

Original Research

Received 25 June 2026

Revised 09 Aug 2026

Accepted 22 Aug 2026

Natural Resources for Human Health 2026, Vol. 6 (18s): 55–69

KEYWORDS:

developed standard costing system; target costing; variance analysis; modern manufacturing environment; Syrian industrial firms.

The Applicability of the Developed Standard Costing System in Syrian Industrial Firms: A Field Study

Mohamad Haytham AL Debs^{1*}, Osama Mohamad Bitar²

¹Department of Accounting, Faculty of Economics, Damascus University, Damascus, Syria; ORCID: 0009-0006-0197-2161

²Ministry of Finance, Damascus, Syria; ORCID: 0009-0000-1910-8968

*Corresponding author: aldebeshm@gmail.com;

ABSTRACT: This study introduces the developed standard costing system and examines whether it can be applied in Syrian industrial firms, given its role in controlling production costs and strengthening the firm's competitive position. It also assesses whether the finance departments of these firms have the qualifications the system requires, and identifies the obstacles that stand in the way of applying it. Data were collected through a questionnaire designed for the study. Twenty-eight questionnaires, completed by cost accountants, chief accountants and financial managers in a varied group of Syrian industrial firms, were analysed with SPSS using Cronbach's alpha, arithmetic means, percentages and the one-sample Student's t-test. The results show that Syrian industrial firms need the developed standard costing system for the control it provides over production costs (mean 3.95 out of 5). The qualifications needed to apply it, however, are still lacking in the finance departments of these firms (mean 2.02), and a number of obstacles hinder its application (mean 4.12), chief among them top management's weak conviction of the system's importance. The study recommends training finance staff, raising decision makers' awareness of the system, and introducing it gradually.

1. INTRODUCTION

The move of the world economy towards globalised production has affected the industrial environment in several ways and turned it into a modern environment whose features differ from those of the traditional one. Among the most important of these features is a quick response to foreign competition and to customers' requirements. At the same time, the industrial sector has seen rapid and continuous technological progress, which has produced wide variety in the characteristics, specifications and quality of industrial products and a marked change in the proportions of their cost elements: the relative weight of direct labour has fallen and the share of manufacturing overheads has risen (Johnson and Kaplan, 1987). This has exposed some weaknesses in the traditional standard costing system and created the need for a developed standard costing system suited to the modern industrial environment, a task on which a number of writers and researchers have worked.

In light of the above, it became necessary to examine whether the developed frameworks for standard costing that researchers have arrived at can be applied in Syrian industrial firms, in order to control production costs, strengthen the firm's competitive position and keep pace with the modern global industrial environment.

2. RESEARCH PROBLEM

The research problem can be put in the following questions:

1. To what extent do Syrian industrial firms need to apply the developed standard costing system, and is the necessary awareness available?

2. Are the qualifications needed to apply the developed standard costing system available in the finance departments of Syrian industrial firms?

3. Does the application of the developed standard costing system face any obstacles in the Syrian economic environment?

3. IMPORTANCE OF THE RESEARCH

The importance of the research lies in giving a picture of how far the developed standard costing system can be applied in the Syrian economic environment and how far it is needed. On the academic side, the research presents the developed framework for setting standards, analysing variances and reporting performance as one integrated whole. On the practical side, it shows the managements of Syrian industrial firms, and the bodies concerned with training accountants, how ready finance departments are to apply the system and which obstacles need to be removed before application begins.

4. RESEARCH OBJECTIVES

The objectives of the research are:

- To introduce the developed standard costing system in terms of the developed process for setting cost standards and the developed procedures for analysing and reporting variances.
- To determine whether the developed standard costing system can be applied in Syrian industrial firms.
- To establish how far the qualifications needed to apply the system are available in finance departments, and which obstacles prevent its application.

5. RESEARCH HYPOTHESES

The study seeks to test the following hypotheses:

First hypothesis: The Syrian economic environment needs the developed standard costing system to be applied in Syrian industrial firms, as a result of the industrial and competitive development taking place in this environment.

Second hypothesis: The qualifications needed to apply the developed standard costing system are available in the finance departments of Syrian industrial firms.

Third hypothesis: There are obstacles that prevent the application of the developed standard costing system in the Syrian economic environment.

6. PREVIOUS STUDIES

A number of Arabic and foreign studies have dealt with standard costing in the modern manufacturing environment. Those closest to the subject of this research are reviewed below.

Fakher et al. (2010), "Improving the standard cost system to serve management purposes in the modern manufacturing environment: a field study". The study discussed the shortcomings that appeared in the traditional standard system as the world economy moved towards globalised production and markets, and relied on a questionnaire distributed in a number of Syrian companies. It concluded that applying modern manufacturing systems does not lessen the role of the standard costing system but increases its importance once the system is developed. It recommended matching the methods of setting standards to the nature of the product and its life cycle, linking standards to manufacturing activities, and developing variance analysis so that it serves control and continuous improvement.

Al-Ameen and Abdin (2012), "Activity-based budgeting and obstacles to its implementation in Syrian industrial firms". The study tested whether activity-based budgeting could be applied in Syrian industrial firms using sixty questionnaires. It found that application runs into a number of difficulties, and recommended teaching the method at universities, holding professional courses and drawing on outside expertise. It meets the present research in that it deals with obstacles to applying a modern management accounting technique in the same environment.

Fakher et al. (2013), "The standard costing system as a tool for performance evaluation in the modern manufacturing environment: a case study". A fourteen-item questionnaire was distributed to fifty-five employees of Baniyas Refinery Company. The results showed that the standard costing system achieves several objectives in the modern manufacturing environment,

that the company uses financial and non-financial performance indicators, and that the system needs to be developed in light of target costing so that it reflects market and competitive variables.

Fakher et al. (2014a), "The effectiveness of modified cost standards in the modern industrial environment: an applied study". The study held that the criticisms directed at cost standards in the traditional environment do not mean that those standards should be abandoned; they mean that the standards must be developed to reflect technological and competitive variables. It set out the objectives that standards should serve in the modern manufacturing environment, the characteristics they should acquire and the steps for preparing them.

Jdeed (2014), "Variances analysis of conversion cost under the modern industrial environment: a case study". The study applied the developed analysis of conversion cost variances to Baniyas Refinery Company and found that the company's total conversion cost variance was unfavourable. This study draws on it in presenting the developed conversion cost variances.

Hamoudah (2007), "Developing the standard costing system to meet the requirements of the modern manufacturing environment". This is a field study of Saudi industrial firms in Jeddah. It offered a framework for setting standards that combines target costing with process standards, and this study relies on it in presenting the stages of building strategic cost standards.

Foreign studies. A group of survey studies asked whether standard costing is still valid in the modern manufacturing environment. Guilding et al. (1998) in New Zealand and the United Kingdom, Sulaiman et al. (2005) in Malaysia, De Zoysa and Herath (2007) in Japan, Marie et al. (2010) in Dubai, and Badem et al. (2013) in the Turkish automotive industry all showed that standard costing is still widely used in industrial firms despite the criticisms directed at it. In the Arab region, van Triest and Elshahat (2007), in a study of forty Egyptian firms, showed that the use of costing information is limited and that advanced techniques are rarely used. Nassar et al. (2013) found that, in Jordanian industrial companies, the high cost of implementation is the main barrier to adopting activity-based costing and adequate training is what most facilitates it. Atieh (2014), also on Jordanian manufacturing companies, found that lack of management support is among the obstacles to applying target costing.

What distinguishes this study. Earlier Syrian studies concentrated on building the theoretical framework of the developed system, or on applying it to a single case, Baniyas Refinery Company. This study turns to a question that comes before application: how ready Syrian industrial firms are for it, in terms of the need for the system, the qualifications available in finance departments and the obstacles that exist, as seen by those who work in these departments in a varied group of firms.

7. RESEARCH METHODOLOGY

The research methodology relied on two approaches:

- **The theoretical approach**, based on studying and analysing earlier theoretical and applied studies related to the subject, in order to form the theoretical framework.
- **The field approach**, which involved a questionnaire designed specifically for the research and distributed to a varied group of Syrian industrial firms with complex production structures, in order to collect and analyse data and test the hypotheses. The data were analysed with SPSS: Cronbach's alpha was used to measure the reliability of the instrument, frequencies and percentages to describe the sample, and arithmetic means, standard deviations and the one-sample Student's t-test to test the hypotheses.

8. STUDY POPULATION AND SAMPLE

The study population consists of all Syrian industrial firms, while the sample was limited to a varied group of them. Within these firms the questionnaire was addressed to finance department staff (cost accountants, chief accountants and financial managers) as those best placed to judge the subject of the research. Participation was voluntary and the questionnaires were completed anonymously. The questionnaire stated at the outset that the identity of each respondent and of the firm to which he or she belongs would be kept confidential, since the confidentiality of firms' data and internal affairs is a matter of considerable importance in the Syrian business environment. Twenty-eight questionnaires were analysed.

Because no register of finance department staff in Syrian industrial firms was available from which a random sample could be drawn, the study used a non-probability purposive (judgement) sample (Sekaran and Bougie, 2016). Respondents were selected because their positions give them direct knowledge of costing practice in their firms, and firms with complex production structures were targeted, since these are the firms in which a developed standard costing system would be most relevant. The

sample is therefore suited to exploring how informed practitioners view the system, but it does not allow statistical generalisation to all Syrian industrial firms; this is discussed further among the limitations in Section 11.

9. THEORETICAL PART

A standard costing system rests on determining in advance what the cost of a product ought to be, then comparing actual cost with that standard and analysing the variances between them for the purposes of control and performance evaluation (Drury, 2018). In its traditional form the system has been widely criticised in the modern manufacturing environment. The criticisms fall under three main headings: those directed at the way standards are set, those directed at variance analysis, and those directed at variance reports. The most important are reviewed below.

A. Criticisms of the way standards are set

1. Direct labour standards have lost their importance, an inevitable result of the sharp decline in the role of direct labour following the adoption of modern manufacturing technology.
2. Competitors' reactions, and the strategies for facing them, are not taken into account when cost standards are set.
3. Cost standards are designed on the assumption that product specifications, manufacturing methods and production processes are fixed, which makes them unsuited to a modern manufacturing environment characterised by flexibility (Fakher et al., 2010).
4. Traditional standard setting relies on the historical value of manufacturing costs, whereas the modern business environment requires the standard base to be built on current cost values.
5. Under the traditional system, standards for manufacturing overheads are set on the basis of the unit of product and not on the basis of the production activities that give rise to these costs. This distorts product cost as the share of overheads rises and products become more varied (Cooper and Kaplan, 1988).
6. The traditional standard costing system includes normal allowances for materials, labour and manufacturing overheads, which conflicts with a modern manufacturing environment that seeks to eliminate waste and spoilage (Jdeed, 2015).

B. Criticisms of variance analysis

The benefit of analysing cost variances in the traditional way has declined considerably, for the following reasons:

1. Direct materials variances, which concentrate mainly on the price variance and the quantity variance. The adoption of just-in-time production, with long-term contracts under which suppliers deliver direct materials at the time of manufacture with no need for storage, has greatly reduced price variances. Quantity variances have almost disappeared as a result of using modern machinery.
2. Direct labour variances. These have lost most of their importance because of the low relative weight of the human labour element (Fakher et al., 2010).
3. Manufacturing overhead variances. In the modern manufacturing environment, different activities are carried out within the same cost centre. This makes it difficult to interpret variances and trace them to direct causes, as the traditional formulas of variance analysis do, and therefore to identify who is responsible for each variance. Activities therefore have to be analysed to identify the value-adding activities within each cost centre, which makes it easier to trace variances to their causes and assign responsibility for them.

C. Criticisms of variance reports

1. The reports of the traditional standard costing system are faulted for not being available at the right time, and for lacking feedback systems that show the effects of correcting variances.
2. Traditional variance reports make no comparisons with competitors and are confined to internal comparisons; nor do they include reports on strategic activities.
3. The reporting period is long, often annual or semi-annual (Jdeed, 2015).

These criticisms did much to narrow the function of the traditional system in the modern manufacturing environment. The main use of standard costs became the valuation of inventory and the determination of cost of goods sold for financial reporting, and they no longer played a large part in measuring performance. The materials price variance also lost importance, since it became small or non-existent under long-term, fixed-price supply contracts, so that materials variances were confined to quantity without price (Tuaima, 2010).

These criticisms did not, however, lead to the system being abandoned. Survey studies in different countries show that standard costing is still widely used in industrial firms (Guilding et al., 1998; Sulaiman et al., 2005; De Zoysa and Herath, 2007; Marie et al., 2010; Badem et al., 2013). Cheatham and Cheatham (1996) argued that the fault lies not in the idea of setting standards itself but in the way the system is designed, and that the answer is to redesign it, not to do away with it. Accordingly, the standard costing system has been developed so that it can meet the requirements of the modern manufacturing environment.

The developed standard costing system

Development took place along three lines: developing the process of setting and preparing standards, developing variance analysis, and developing performance reports.

First: developing the process of setting and preparing standards

Cost standards are built hierarchically from the top down: management determines the selling price and the production costs required in light of competitors' prices (the target costing approach), and these strategic objectives are then translated into operating plans. Through this link the standards become responsive to the competitive environment and acquire a strategic dimension. To give the standards a dynamic quality, they must also be prepared from the bottom up, using the cost-plus approach. To achieve integration in the developed standard costing system it is preferable to combine the two approaches, so that the system can keep going as the conditions of the modern environment continue to change, and is strategic, dynamic and integrated (Hamoudah, 2007).

Steps for preparing cost standards under the developed framework:

- 1. Setting standards for manufacturing processes.** Cost elements are linked to the manufacturing processes carried out by the automated machines that make up flexible manufacturing cells, and not to a particular product. All the manufacturing processes (activities) that each flexible automated machine can perform are listed, and these activities are the basis on which cost standards are built. Each activity is then standardised by setting standards for direct materials and for direct electronic labour, and by preparing standard activity-based absorption rates for manufacturing overheads.
- 2. Setting target standards.** This relies on the target costing approach, which draws the upper limit of product cost: the selling price that will attract customers is determined, the desired profit margin is deducted from it, and what remains is the cost that must not be exceeded (Kato, 1993; Cooper and Slagmulder, 1997). Target standards thus respond to changes in the external environment. Measuring the target cost is the step that follows the setting of process standards, and it is what gives cost standards their strategic dimension.
- 3. Giving process standards a strategic dimension.** This is done by comparing the standard cost of the product, as determined by the manufacturing process standards, with the target cost of the same product. The standard cost must be less than or equal to the target cost to be described as effective and strategic, in which case it is approved. If it is higher, its tightness must be reconsidered using several methods: value-chain analysis of activities, which eliminates activities that add no value; kaizen costing, which rests on the continuous reduction of cost during the production stage (Monden and Hamada, 1991); value engineering; and so on, so that these standards are brought down to the target cost or below it (Jdeed, 2015).

When developed cost standards are prepared, direct wages are not taken into account, because the share of this element in the unit cost structure is very small or nil; standards for the cost of electronic labour take their place. The standards should cover manufacturing, marketing and administrative costs alike (Hamoudah, 2007). Figure 1 shows the stages of building strategic cost standards.

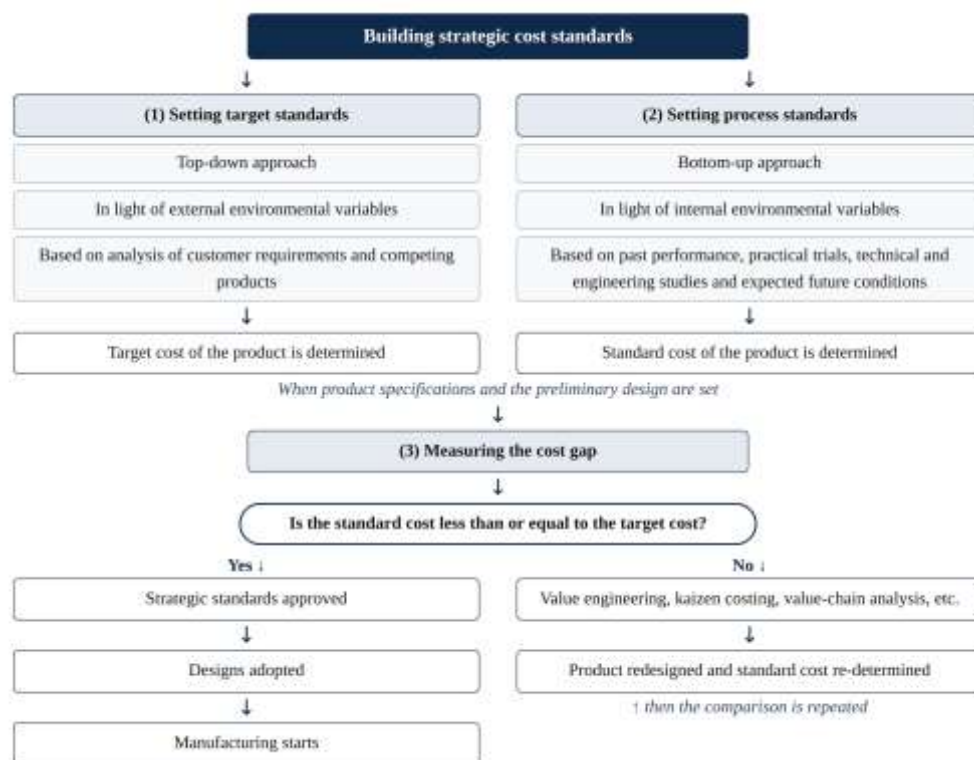


Figure 1. Stages of building strategic cost standards

Source: Hamoudah (2007).

Second: developing variance analysis

Many researchers see a need to give up traditional performance measures in the modern industrial environment, since these measures conflict with the aims of modern management accounting systems. They stress performance measures that focus on quality, processing time, shorter lead time and the like, along with any other aspect of operating performance that suits the nature of the modern industrial environment (Mo'mina, 2004). The most important variances that answer the requirements of this environment are the following.

(a) The quality variance

Quality costs are the costs a firm incurs to avoid producing low-quality products, or those that arise because such products have in fact been produced (Datar and Rajan, 2018). The quality variance is calculated on the basis of the standard cost of defective output, whose value is determined either by the cost of repairing that output by adding some raw materials, or by the value of the output itself if it is not fit for use at all (Fakher et al., 2014b):

$$\text{Quality variance} = (\text{Good output} \times \text{Standard direct materials cost per unit}) - (\text{Actual output} \times \text{Standard direct materials cost per unit})$$

The variance therefore equals the standard cost of the direct materials contained in the defective units; the closer good output comes to actual output, the closer the variance comes to zero.

(b) Conversion cost variances

Conversion costs comprise direct wages, where they exist, and other manufacturing costs excluding the cost of direct materials. A standard absorption rate is prepared on the basis of total conversion costs, at the level of machines and not products, and modern cost allocation systems can be used to identify suitable cost drivers for conversion costs (Hamoudah, 2007). Some hold that production to order, as practised in the modern manufacturing environment, has removed the need for production volume variances and left only budget variances.

The developed analysis of conversion cost variances can be represented by keeping the traditional analysis, changing the absorption base to suit the modern manufacturing environment, and adding the following variances (Jdeed, 2014; Jdeed, 2015):

1. The finished goods inventory variance. This measures the conversion costs absorbed by output that has not yet been sold, in keeping with the philosophy of producing to demand:

$$\text{Finished goods inventory variance} = \text{Standard absorption rate} \times [(\text{Actual production volume} \times \text{Standard time}) - (\text{Volume of production sold} \times \text{Standard time})]$$

2. The manufacturing cycle efficiency variance. The manufacturing cycle is the time a production order takes from entering the production line until it becomes a finished product ready for delivery to the customer or the warehouse; manufacturing cycle time thus includes processing, waiting, inspection and moving time. Researchers hold that using manufacturing cycle time as the basis for absorbing conversion costs is better suited to the nature of the modern manufacturing environment and in line with the aims of developed variance analysis, since it encourages the elimination of time that adds no value to the product. The variance is calculated as follows:

$$\text{Manufacturing cycle efficiency variance} = (\text{Actual production} \times \text{Standard absorption rate} \times \text{Standard time}) - (\text{Actual production} \times \text{Standard absorption rate} \times \text{Actual time})$$

Manufacturing cycle efficiency itself can be measured by the following equation (Brewer et al., 2022):

$$\text{Manufacturing cycle efficiency} = \text{Processing time} \div (\text{Processing time} + \text{Waiting time} + \text{Inspection time} + \text{Moving time})$$

It is clear from this equation that a higher ratio, closer to one, is in the firm's favour, because processing time alone is value-adding time; the reverse is also true.

3. The target manufacturing cycle efficiency variance. The firm's strategic aim is to eliminate this variance, which is measured as follows:

$$\text{Target manufacturing cycle efficiency variance} = (\text{Actual production} \times \text{Standard absorption rate} \times \text{Target time}) - (\text{Actual production} \times \text{Standard absorption rate} \times \text{Standard time})$$

4. The competition variance. The purpose of this variance is to determine the firm's competitive position among the leading firms in the same industry, by comparing the conversion cost absorption rate the firm uses with the rate used by the leading firms. The latter is called the target absorption rate and is a strategic goal the firm works to reach:

$$\text{Competition variance} = (\text{Actual production} \times \text{Standard time} \times \text{Target absorption rate}) - (\text{Actual production} \times \text{Actual time} \times \text{Actual absorption rate})$$

5. The strategic excellence variance. This variance aims to determine the real extent of competitors' superiority (Jdeed, 2015):

$$\text{Strategic excellence variance} = (\text{Actual production} \times \text{Standard time} \times \text{Target absorption rate}) - (\text{Actual production} \times \text{Standard time} \times \text{Standard absorption rate})$$

Third: developing variance reports (performance reports)

Some see scope for using modern cost allocation and measurement systems in developing variance reports. These systems offer a set of pooling and absorption bases suited to the nature of each element and identify precise cost drivers that reflect why each resource is consumed. This ties standards more closely to practice and makes reporting on them and on their variances easier, clearer and more realistic (Fakher et al., 2010).

Developed variance reports should have a number of characteristics, the most prominent of which are:

1. Simplicity and clarity.
2. Brevity and relevance.

3. Timeliness. To gain the most from reports, they must reach those responsible as soon as they are requested, so that appropriate decisions can be taken in time. The philosophy of daily reporting has emerged in the modern manufacturing environment, and it is worth noting that the timing of reports differs according to who uses them (Hamoudah, 2007).

In addition, variance reports need to be flexible and in keeping with the nature and needs of modern manufacturing systems. Their content should not be confined to identifying who is responsible for unfavourable variances; they should also help build cooperation between the different parties concerned with manufacturing costs, whether internal, such as the various activity centres, or external, such as suppliers, customers and competitors. For a report to be useful, the variances that deserve study and analysis must be identified and those that do not must be left out. Several factors are taken into account in this sorting, including the size of the variance and its effect on performance, and a comparison between the return from analysing and reporting a variance and the cost of doing so. Before all of these comes one main factor: whether the causes of the variance can be controlled. The variances examined and reported should be limited to those whose causes can be controlled and influenced, since studying variances that are not followed by decisions that improve performance is a waste of time and effort (Jdeed, 2014).

Table 1 summarises the main differences between the traditional and the developed system in light of the above.

Table 1. Comparison between the traditional and the developed standard costing system

Aspect	Traditional system	Developed system
Basis for setting standards	Historical cost values, assuming fixed product specifications and manufacturing methods	Current values and target cost, with standards revised as market conditions change
Direction of standard setting	From inside the firm, without regard to competitors	Top-down (target standards) combined with bottom-up (process standards)
Direct labour	Standards for direct wages	Standards for the cost of electronic labour
Overheads	Absorption rates based on the unit of product	Standard activity-based absorption rates
Allowances	Normal allowances for materials, labour and overheads	Allowances tightened, in keeping with the drive to eliminate waste
Variances	Materials price and quantity variances, direct labour variances, volume and budget variances	Quality variance, finished goods inventory variance, actual and target manufacturing cycle efficiency variances, competition variance, strategic excellence variance
Reports	Long reporting period (annual or semi-annual); internal comparisons only	Timely reports, down to a daily basis, with comparisons against competitors and feedback

Source: authors' elaboration, based on Hamoudah (2007), Fakher et al. (2010) and Jdeed (2015).

10. FIELD STUDY

The study instrument and its reliability

The questionnaire consisted of five sections. The first contained three items giving information about the person completing the questionnaire. The second contained four items giving information about the firm. The third contained five items (items 1–5) and related to the first hypothesis, that is, to the need of Syrian industrial firms to apply the developed standard costing system as a result of the industrial and competitive development taking place in this environment. The fourth contained six items (items 6–11) and related to the second hypothesis, that is, to the availability in finance departments of the qualifications needed to apply the system. The fifth contained four items (items 12–15) and related to the third hypothesis, that is, to the existence of obstacles that prevent the system being applied in the Syrian economic environment. The questionnaire thus contained twenty-two items in all, fifteen of which relate to the three hypotheses.

The items were formulated on the basis of the theoretical framework in Section 9 and the prior studies reviewed in Section 6, particularly Hamoudah (2007), Fakher et al. (2010) and Jdeed (2015). Each of the three hypothesis sections was built to cover one construct: the need for the developed system, the readiness of finance departments to apply it, and the obstacles to its application. The items of the first section were worded negatively so that respondents could not simply agree with every statement; their scores were reversed before analysis, as explained below.

In analysing the data from the twenty-eight questionnaires, the reliability and consistency of the answers were tested first, for the dimension of each hypothesis separately, by calculating Cronbach's alpha (Cronbach, 1951). Table 2 shows the values of the coefficient.

Table 2. Cronbach's alpha coefficients for the questionnaire dimensions

Section	Number of items	Cronbach's alpha
Section 3: first hypothesis	5	0.7231
Section 4: second hypothesis	6	0.8221
Section 5: third hypothesis	4	0.8102

The coefficient was approximately 0.72, 0.82 and 0.81 for the three hypotheses respectively. All three exceed the minimum acceptable level of 0.70 (Nunnally and Bernstein, 1994), and values above 0.80 are regarded as good (Sekaran and Bougie, 2016). This indicates that the questions under each hypothesis are consistent and bear directly on what they were meant to ask, and that the respondents understood them.

Characteristics of the sample

The following tables show the main characteristics of the respondents.

Table 3. Distribution of respondents by job title

Job title	Number	Percentage
Cost accountant	17	60.7%
Chief accountant	5	17.9%
Financial manager	6	21.4%
Total	28	100%

Table 4. Distribution of respondents by years of experience

Years of experience	Number	Percentage
Less than 5 years	4	14.3%
5 to less than 10 years	11	39.3%
10 to less than 15 years	8	28.6%
15 to less than 20 years	4	14.3%
20 years or more	1	3.6%
Total	28	100%

Table 5. Distribution of respondents by the firm's capital

Firm's capital (US dollars)	Number	Percentage
500,000 to less than 1,000,000	1	3.6%
1,000,000 to less than 1,500,000	14	50.0%
1,500,000 to less than 2,000,000	11	39.3%
2,000,000 or more	2	7.1%
Total	28	100%

The tables show that cost accountants make up about 61% of the respondents, and they are the ones in closest contact with the costing system in their firms. About 86% of the respondents have five or more years of experience, and most of the answers (about 89%) come from firms with capital of between one and two million US dollars. This supports confidence that the respondents were sufficiently familiar with the subject of the questionnaire.

Testing the hypotheses

A five-point Likert scale was used to measure the answers to the questionnaire items. In sections 4 and 5, which relate to the second and third hypotheses and in which the statements were positive, the answers were weighted as follows: 1 strongly

disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree. The items in section 3, which relates to the first hypothesis, were worded negatively, in the opposite sense to the hypothesis, and their answers were therefore weighted: 1 strongly agree, 2 agree, 3 neutral, 4 disagree, 5 strongly disagree. A mean above 3 in section 3 thus means that the negative statements are rejected, that is, that the need for the system is supported.

Each hypothesis was tested with the one-sample Student's t-test, by comparing the mean of the answers with the neutral value on the five-point Likert scale, which is 3. The null hypothesis of the test states that the mean equals 3, that there are no significant differences from it and that the observed difference is due to chance ($H_0: \mu = 3$). The alternative hypothesis states that the mean does not equal 3 and that there are significant differences from it ($H_1: \mu \neq 3$). The value of t is calculated by dividing the difference between the mean and 3 by the standard error of the mean (the standard deviation divided by the square root of the sample size). Its absolute value is then compared with the theoretical (tabulated) value of t at 27 degrees of freedom (the sample size less one) and the 5% level of significance, which is 2.052 for a two-tailed test.

The one-sample t-test was chosen because each hypothesis is a statement about the general direction of respondents' views, and the natural benchmark for such a statement on a five-point scale is the neutral point of 3. Testing the mean of each dimension, rather than individual items, reduces the effect of the ordinal nature of single Likert items, since a mean of several items behaves more like an interval measure. With 28 observations and dispersion that is small relative to the means, the test is reasonably robust to moderate departures from normality. The results are also far from the critical values, so the conclusions would not change under a more conservative test.

Testing the first hypothesis: the Syrian economic environment needs the developed standard costing system to be applied in Syrian industrial firms, as a result of the industrial and competitive development taking place in this environment.

The overall mean of the answers under the first hypothesis was approximately 3.95, with an accompanying measure of dispersion, the standard deviation, of approximately 0.51. The dispersion is thus relatively small compared with the measure of central tendency, which increases confidence in this mean as a basis for the Student's t-test. Table 6 shows the result of the test.

Table 6. Result of the t-test for the first hypothesis

Mean	Standard deviation	Standard error	Calculated t	Degrees of freedom	Theoretical t (5%, two-tailed)	Significance
3.95	0.51	0.096	9.86	27	2.052	< 0.001

The calculated value of t under the first hypothesis is greater than the theoretical (critical) value of t. Even if a one-tailed test were adopted, the theoretical value would be 1.703 and the direction of the inequality would not change. We therefore reject the null hypothesis: the answers are not neutral, the mean does not equal 3 but departs from it, and the differences are significant. The answers lean in general towards options 4 and 5, meaning a good degree of disagreement with the statements in the questions (which are negative and opposite to the hypothesis put forward). We conclude by accepting the hypothesis that the Syrian economic environment needs the developed standard costing system to be applied in Syrian industrial firms. This is reinforced by the fact that option 4 received the highest valid percentages across the five questions of this hypothesis, as Table 7 shows.

Table 7. Approximate percentages for option 4 in the answers under the first hypothesis

Question number	Percentage for option 4
1	45%
2	42%
3	51%
4	38%
5	43%

Testing the second hypothesis: the qualifications needed to apply the developed standard costing system are available in the finance departments of Syrian industrial firms.

The overall mean of the answers under the second hypothesis was approximately 2.02, with a standard deviation of approximately 0.44, so that the dispersion is relatively small compared with the measure of central tendency. Following the same steps as for the first hypothesis, the Student's t-test was carried out on the mean of the answers under the second hypothesis. Table 8 shows the result.

Table 8. Result of the t-test for the second hypothesis

Mean	Standard deviation	Standard error	Calculated t	Degrees of freedom	Theoretical t (5%, two-tailed)	Significance
2.02	0.44	0.083	-11.79	27	2.052	< 0.001

The calculated value of t under the second hypothesis is greater in absolute value than the theoretical (critical) value of t, and its negative sign means that the mean lies below the neutral value. We therefore reject the null hypothesis: the answers are not neutral, the mean does not equal 3 but departs from it, and the differences are significant. The answers lean in general towards option 2, meaning a good degree of disagreement with the statements in the questions; opinions are thus negative towards the hypothesis (the statements in this section are positive). We conclude by rejecting the hypothesis that the qualifications needed to apply the developed standard costing system are available in the finance departments of Syrian industrial firms. This is reinforced by the fact that option 2 received the highest valid percentages across the six questions of this hypothesis, as Table 9 shows.

Table 9. Approximate percentages for option 2 in the answers under the second hypothesis

Question number	Percentage for option 2
6	52%
7	61%
8	42%
9	71%
10	49%
11	56%

Testing the third hypothesis: there are obstacles that prevent the application of the developed standard costing system in the Syrian economic environment.

The overall mean of the answers under the third hypothesis was approximately 4.12, with a standard deviation of approximately 0.69. By comparison, the dispersion here is somewhat more marked relative to the measure of central tendency, and higher than under the two previous hypotheses; in other words, respondents' views on the obstacles are less uniform. The Student's t-test was carried out on the mean of the answers under the third hypothesis, and Table 10 shows the result.

Table 10. Result of the t-test for the third hypothesis

Mean	Standard deviation	Standard error	Calculated t	Degrees of freedom	Theoretical t (5%, two-tailed)	Significance
4.12	0.69	0.130	8.59	27	2.052	< 0.001

The calculated value of t under the third hypothesis is greater than the theoretical (critical) value of t. We therefore reject the null hypothesis: the answers are not neutral, the mean does not equal 3 but departs from it, and the differences are significant. The answers lean in general towards option 5, meaning a good degree of agreement with the statements in the questions. We conclude by accepting the hypothesis that there are obstacles that prevent the application of the developed standard costing system in the Syrian economic environment. This is reinforced by the fact that option 5 received the highest valid percentages across the four questions of this hypothesis, as Table 11 shows.

Table 11. Approximate percentages for option 5 in the answers under the third hypothesis

Question number	Percentage for option 5
12	61%
13	53%
14	39%
15	58%

11. RESEARCH RESULTS

On the basis of testing the research hypotheses, after the answers to the distributed questionnaires had been tabulated and analysed, the study reached the following results:

1. The Syrian economic environment needs the developed standard costing system to be applied in Syrian industrial firms, in response to the industrial development and competitive dimension this environment is witnessing, because the traditional standard costing system falls short of the requirements of the modern industrial environment. This result agrees with the conclusion of Fakher et al. (2010) that the modern manufacturing environment increases the importance of the standard system once it is developed.
2. The qualifications needed to apply the developed standard costing system are not available in the finance departments of Syrian industrial firms. There is a clear lack of adequate knowledge of the system and of the ways of applying it, and finance staff do not have enough experience to prepare developed standard absorption rates and link them to the appropriate production activities in a way that makes the best use of the variances and performance reports the system produces.
3. There are many obstacles that prevent the application of the developed standard costing system in the Syrian economic environment. The most important is that the top managements of industrial firms are not convinced of the importance of the system and of its central role in raising the firm's competitive advantage over the strategic horizon, together with the weakness of the qualifications needed to apply it within these firms. This result is in line with what other studies have found, in Syria and in neighbouring Arab environments, about obstacles to adopting modern cost management techniques (Al-Ameen and Abdin, 2012; Atieh, 2014).

Taking the three results together, the problem does not lie in finance staff failing to recognise the need for the system, since in their view the need is there. It lies in the gap between that need and the means available to meet it, in terms both of training and of management support.

Discussion

The respondents' strong sense of need is easier to understand when the developed system is compared with traditional standard costing practice (Table 1). The traditional system sets standards from historical values and from inside the firm, absorbs overheads on the unit of product, and reports variances long after the period has closed. The developed system starts instead from the market: target costs set the upper limit for standards, process standards are built from the bottom up, overheads are absorbed through activity-based rates, and the variance set is extended to quality, manufacturing cycle efficiency and competitiveness. Reports are produced at short intervals, so that deviations can be acted on while they still matter.

These features bring practical requirements. The firm needs reliable data on activities and their drivers, measurement of processing, waiting, inspection and moving time, information systems able to produce timely reports, and staff who can prepare activity-based absorption rates and interpret the extended variances. The second result of the study shows that the last of these requirements is the one most clearly missing, and the third result shows that management conviction, which is needed to finance the others, is also weak.

Where these conditions are met, the developed system supports production-cost monitoring more closely than existing practice. Conversion cost variances and manufacturing cycle efficiency point to where time and resources are being lost within the process, target-based standards keep cost control tied to the price the market will accept, and competition variances show how far the firm's costs stand from those of its rivals. Management can therefore use standard costing not only to explain past variances but also to guide pricing, product design and process improvement decisions.

Limitations and directions for future research

The findings should be read in the light of several limitations. First, the sample is small (twenty-eight questionnaires) and was drawn purposively, so the results cannot be generalised statistically to all Syrian industrial firms. Second, the data reflect the self-reported perceptions of finance staff and may be affected by personal judgement and by a tendency to give socially desirable answers; they were not verified against the firms' actual costing records. Third, the respondents came from finance departments only, and the views of top management and production management, who play a central role in adopting the system, were not captured. Fourth, the study did not examine in detail the resource constraints that firms face under current economic conditions,

their access to accounting software and information technology, or differences between firms by size, sector and ownership, all of which are likely to shape both the need for the system and the ability to apply it. Future studies could address these points with larger and stratified samples, by including managers outside the finance function, and by combining surveys with case studies of firms that have begun to apply elements of the developed system.

12. RECOMMENDATIONS

1. Carrying out further research on the developed standard costing system and the mechanisms for applying it, especially in the Syrian industrial environment, and making decision makers in Syrian industrial firms aware of the importance of the system and of its role in supporting the firm's competitive position.
2. Qualifying and training finance department staff in Syrian industrial firms as required, so that they have adequate knowledge of the developed standard costing system and can apply it effectively, particularly in preparing standard activity-based absorption rates and analysing the developed variances.
3. Including target costing and developed standard costing in the cost accounting and management accounting courses of faculties of economics, and in the training programmes run by the professional bodies concerned with accountants.
4. Starting to apply the system gradually in firms with complex production structures, for example by beginning with a single production line or with conversion cost variances and manufacturing cycle efficiency, and then extending it in light of what the experience shows.

ACKNOWLEDGEMENTS

The authors thank the finance department staff who took part in the survey. This research received no specific funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Mohamad Haytham AL Debs: conceptualization, methodology, writing – original draft, writing – review and editing.

Osama Mohamad Bitar: investigation (data collection), data curation, formal analysis.

Both authors read and approved the final manuscript.

ETHICS STATEMENT

Participation in the questionnaire was voluntary. Responses were collected anonymously, and the questionnaire assured respondents at the outset that neither their identity nor that of their firm would be disclosed. No personal identifying information was recorded.

DATA AVAILABILITY STATEMENT

The survey data are not publicly available because respondents were assured of anonymity.

REFERENCES

- [1] Al-Ameen, M., Abdin, O.M., 2012. Activity-based budgeting and obstacles to its implementation in Syrian industrial firms [in Arabic]. *Tishreen University Journal for Research and Scientific Studies - Economic and Legal Sciences Series* 34(3).
- [2] Atieh, S.H., 2014. The adoption and implementation of target costing approach in manufacturing companies in Jordan. *International Journal of Business and Social Science* 5, 72-81.
- [3] Badem, A.C., Ergin, E., Drury, C., 2013. Is standard costing still used? Evidence from Turkish automotive industry. *International Business Research* 6, 79-90. <https://doi.org/10.5539/ibr.v6n7p79>
- [4] Brewer, P.C., Garrison, R.H., Noreen, E.W., 2022. *Introduction to Managerial Accounting*, 9th ed. McGraw-Hill, New York.
- [5] Cheatham, C.B., Cheatham, L.R., 1996. Redesigning cost systems: Is standard costing obsolete? *Accounting Horizons* 10, 23-31.

- [6] Cooper, R., Kaplan, R.S., 1988. Measure costs right: Make the right decisions. *Harvard Business Review* 66, 96-103.
- [7] Cooper, R., Slagmulder, R., 1997. *Target Costing and Value Engineering*. Productivity Press, Portland, OR.
- [8] Cronbach, L.J., 1951. Coefficient alpha and the internal structure of tests. *Psychometrika* 16, 297-334. <https://doi.org/10.1007/BF02310555>
- [9] Datar, S.M., Rajan, M.V., 2018. *Horngren's Cost Accounting: A Managerial Emphasis*, 16th ed. Pearson.
- [10] De Zoysa, A., Herath, S.K., 2007. Standard costing in Japanese firms: Reexamination of its significance in the new manufacturing environment. *Industrial Management & Data Systems* 107, 271-283. <https://doi.org/10.1108/02635570710723840>
- [11] Drury, C., 2018. *Management and Cost Accounting*, 10th ed. Cengage Learning, Andover.
- [12] Fakher, N., Al-Ameen, M., Ali, A., 2010. Improving standard cost system to serve management objects on modern manufacturing environment: Field study [in Arabic]. *Tishreen University Journal for Research and Scientific Studies - Economic and Legal Sciences Series* 32, 117-138.
- [13] Fakher, N., Sheekh Mohammad, H., Jdeed, G.M., 2013. Standard costing system as a tool for performance evaluation in modern manufacturing environment: A case study [in Arabic]. *Tishreen University Journal for Research and Scientific Studies - Economic and Legal Sciences Series* 35(5).
- [14] Fakher, N., Sheekh Mohammad, H., Jdeed, G.M., 2014a. The effectiveness of modified cost standards in modern industrial environment: An applied study [in Arabic]. *Tishreen University Journal for Research and Scientific Studies - Economic and Legal Sciences Series* 36, 61-80.
- [15] Fakher, N., et al., 2014b. Suggested framework for development of variances analysis of direct materials cost under the modern industrial environment: A case study [in Arabic]. *Al-Baath University Journal* 36, 207-235.
- [16] Guilding, C., Lamminmaki, D., Drury, C., 1998. Budgeting and standard costing practices in New Zealand and the United Kingdom. *The International Journal of Accounting* 33, 569-588. [https://doi.org/10.1016/S0020-7063\(98\)90013-9](https://doi.org/10.1016/S0020-7063(98)90013-9)
- [17] Hamoudah, M., 2007. Developing the standard costing system to meet the requirements of the modern manufacturing environment: A field study of Saudi industrial firms in Jeddah [in Arabic]. Master's thesis, Department of Accounting, Faculty of Economics and Administration, King Abdulaziz University, Jeddah, Saudi Arabia.
- [18] Jdeed, G.M., 2014. Variances analysis of conversion cost under the modern industrial environment: A case study [in Arabic]. *Tishreen University Journal for Research and Scientific Studies - Economic and Legal Sciences Series* 36, 151-170.
- [19] Jdeed, G.M., 2015. The standard costing system and its role in control and performance evaluation in oil industry companies in Syria: An applied study of Baniyas Refinery Company [in Arabic]. Doctoral thesis, Faculty of Economics, Tishreen University, Syria.
- [20] Johnson, H.T., Kaplan, R.S., 1987. *Relevance Lost: The Rise and Fall of Management Accounting*. Harvard Business School Press, Boston.
- [21] Kato, Y., 1993. Target costing support systems: Lessons from leading Japanese companies. *Management Accounting Research* 4, 33-47. <https://doi.org/10.1006/mare.1993.1002>
- [22] Marie, A., Cheffi, W., Louis, R.J., Rao, A., 2010. Is standard costing still relevant? Evidence from Dubai. *Management Accounting Quarterly* 11, 1-10.
- [23] Mo'mina, H., 2004. The effectiveness of throughput accounting in light of developments in the modern manufacturing environment: A field study of industrial companies in Jeddah [in Arabic]. Master's thesis, Department of Accounting, Faculty of Economics and Administration, King Abdulaziz University, Jeddah, Saudi Arabia.
- [24] Monden, Y., Hamada, K., 1991. Target costing and kaizen costing in Japanese automobile companies. *Journal of Management Accounting Research* 3, 16-34.
- [25] Nassar, M., Al-Khadash, H.A., Sangster, A., Mah'd, O., 2013. Factors that catalyse, facilitate and motivate the decision to implement activity-based costing in Jordanian industrial companies. *Journal of Applied Accounting Research* 14, 18-36. <https://doi.org/10.1108/09675421311282522>
- [26] Nunnally, J.C., Bernstein, I.H., 1994. *Psychometric Theory*, 3rd ed. McGraw-Hill, New York.
- [27] Sekaran, U., Bougie, R., 2016. *Research Methods for Business: A Skill-Building Approach*, 7th ed. John Wiley & Sons, Chichester.
- [28] Sulaiman, M., Ahmad, N.N.N., Alwi, N.M., 2005. Is standard costing obsolete? Empirical evidence from Malaysia. *Managerial Auditing Journal* 20, 109-124. <https://doi.org/10.1108/02686900510574539>

- [29] Tuaima, T., 2010. Cost Management in Modern Technologies [in Arabic]. Open Education Centre, Faculty of Commerce, Benha University, Egypt.
- [30] van Triest, S., Elshahat, M.F., 2007. The use of costing information in Egypt: A research note. Journal of Accounting & Organizational Change 3, 329-343. <https://doi.org/10.1108/18325910710820328>