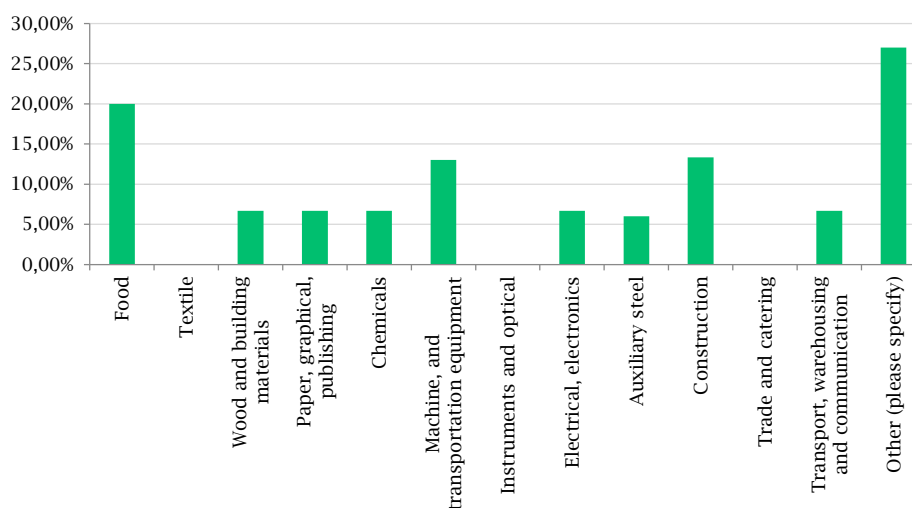
Direction	Yearly Data, N=36 T=14		Quarterly Data, N=17 T=62			
	Z bar ( $Z_{\sqrt{T}}$ ) l(BIC,HQIC)=1	Z bar tilde ( $\tilde{Z}_{\sqrt{T}}$ ) l(BIC,HQIC)=1	Z bar ( $Z_{\sqrt{T}}$ ) l(BIC)=3	Z bar tilde ( $\tilde{Z}_{\sqrt{T}}$ ) l(BIC)=3	Z bar ( $Z_{\sqrt{T}}$ ) l(HQIC)=4	Z bar tilde ( $\tilde{Z}_{\sqrt{T}}$ ) l(HQIC)=4
LS → LOE	5.844 (0.000)***	3.124 (0.001)***	9.977 (0.000)***	8.945 (0.000)***	4.953 (0.000)***	4.239 (0.000)***
LOE → LS	3.327 (0.000)***	1.480 (0.138)	6.426 (0.000)***	5.695 (0.000)***	5.735 (0.000)***	4.944 (0.000)***
LS → LCGS	7.935 (0.000)***	4.491 (0.000)***	21.562 (0.000)***	19.546 (0.000)***	24.089 (0.000)***	21.478 (0.000)***
LCGS → LS	0.375 (0.707)	-0.447 (0.654)	8.994 (0.000)***	8.045 (0.000)***	9.847 (0.000)***	8.648 (0.000)***

Note: The maximum authorized number of lags to be tested is  $T > 5 + 3k$ . For yearly data, the lags tested ranged from 1-2, and from quarterly data the tested lags ranged from 1-18. l(BIC) = Bayesian criteria & l(HQIC) = Hannan-Quinn criteria for lag lengths. \*\*\* $p < 0.01$ .

## 4.2. Survey results

Qualitative research is the second mixed approach employed. Sixteen firms out of 48 responded to the questionnaire. In some cases, we report basic statistics such as the weighted average of the Likert scale and standard deviation. However, confidence interval statistics are not possible to report due to

the low absolute total number of responses. Figure 1's purpose is to provide a snapshot of what type of activities the firms conducted. Unfortunately, a fourth of the respondents replied "other" without giving details. Food processing corresponds to 20% of the answers, followed by machinery, transportation, and construction.

**Figure 1.** The core activities of companies

Export data were not available from the database, so we decided to include a question about it in the questionnaire. Since international markets are wider and considered more competitive, this provides additional information if the companies at the time of the research were able to sell only for the domestic market. Our results show that 62.5% of the respondents sell abroad to a variety of degrees, with about 6% of the respondents making more than half of their sales overseas, 25% of them making 25 to 49% of sales overseas, and about 31% making 1 to 24% foreign sales. Although 37.5% of the respondents do not sell abroad, this number should be read with caution in terms of competitiveness, because most imported products in the UAE pay an import tariff of only 5%, while some products are exempt. Alcoholic products and tobacco are exceptions; they pay 50% and 100% in tariffs respectively, but none of these goods are produced by local firms.

Another question added to address the idiosyncrasy of the UAE is company ownership.

About 69% of the respondents classified their companies as publicly owned, while the remaining 31% is privately owned. This is reflective of a country in which the economy is heavily based on oil revenues and which has been intensively trying to diversify its economy. The UAE sovereign wealth funds, estimated to constitute several hundred billion dollars (<https://www.swfinstitute.org/fund-rankings/sovereign-wealth-fund>), have been used to establish firms that generate revenues alternative to the unstable oil market.

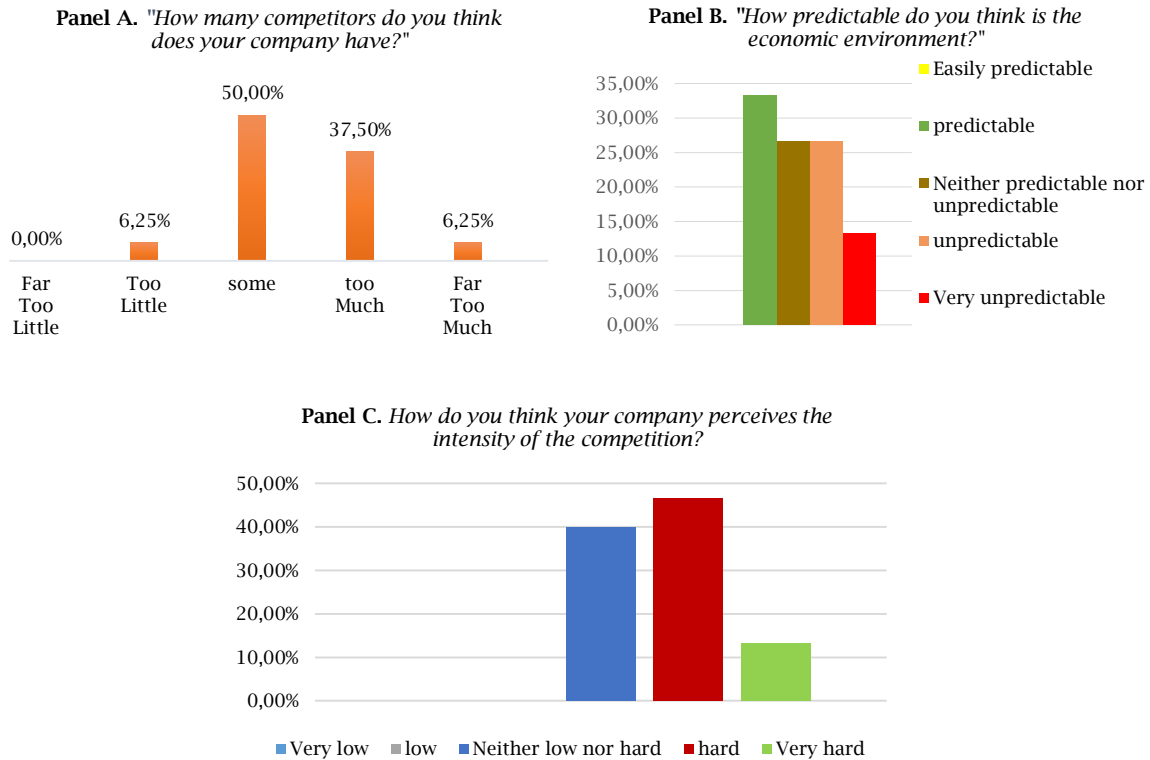
An important question associated with the adoption of target costing is its relationship with the business environment. Dekker and Smidt (2003) found support for this relationship; meanwhile, Ax, Greve, and Nilsson (2008) and Goncalves, Gaio, and Silva (2018) did not corroborate the association between target costing adoption and competitiveness. Figure 2, Panels A, B, and C address this association in three dimensions: number of competitors, predictability of the environment, and perceived intensity of competition. On the number

of competitors (Panel A), about 40% responded “too much” or “far too much”. The weighted average is 3.44 (from a five-point Likert scale) and the standard deviation is 0.70. On the predictability of the economic environment (Panel B) and perceived competition (Panel C), numbers are slightly different with a weighted average of 3.20 for the former and 3.73 for the later: standard deviations are 1.05 and

0.68 respectively.

Regarding the perceived competition dimension, with 60% of the respondents stating that it was “hard” or “very hard” and a weighted average of 3.73, we believe we could conclude that there is modest support for Dekker and Smidt’s (2003) findings that associate the adoption of target costing with the competitive environment.

Figure 2. Competitive environment assessment (responses structure)



Target costing strategy boils down to three variables, i.e., sales price, cost, and required profit margin. Figure 3 shows that sales price has the highest response for “very important” with 62.5%; when combined with “important” responses it came close to “required profit margin”. The weighted average for the sales price, profit margin, and cost were 4.50, 4.38, and 4.19 respectively. This question directly asks about the adoption of target costing,

albeit not using its definition yet (it was used in the following questions). Target costing can be summarized as taking the would-be market price to then accommodate a profit margin and accommodate the target cost into the product design to avoid unreversed future costs. Thus, the weighted average responses trend shows moderate support for the adoption of it as well as for the regression analysis results.

Figure 3. The most important factors when positioning a product in the market (as per responses)

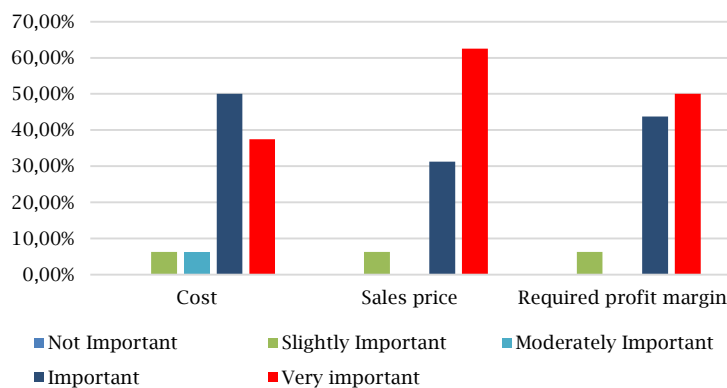
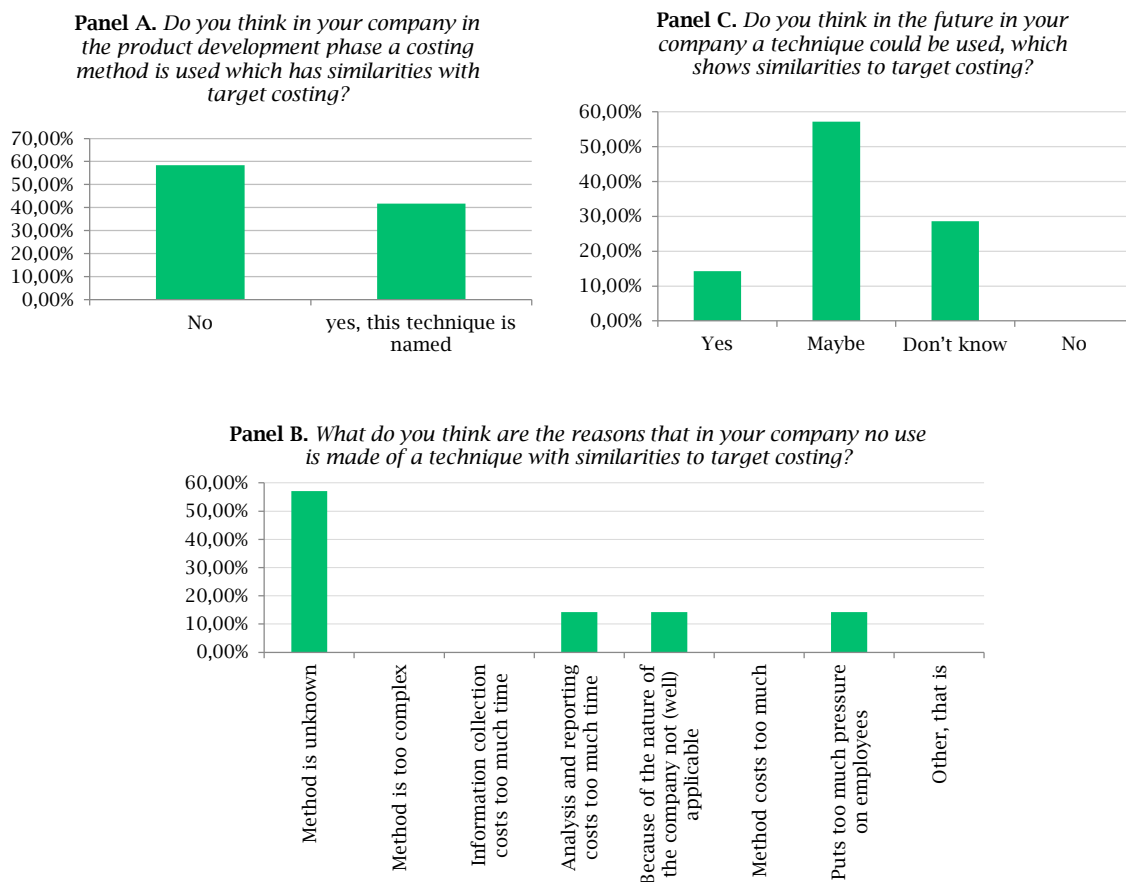


Figure 4 and its panels are specific for those firms in which the respondents did not identify with a target costing strategy. Initially, a brief definition of target costing was provided to overcome any lexicon issue that may have prevented the respondents from identifying a target costing strategy because they were unfamiliar with the expression. Fifty-eight percent responded that their method did not have similarities with target costing; thus, they were invited to respond to the next two questions (Panels B and C). Fifty-seven percent of the respondents stated that they did not use it because the method was unknown to them and a similar percentage said that they may use target costing in

the future.

Unfortunately, only two respondents responded regarding which method they used ("product costing" and "margin squeeze tests"). Thus, it is not clear if they said they are not using target costing because they are not familiar with the term; they either may be using similar cost strategies or are not using it at all. However, expressions like "product costing" and "margin squeeze tests" are open for speculation on their similarities with target costing. Fourteen percent responded that they might use target costing in the future.

Figure 4. Target costing assessment (responses structure)

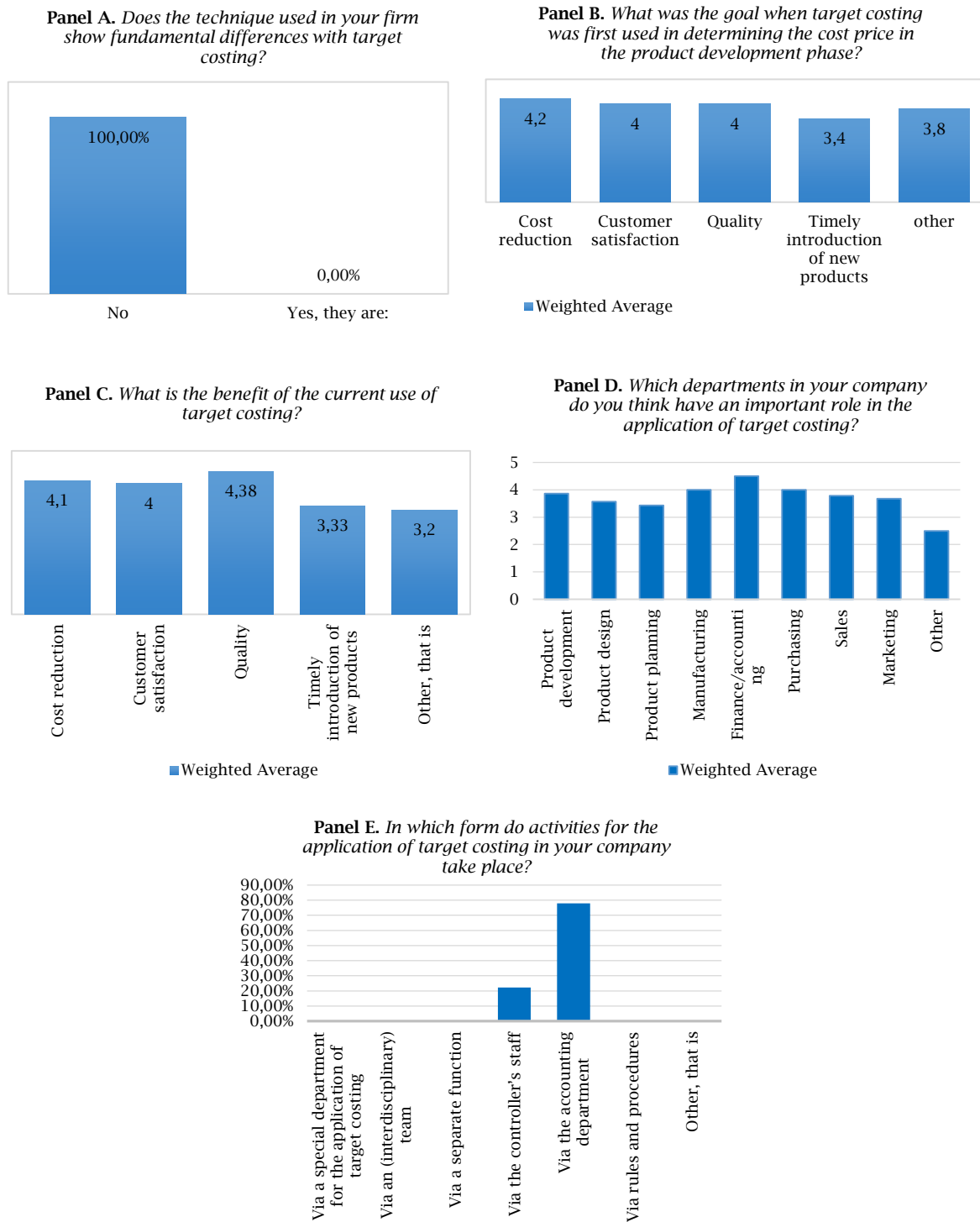


The different panels of Figure 5 all addressed questions for the respondents that firmly stated (100% as per Panel A) that they adopt target costing as a strategy. As expected, cost reduction was chosen as the main reason for adopting it, with a weighted average of 4.2. Regarding the benefits of target costing, cost reduction came in second with a 4.1 weighted average score and tracking quality with a score of 4.38. This is an interesting outcome for adopting target costing considering that in the original survey of Dekker and Smidt (2003), one respondent showed concern that adoption of target costing could lower product quality due to its focus

on cost reduction. For the UAE firms, explicitly adopting target costing seems to be associated with better product quality, and that is consistent with some research associating target costing with quality of the product (Kádárová, Teplická, Durkápová, & Vida, 2015; Zengin & Ada, 2010). Panel D shows the widespread importance of the target costing method among several departments, a consistent result with the method itself. Finally, Panel E shows the accounting department as leading the process. However, considering that the survey was directed primarily to the CAO, or controller officers, the response is not too surprising.



**Figure 5.** The structure of companies' responses



**5. DISCUSSION**

The main aim of this study is to gauge the level of adoption of target costing by UAE manufacturing companies. The results of the study unequivocally show support, at a 1% level of significance, for adopting a target costing strategy. When the same D-H causality method is applied using quarterly data, results show a bi-causality between sales and both operating expenses and the cost of goods sold.

D-H test requires strong balance data, but only 37.5% of the firms had quarterly data publicly available. We further investigated the adoption of target costing practice by a qualitative research method - a survey. Thirty-three percent of the firms responded. Results of the self-reported data were mixed relative to the quantitative analysis. Fifty-eight percent of the respondents said that they do not apply target costing in their business, while 48% identified their costing method as target costing. It is not possible

to identify how many of the survey respondents were also part of the causality test group because the questionnaires were applied with assurances of anonymity (responding online without any identification) to increase the response rate. This was to address the reluctance of executives to disclose any information if their firms were singled out. Regarding the relationship between the intensity of competition, predictability of the environment, and adoption of target costing (Dekker & Smidt, 2003; Ax, Greve, & Nilsson, 2008; Goncalves, Gaio, & Silva, 2018) results should be interpreted with extreme caution. However, we believe that the results show some modest support with weighted average results (from a five-point Likert scale) of 3.73 for the perceived intensity of competition and its relationship with target costing adoption. Regarding the target cost antithesis, i.e., the cost-plus approach, none of the research methods corroborated it.

The mixed-method research approach offers vast potential during a subject investigation by simultaneously confronting the results of quantitative and qualitative methods. The UAE is a very interesting field for investigation due to its open economy and its nascent manufacturing companies meant to be revenue and diversification alternatives to the oil and gas industry. Studies that reveal the level of competitiveness of these companies, vis-a-vis the business environment in which they operate, have huge policy implications and ramifications for further development, and as a gauge for the success or otherwise of government and corporate strategies. The confirmation of widespread adoption of target costing as a pricing strategy in this study indicates that UAE manufacturing firms are operating in a competitive market environment that mandates careful cost planning as a necessary pre-requisite for product pricing.

## 6. CONCLUSION

Target costing, a process in which sales prices determine the adjustment of production costs to accommodate a required profit margin, is a cross-disciplinary subject of business economics, accounting management, and supply chain. Target costing antithesis is the widely known cost-plus approach in which managers just add a profit margin on top of costs to determine the final price for customers. Despite its academic and practical implications, target costing has not been explored enough, especially methodologically. In this paper, we address this point by employing a combination of mixed quantitative and qualitative research

methods to investigate the adoption of target costing by manufacturing firms in the United Arab Emirates (UAE). The first employed method is the new Dumitrescu-Hurlin (D-H) Granger non-causality test (Dumitrescu & Hurlin, 2012) for heterogeneous panel data; the second method was a survey.

The D-H causality test was further broken down by dividing the test into yearly and quarterly data. Yearly data was available for 75% of all publicly listed manufacturing firms in the UAE. The results of the quantitative element of the study confirm wide-spread adoption of target costing strategy by UAE companies, with a strong bi-causal relationship between sales and both operating expenses and cost of goods sold; while the results of the self-reported qualitative data were mixed relative to our quantitative analysis.

Fifty-eight percent of the respondents said that they do not apply target costing in their business, while 48% identified their costing method as target costing. It is not possible to identify how many of the survey respondents were also part of the causality test group because the questionnaires were applied with assurances of anonymity (responding online without any identification) to increase the response rate. This was to address the reluctance of executives to disclose any information if their firms were singled out. Regarding the relationship between the intensity of competition, predictability of the environment, and adoption of target costing (Dekker & Smidt, 2003; Ax, Greve, & Nilsson, 2008; Rasit & Ismail, 2017; Goncalves, Gaio, & Silva, 2018; Hammami et al., 2019) results should be interpreted with extreme caution. However, we believe that the results show some modest support with weighted average results (from a five-point Likert scale) of 3.73 for the perceived intensity of competition and its relationship with target costing adoption. Regarding the target cost antithesis, i.e., the cost-plus approach, none of the research methods corroborated it. As with any research of this nature, there are limitations, which provides some room for further research and expansion of our knowledge in the area. The usual shortcomings of self-reported survey data apply here, and employing alternative methodologies such as case studies, for example, may help provide additional insight into other cost management strategies when a company has different product lines, with some involving target costing approach, while others may not. In addition, the study suffers from the limitation of limited sample size and could benefit from larger a much sample or direct comparison of UAE practices with those of other national or regional jurisdictions to ascertain the degree of similarity or differences.

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## APPENDIX

### Survey's questionnaire

(Five-point Likert scale and nominal/open responses)

1. In which of the following industries are the core activities of your company positioned?
  - Food;
  - Textile;
  - Wood and building materials;
  - Paper, graphical, publishing;
  - Chemicals;
  - Machine, and transportation equipment;
  - Instruments and optical;
  - Electrical, electronics;
  - Auxiliary steel;
  - Construction;
  - Trade and catering;
  - Transport, warehousing, and communication;
  - Other, specify...
2. What is the company's percentage of foreign sales:
  - 0%;
  - 1-24%;
  - 25-49%;
  - ≥ 50%.
3. Is your company ownership:
  - private;
  - public.
4. How many competitors do you think does your company have?
  - far too little;
  - too little;
  - some;
  - too much;
  - far too much.
5. How predictable do you think is the environment in which your company is positioned?
  - very predictable;
  - predictable;
  - neither predictable or unpredictable;
  - unpredictable;
  - very unpredictable.
6. How do you think your company perceives the intensity of competition?
  - very low;
  - low;
  - neither low or hard;
  - hard;
  - very hard.
7. Which factors do you think have an important role when positioning a product in the market (cost, sales price, required profit margin)?
  - not important;

- slightly important;
  - moderately important;
  - important;
  - very important.
8. Do you think in your company in the product development phase a costing method is used which has similarities with target costing (no - yes, this technique is named....)?
- if you answered “yes” please skip to the question 11;
  - if you answered “no” please answer the questions 9 and 10 only.
9. What do you think are the reasons that in your company no use is made of a technique with similarities to target costing?
- method is unknown;
  - method is too complex;
  - information collection costs too much time;
  - analysis and reporting costs too much time;
  - because of the nature of the company not (well) applicable;
  - method costs too much;
  - puts too much pressure on employees;
  - other, that is .....
10. Do you think in the future in your company a technique could be used, which shows similarities to target costing?
- yes;
  - maybe;
  - don't know;
  - no.
11. Does the technique used in your company show fundamental differences with target costing?
- yes, they are...
  - no.
12. What was the goal when target costing was first used in determining the cost price in the product development phase (cost reduction, customer satisfaction, quality, timely introduction of new products, other, that is ....)?
- not important;
  - slightly important;
  - moderately important;
  - important;
  - very important.
13. What is the benefit of the current use of target costing (cost reduction, customer satisfaction, quality, timely introduction of new products, other, that is ....)?
- not important;
  - slightly important;
  - moderately important;
  - important;
  - very important.
14. Which departments in your company do you think have an important role in the application of target costing (Product Development, Product Design, Product Planning, Manufacturing, Finance/Accounting, Purchasing, Sales, Marketing, other, that is....)?
- not important;
  - slightly important;
  - moderately important;
  - important;
  - very important.
15. In which form do activities for the application of target costing in your company take place?
- via a special department for the application of target costing;
  - via an (interdisciplinary) team;
  - via a separate function;
  - via the controller's staff;
  - via the accounting department;
  - via rules and procedures;
  - other, that is....