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Social Value Added; A New Model for Developing Sustainability Accounting

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Abstract

Sustainability accounting by presenting a holistic view of the organization activities and providing a balanced view of its economic, social and environmental impacts and benefits, and by presenting sustainability reporting seeks to encourage business units and investors to maintain the mutual benefits of all stakeholders in the society. Given the criticisms that researchers have had about the efficiency of sustainability reporting, the purpose of this article is to develop sustainability accounting by presenting a new model that can address the challenges in sustainability accounting and can be a good alternative to sustainability reporting. Social value-added is the sum of tangible and intangible values created and added to society by a business through technological development/change and the knowledge of its manufacturing engineers and managers. In this research, to test the proposed social value added model, Nano engine oil was selected randomly and the test was performed using paired comparison of data. The results of the research showed that social value-added statement can be an appropriate report for evaluating the economic, social and environmental performance of a business entity. Nano engine oil has a social value added of 3797.2 percent compared to regular engine oil, that 15 percent of it is related to tangible value added and 85 percent to intangible value added.

Keywords: Tangible value added, Intangible value added, Social value added, Sustainability accounting.

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Introduction

Values can be defined as broad advantages over the appropriate periods of actions and outcomes. In this way, the values reflected correctness and incorrectness of the rights of individuals or what they should be. Values tend to affect attitudes and behavior, including ethical values, ideological (religious, political) values, social values and aesthetic values [1]. The concept of value and more broadly, created value-added is very important to many researchers, theorists, customers, the society and other stakeholders in today's modern business. Available and reliable theories for calculating value added that have been developed with regard to their application are economic value added and tax value added. Economic value added, which is based on the theory of economic profit, believes that value is created when a business unit can cover all its capital expenditures and have amounts as profit or economic value added [2]. Financial ratios and information available in financial statements derived from historical data (such as returns of shareholders, return on assets, price-to-earnings ratio, etc.) are traditional performance measurement criteria and no longer meet the needs of users. Therefore, accounting as an information system needs to evolve to make economic decisions [3].

Meanwhile, sustainability accounting of companies with a different perspective calls for accountability to stakeholders to address the needs of the future generations, while addressing the needs of the current generation. In this regard, many models have been proposed and presented by researchers, each of which has many supporters and critics. Critics see sustainability-based reporting challenges as ambiguity and complexity, and lack of a clear and understandable definition of sustainable development. They also say that one of the main problems of these models is the relation of sustainability and business objectives of the company to maximize capital growth and the interests of shareholders and stakeholders. In addition, the use of traditional accounting systems makes it difficult to measure the external impacts of an organization's operations [4].

The social value-added model removes these shortcomings and provides a more comprehensive perspective on the assessment of business performance with regard to social and environmental benefits. This model states that real value added is not the only perceived value created by business units, and must take into account other intangible effects that create value added for society. The social value added model can have many applications in many socio-economic perspectives and pave the way for the evolution of corporate sustainability reporting. Any business that is considering increasing its intangible value added at environmental and community level and using this model can improve that it has been able to multiply its product value added. Other purposes and needs of this research are to focus on stakeholder theory and the theory of legitimacy of the entity so that companies are taken into consideration and their products purchased on the market to create more intangible and social value added for the community. Another application of this model is the taxes value added approach. Companies that can increase the value added of their products as well as reduce the harmful effects of the environment; they can be targeted by government agencies for tax discounts. As in some countries harmful nature and human products are subject to higher taxes and, on the contrary, businesses that can reduce their outputs and reduce their harm and contribute to environmental and human health. Therefore, in this research, after reviewing the literature of value added and the theoretical framework of the research, a conceptual model of social value added is formulated. Then, in order to test the social value added model, in this research in the form of case study, the social value added of nanotechnology engine oil is evaluated and its results are presented.

Theoretical framework and literature review

Economic value added

In 1970, for the first time, the idea that value added could be one way of providing financial information was developed and a number of British companies published a simple form of value added. For this reason, IASC[1] issued a statement recommending that corporations should provide value added statements as an annual report. In fact, most financial professionals have realized the comprehensiveness of economic value added [5]. In October 1996, economic value added introduced by Fortune Magazine as the most attractive

1- International Accounting Standards Committee

financial idea and predicted that value added would replace the earnings per share. Coca-Cola manager believes that the economic value added makes him more likely to find clever ways to continue working with capital; In other words, the economic value added creates the incentive to find ways to increase the efficiency of capital and ultimately leads the company to make a positive performance. [6].

Value added is a new and emerging concept and has developed over the last half century. The word value added has widely developed in the society and industry, and many researches has been done in this area. This concept is used in the business and economic environment to portray the real wealth created by managers and business units for shareholders and creditors and helps managers make tactical and strategic decisions. The needs of consumers and customers in societies have changed. Consumers not only consider the useful life, functionality, and quality of the product in their purchase choice, but also evaluate the impact of that product on the environment and society, and incorporate this evaluation into purchasing decisions. For this reason, the social responsibility of the organization is the survival factor of any organization, and any business unit that can move forward in this direction places a wider range of customers in its shopping cart. Continuation of activities of a business unit depends on its ability to create value. The ability of an economic unit to create value is the major prerequisite for financial providers such as lenders and shareholders. An increase in value added improves the company's wealth. Therefore, the concept of value added can be considered a measure for evaluation of manager performance and accountability. The development and improvement of value added figures can be a good indicator of the economic growth and performance of the company in generating wealth for the stakeholders. Value added is a good benchmark for measuring productivity and economic growth of the company [7].

Many researches has been done on the value added from various perspectives, including the economic and tax perspectives, in the scientific associations and research institutes of the world. The basic definition of value added is the difference in value presented at the end of the production process (output) with the value received at the beginning of the production process (input).The EVA2 is a performance measure that focuses on the total value created by the company and presents a real image of wealth creation for shareholders [8]. Specifically, the concept of economic value added was used

2- Economic Value Added

in the late 1980s by Stern Stewart & Co., a New York consulting company, with the aim of developing a measure for returns of shareholders capital. One of the most important applications of this model is its use by organizational managers as an indicator of internal performance in decision making and selection of investment projects and plans [9].

Many researchers over the years have examined the economic value added and market value added and the ability of these two benchmarks to meet the information needs of users to measure company and product value. For example, Hejazi and Hoseini (2006) compared economic value added and market value added with other accounting benchmarks to evaluate company performance. In their research, they concluded that EVA and MVA[3] are new and representative benchmarks for evaluating company performance. They therefore suggested that economic value added be used as an indicator of internal and external evaluation due to its strong relationship with market value [10].

Heidarpoor and Fouladi (2016) examined the impact of ownership structure on the value added of intellectual capital. Researchers believe that intellectual capital is one aspect of the necessary resources for success of companies in the knowledge-based economy. Move of the society toward a knowledge-based economy drives researchers to focus their attention on the intangible factors that create value. The findings of the researchers indicate that there is no significant linear relationship between managerial ownership structure and intellectual capital value added coefficient. However, there was a linear and significant relationship between corporate and institutional ownership with intellectual capital value added coefficient [11]. In this regard, Rahmani and Arefmanesh examined the relation of intellectual capital value added with the cost of shareholders equity using Pulic model[4]. The result showed a significant negative relationship between the value added of human capital and the cost of capital. Also there was not a significant relationship between the value added of structural capital and the cost of capital. They concluded that investing more in physical and structural capital would not have a significant and positive impact on company performance and, consequently, would not lead to lower capital cost [12].

In a study entitled “The Quest for Value”, Stewart (1999) examined the

3- Market Value Added

4- Pulic Intellectual capital model (2004)

relationship between economic value added and market value added. He ranked six hundred and thirty companies out of a thousand top American companies in terms of average economic value added during the years 1987 - 1988 and divided them into twenty five groups. The study was based on the mean economic value added and market value added for each of the twenty five groups and also on their changes. The results of the study showed a very high correlation between these two benchmarks, their mean and their changes in companies with positive economic value added. However, in companies with negative value added, the correlation between these two benchmarks was not high [13].

Allen and Bryan (2007) define social values as "general models of behavior, collective rules, and functional norms that have been publicly accepted and demanded by society." Social values gradually become social norms and society becomes disciplined by observing them. Business units can create value added for the company and society by fulfilling their social responsibilities [14]. Griffin and Barney (1992) have defined social responsibility as: "a set of duties and obligations that an organization must perform to maintain, care for, and assist the society in which it operates" [15]. Ahmad Riahi Belkaoui (2003) defines value added as the residual value of returns generated by utilizing productive capacity such as labor and capital. This value added includes wages, interest and taxes, accumulated profits and dividends paid to shareholders [16].

$$S\text{-}B\text{-}DP = W + I + DIV + T + R \quad (1)$$

Sale - Base Materials - Depreciation = Wage + Interest + Dividend Paid + Tax + Retained Earnings

As it can be seen in the above formula, the value added of the business unit includes dividends paid and accumulated, wages, interest and taxes that are distributed among the contributing factors, namely shareholders, employees, credit institutions and the government. But does the true value added of a business unit only incorporate those factors, or are there other intangible factors that have not been considered so far? In the next section, we will look at some of the intangible factors that can be considered as the value added of a business unit and examine them further.

Sustainability accounting and related challenges

In the twenty first century, the business reporting process tends to meet the needs of a broad range of stakeholders, rather than merely focusing on

shareholders, and on this basis, sustainability reporting has been established. According to sustainability reporting, sustainable accounting requires consideration of different economic, social and environmental systems inside and outside the organization, in the present and future. The role of sustainability reporting is to provide a holistic view of the organization activities and to provide a balanced view of its impacts and benefits on economic, social and environmental dimensions. In this regard, defining specific conditions for sustainability reporting is one of the major challenges. Boundaries of sustainability reporting principles must extend beyond the boundaries of traditional financial reporting to meet stakeholder expectations. Sustainability performance of companies is a key driver for encouraging and promoting investment with a sustainable approach that has mutual benefits for companies and investors and will have a direct impact on economic and social development of the world [4].

So far, many models have been put forward to accurately explain corporate sustainability reporting, each of which has many supporters and critics. Looking at the criticisms of the researchers, we find that most of the criticisms are about the efficiency of sustainability reporting and not about its effectiveness. Critics consider sustainability accounting reporting to be a non-financial, statistical reporting that poses the greatest challenge to economic decisions. The social value added model seeks to answer the challenges and criticisms raised against the two approaches of economic value added and corporate sustainability reporting and can address the shortcomings of these models.

Social value added model

Before defining the concept of value added and providing a suitable model for it, we will first have a brief overview of Clair Krizov and Brad Allenby's research titled "Social Value Added: A Metric for Implementing Corporate Social Responsibility" [17]. In a research, Krizov and Allenby have introduced social value added as a metric for implementing corporate social responsibility in American Telephone and Telegraph Company, as a tool that can measure value added in environmental, health and safety plans. Based on this research, the measure of social value added in environmental, health and safety plans based on the net profit margin of financial ratios is used as a general measure of the effectiveness of operations. On the basis of Krizov and Allenby model, the total benefits arising from business activities as well as the total costs thereof are calculated and after deduction of these factors the social value added of the product is calculated. Some researchers (Godfrey and Hatch, 2007

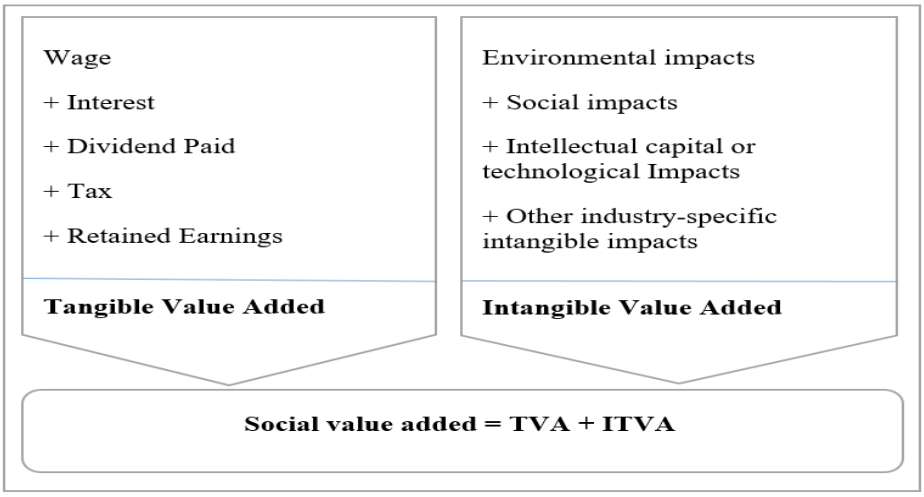
and Turker, 2009) believe that almost all definitions of corporate social responsibility are generally not desirable concepts and cannot measure social and economic welfare, direct economic benefits, ethical consequences, social satisfaction, social order, and legitimacy of corporate business activities.

Krizov and Allenby's research has several drawbacks: First, there is no definition of social value added in this research to distinguish it from other existing value added. Second, this research does not provide a clear model of social value added and its differences with other values. Third, the results of this research has not determined whether the services provided by American Telephone and Telegraph Company have social value added and would increase social responsibility.

Paweł Wnuczak (2017) also explores the Social value added as an adaptation of economic value added to the specificity of cultural institutions. Pawel expresses his intention to do research on the concept of social value added as the effectiveness of non-profit activities and considers the use of economic value added impossible for non-profits. In calculating the social value added of non-profits, Pawel deducted the difference between the social impacts of the assessed institution on the relevant social costs. If the result was positive, considered that the social impact to be value added and durable. In fact, in this model, Pawel calculates the social benefits and social costs of non-profits and adjusts earnings before interest and taxes.

In view of the above, the present research seeks to develop the concept of social value added and to provide a model to measure the social value added of products, which in comparison with previous models of value added is superior in terms of other production factors that have been considered intangible. Unlike previous studies that have proposed a social value added model by modifying economic value added, In this study, In addition to defining the concept of social value added, we present a new model of social value added that is important and have more innovation in construct of pervious research. Figure 1 describes the components of the social value added model.

Figure 1: social value added model



Source: Researcher

As can be seen in the above value added model, social value added is divided into two parts. The first part contains the tangible factors of production that has been included in earlier models such as the Riahi Belkaoui model. In this part of the value added the wage belongs to the employees and is paid because of the value created by them. The interest belongs to the creditors of the business unit for their assistance in the process of investing in fixed capital and working capital and their contribution to the value added is taken into account. Paid and unallocated dividends are owned by shareholders of the business unit, and taxes are included because of services provided by governmental organizations.

In the second part, the intangible factors of production are added to the previous model. These factors include the environmental and social impacts of the manufactured product and the impacts arising from the use of technical and technological knowledge as well as other specific intangible impacts of each industry. Therefore, we define social value added as follows: “The social value added is the sum of the tangible and intangible values which is created by the business unit and is brought to the society with the change and advancement of technology and also through the knowledge of managers and production engineers” [18].

Intangible value added components

Environmental impacts of a product or service: Environmental Impact Assessment is a method in which the impacts of a project or its operations on the environment are assessed and predicted so that the operation can be minimized during the project, taking into account the status and type of impacts. Excessive human activities are now factors that damage nature and the environment. It is not possible to restrict these activities because of human need for food and energy. For this reason, different countries are trying to address the impacts of these activities. This attention and foresight is called the EIA[5] [19]. Environmental impact assessment is a process used to identify the likely outcomes and consequences of a proposed project. It is the process of conducting studies to predict the impacts of activities and functions of a project on the environment, human health and social welfare. From a national perspective environmental studies are conducted to maintain sustainable development at the national level and from a regional and global perspective to protect the environment in its broadest sense. Nowadays, it is widely accepted that economic development policies must conform to environmental objectives [20].

Environmental factors in environmental impact assessment: Environmental factors that have been identified and investigated in this case and which determine the existing status of the environment include [21]:

A: Physical environments such as geological environments, seismicity, air, water, soil, sound, etc.

B: Biological environments such as plants and animals, etc.

Social impacts of a product or service: Social impact assessment is an approach to identifying and analyzing the impacts of any activity on the social aspects of the environment [22]. In the present study, the social impacts of the product include social, economic and cultural environments as follows:

A: Socio-economic environments (population, literacy and education, religion, health, welfare, employment and unemployment, etc.)

B: Cultural environments (entertainment venues, religious sites, scientific places, monuments and antiquities, protected locations, landscapes, etc.)

5- Environmental Impact Assessment

Impacts of intellectual or technological capital: In a knowledge-based economy, intellectual capital is used to create value for the organization. In today's world, the success of any organization depends on the ability to manage these assets. To come up with new technology and produce new products, researchers search for hours, days, months and even many years to create new knowledge and inventions. Once the result is achieved and the product is commercialized, the value of the company's assets is increased by the created intellectual capital. In fact engineers and scientists of the business unit are considered as an effective tool for business units to compete in industries. In earlier models of value added, the value of the created intellectual capital was ignored. This factor is added to the intangible value added model. Consequently, with the creation of a new product that has significant advantages over the previous product, in addition to considering the environmental and social impacts of the product in the social value added model, the role of human beings as intellectual capital that can generate business unit profits in the future will also be highlighted and their value is added to the intangible value added of this model.

The impacts of intellectual and technological capital are the value added that researchers have created and presented to the society by making models, product inventions or etc. These impacts were added to the product in the majority of environmental and social impacts in the social value added model. Successful creation of these impacts for the society certainly increases the value of human and intellectual capital in the business unit. But these impacts may be hidden in the valuation of business assets. Now by identifying the real value of intellectual capital calculated in different ways, we can add this value to the intangible value added in the social value added model.

Other industry-specific intangible impacts: Industry-specific intangible impacts mean all the significant intangible impacts that a business unit can create for the society or any other stakeholder through creation of new knowledge and technology. These impacts may not be in the category of intellectual, environmental and social capital indicators or may be separated from other intangible indicators because of their importance. If there are other impacts in certain industries that are hidden in earlier value added models, in this model these impacts can be added or removed as other intangible impacts.

Social value added statement

Value added statement is one way of communicating with stakeholders in the area of value generated by the company. The activities of a company have economic and social impacts on information users. A company is accountable

to the society because it uses society-owned assets such as roads, railways, communications, harbors, and other basic facilities and infrastructure paid for by taxpayers' money. Value added statement is considered as part of social responsibility reporting. Value added statement is now considered a complementary measure to judge the performance of the company in relation to essential measures based on the traditional accounting system. The value added statement provides more information about the wealth (value) created by a company over an accounting period and distributed among different stakeholders. [23].

Social value added statement allows organizations to publish their economic, social and environmental value added. This statement can be effectively applied to nonprofit organizations, joint-stock companies, and governmental departments in a way that reflects the details of the commitments made by organizations. Usefulness of social value added statement as a complementary financial statement in addition to traditional financial statements can address the additional information needs of all business stakeholders. This statement can be defined as part of the sustainability accounting report, as improving quality of life and reducing environmental degradation. Figure 2 is an example of a social value added statement.

Figure 2: social value added statement

Sale		××	
- Base Material	×		
- Depreciation	×		
		(××)	
The tangible value added belongs to:			××
Employees (wages)	×		
Business financier (interest)	×		
Owners (dividends and retained earnings)	×		
Government (tax)	×		
Other Beneficiaries	×		
+ The intangible added value belongs to:			××
Employees (intellectual capital)	×		
Consumer	×		
Government	×		
Community (environment, public, etc.)	×		
Social value added			××

Source: Researcher

As can be seen in the above social value added, visible value added of the business unit is obtained from deduction of the base material cost and depreciation expense from net sales. This value added belongs to business unit employees, business unit financers, governmental agencies and business unit owners. Other beneficiaries of tangible value added are other organizations such as social security organization (insurance company), electricity Distribution Company, water and Wastewater Company, and individuals who present service to the business unit and benefit from their services. Overhead costs usually fall into this category with deduction of depreciation expense. The intangible benefits and losses resulting from the activities of the business unit belong to its stakeholders. These stakeholders include business unit employees, consumers of goods and services and the society. Business unit employees include individuals who have value both in the sector of tangible value added due to receiving salaries and benefits and in the sector of intangible value added due to the growth of intellectual capital. Consumers are beneficiaries because of receiving and purchasing quality and socially valuable goods. Also society can benefit from the value added of the manufactured product for a variety of reasons, including environmental and social benefits.

Social value added and its measurement

In order to accurately and reliably evaluate social value added, we need to identify the intangible value added created by the business unit as well as quantify that parameter in the form of related economic values. To quantify the social and environmental impacts of the manufactured product, we evaluate the value of each of the factors and parameters influenced by the new technology. We should examine the results obtained directly and indirectly and assess the value of the resulting economic or social benefits or losses. We can then generalize it to the whole society by assuming comprehensiveness and then add those results to the value added of the company and the product. Our conceptual model in this research for quantifying and evaluating intangible value added is as follows:

First, the results of the product change from technical, economic and social perspectives are examined. These results may have positive or negative impacts in any of the above perspectives. So we have to calculate and show these results in comparison to the old technology or product.

$$\%ER_i = \frac{A_{ij} - A_{i(j-1)}}{A_{i(j-1)}} \quad (2)$$

Wherein:

$\%ER_i$: Effected ratio created in i^{th} parameter

A_{ij}: Value of ith parameter after applying technology

$A_{i(j-1)}$: Value of ith parameter before applying technology

The changes in technology and new product from technical perspective cause positive and negative changes from economic and social perspective. We should now express these changes with economic and social perspective from a relative to a quantitative value in constant monetary terms in order to calculate the social value adds. For this purpose, from extreme number of the impacts and changes created, all of them may not be convertible into monetary unit and the results of these impacts on society and economy may not be measurable. So we use the minimum results and impacts that can be calculated and quantified (convertible into monetary unit or quantity) in the calculation of social value added.

$$ME(W)_i = \%ER_i * Y_i \quad (3)$$

Y_i: Quantitative target factor (Quantitative related factor: Environmental degradation, gasoline consumption, time factor, etc.)

ME: (Measure of economy) Quantity of changed positive (negative) impact in i^{th} parameter

In some industries, the importance of each of the intangible value added parameters may be different from other parameter, meaning that one percent of the savings or improvements in one factor are far more important than advancement in other factor. For this purpose, it is possible to determine coefficients with respect to important characteristics and to apply them before integrating the impacts of new technology. We do the following two steps to apply the coefficient of importance:

Step One: Determining the significance coefficients for each of the factors whose sum is one hundred.

$$\sum_{n=1}^{\infty} CR_n = 100 \;\Rightarrow\; CR_1 + CR_2 + \cdots + CR_n = 100\ n \quad (4)$$

$CR_{1....n}$:(coefficient ratio) Significance coefficients of each of the intangible factors

$\sum CR_n$: The sum of the significance coefficients of all intangible factors

In the second step, after applying the coefficient for each of the intangible value added factors with the sum of one hundred, by considering the lowest significance coefficients as a constant coefficient (one hundred) and dividing the remainder its ratio with the lowest coefficient is calculated. In this method, the value added of the most unimportant factor remains constant and the other factors increase with respect to their coefficients.

$$CR_x = 100 \Rightarrow \text{New } CR_{i=1\ldots n} = (CR_{i=1\ldots n} * 100)/CR_x \quad (5)$$

CR_x: Coefficient of the most unimportant intangible factor

$CR_{i=1\ldots n}$: Significance coefficients of other intangible factors

To calculate the intangible value added we need to calculate the quantified impacts of each parameter and add them. (We add benefits and subtract disadvantages).

$$ITVA = \sum_{n=1}^{\infty} ME(w)_i \quad (6)$$

$$\sum_{n=1}^{\infty} ME(w)_i = ME(w)_1 \pm ME(w)_2 \pm ME(w)_3 \pm \cdots \pm ME(w)_n \quad (7)$$

Wherein (ITVA) is the intangible value added and $\sum ME(w)_i$ is the sum of the impacts of the new technology. Now SVA[6] is equal to the sum of TVA[7] and ITVA[8].

$$\text{SVA} = \text{TVA} \pm \text{ITVA} \quad (8)$$

As you can see, the amount of social value added depends on two factors of tangible value added and intangible value added and this value can be divided among any of its contributing factors (shareholders and owners of business units, employees including managers and production engineers, government, credit institutions, etc.) given their role in the obtained technology. In this model, intangible value added can be evaluated up to several times more than the tangible value added.

Analysis of social value added model

Environmental protection in the twenty first century is recognized as one of the eight Millennium Development Goals and one of the three pillars of

6- Social Value Added

7- Tangible Value Added

8- Intangible Value Added

sustainable development. Every business unit that invests in and uses the factors of production in line with the principles of environmental protection plays an important role in creating and enhancing value. But in calculating traditional value added this created value by business units has been overlooked. Do products made in compliance with environmental standards have similar value added in comparison with those produced without compliance with environmental standards? The answer is clear. This value is created through the production process and value engineers, but only the cost of wages and the associated minor costs are taken into account in value added of the product and company. For this reason, in the proposed new value added model, attention to the environment is considered an important factor.

Imagine a company with production engineering and the use of modern technology succeeds in reducing the environmental damage of the product. In this company, so far, only the cost of production engineers' wages, regardless of the outcome, has been considered as the value added of that product and company. But in the new value added, its intangible impacts are also taken into account. In this model, after calculating the beneficial and detrimental impacts of the product on the environment, we add these impacts to the value added or subtract them. Also, if we want to examine the efficiency and effectiveness of this demand we can determine the efficiency and effectiveness by dividing the results to the incurred costs. The more a business unit achieves the desired results with lower costs or better technological engineering, the more efficient it is at creating value added.

If a business unit with the right intellectual and technological capabilities can improve the quality, product life and other features of its product, that unit has succeeded in creating value added. But this success may not be reflected in the factors of production. Therefore we can add that intangible part to our value added model.

This model states that real value added is not restricted to tangible value created by business units and other intangible effects that create value added for the society should be addressed. The social value added model can have many applications in many social and economic perspectives and pave the way for the evolution of corporate sustainability reporting. Any business unit that intends to increase its intangible value added at the environmental and social level can prove that it has been able to multiply the value added of its product by using this model. Another aim and necessity of this research is to focus on stakeholder theory and the theory of the legitimacy of the economic unit, meaning that companies that create more intangible and social value added for

society are being considered and their products are purchased on the market. Another application of this model is tax approach of the value added. Companies that can increase the value added of their products and reduce harmful impacts on the environment can be targeted by government agencies to reduce their tax payments. In some countries, environmentally harmful products are subject to higher tax, and businesses that are able to reduce these harmful impacts in their products and contribute to environmental and human health pay less tax.

Purpose and method of research

This is a fundamental research. The research method for calculating the social value added of nanotechnology engine oil is made possible by paired comparison of the data. Data of regular engine oil and nanotechnology engine oil and their impacts on society are examined and then the social value added of the nanotechnology engine oil is calculated according to the proposed model. Engine oil is one of the lubricants that have the most diverse classification among all other lubricants. The basis of these classifications is the viscosity of the oil at different temperatures as well as the amount of additives and the quality of the oil. To calculate the social value added of Nano-oils, some important indexes of engine oil such as viscosity index, flash point, pour point, density, TBN index before adding Nano materials and after adding Nano materials are measured together. Then the results are compared in both cases and the value added of the product is evaluated. The statistical population in this study is the base oil and Nano oil in the motor oil production company which the relevant data was extracted and its added value results have been determined. Therefore, the purpose of this research is to present and test the social value added model (case study: nanotechnology engine oil). This model reveals intangible value added created by business units and is a more appropriate criterion for the decision-making of stakeholders of business unit and product. This model can drive business units to move towards creating value added for the society.

Results

As described in the previous section, data analysis was performed using paired comparison of data. For this purpose, statistical data on the indices of importance of engine oil were prepared as pre-test samples before adding nanotechnology materials. Then fullerene was added to the engine oil using ultrasonic mixer. The nanotechnology engine oil produced after the test (test:

change of regular engine oil to nanotechnology engine oil) was also sampled and sent to the oil testing laboratory with pre-test samples for examination of the mentioned indices. The test results showed forty six percent technical efficiency of the product. Table (1) shows the results of regular engine oil and the technical performance of nanotechnology engine oil before and after applying the impact coefficient.

Table1. The results of Nano-oil technical efficiency test

test	*	**	***	****	*****
Viscosity index	122	0/04	35%	100%	0/049
Pour point	-20	0/5	20%	57%	0/285
Flash point	210	0/038	15%	43%	0/016
density	0/89	0/001	10%	29%	0/0003
TBN	7/7	0/19	20%	57%	0/111
Total	-	1/783	100%	286%	0/462

*: Conventional engine oil test

**: Technical efficiency before applying the impact factor

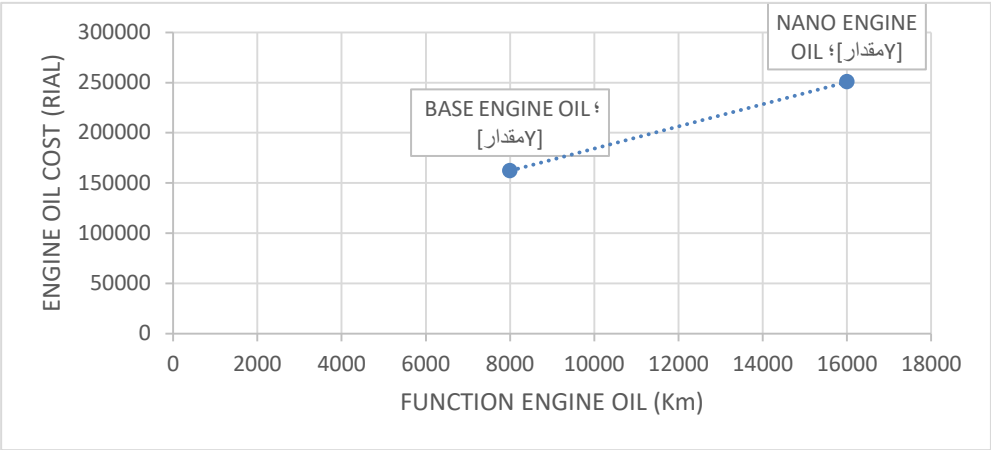
***: Determination of impact factor

****: Modified impact factor

*****: Technical efficiency after applying the impact factor

After calculating the technical efficiency of Nano engine oils, we should evaluate the economic efficiency of Nano engine oils with regard to cost index and the rate of increase in performance of the new product. On the issue of cost of the product, field research was initially conducted through existing products on the market and products currently manufactured. Then, in order to prove and document the price of regular engine oil and Nano engine oil, a full calculation of the price of the product from the beginning of the manufacturing process was carried out, taking into account all fixed and variable costs of the product. The results showed that the price of Nano engine oil was fifty five percent higher than that of regular engine oil. Also in the performance index, the results showed an approximate increase in the useful life of Nano engine oil by one hundred percent compared to regular engine oil. Figure 3 shows the cost and performance of the Nano engine oil compared to regular engine oil per liter of engine oil.

Figure3. Comparing cost and performance of Nano engine oil



The tests also showed an eight percent reduction in vehicle fuel consumption using Nano engine oil compared to regular engine oil. It can be concluded that reducing fuel consumption reduces air pollution and environmental pollution by eight percent. Therefore, it can be concluded that with the change of technology and adding nanotechnology particles to engine oil, the technical efficiency of Nano engine oils will increase by forty six percent with a fifty five percent increase in cost. This increase increases the economic efficiency of the product by forty percent and also increases the social efficiency of the product by eight percent. Therefore, it can be inferred that with increasing efficiency at the technical, economic and social levels of Nano engine oils, they have productivity and can generate value added for society.

To calculate the social value added of Nano engine oils according to the presented conceptual model, the economic value added of the product (tangible value added) was first calculated. Then the economic and social benefits of this product such as the benefits of reducing the cost of purchasing the product over its useful life for the customer, the benefits of reducing fuel consumption for the customer, the benefits of reducing subsidies for the government, and the benefits of reducing the damage caused by environmental pollution for the society and government were calculated as the intangible value of Nano engine oil.

By integrating the tangible value added and the benefits of the intangible value added, the social value added of the product was examined. The results showed that the intangible value added of Nano engine oil was approximately

thirty eight times more than its tangible value added, which was not considered in the calculations of previous models. Therefore, it can be concluded that the social value added model is an optimal model to replace traditional value added models, which did not take into account hidden and intangible factors. This model can be considered for better decision making by stakeholders, customers, government institutions and the society. Figure 4 shows the social value added statement of Nano engine oil based on monetary units (the figures are in thousand rials).

Figure 4: social value added statement

Sale		300	
- Base Material	232/1		
- Depreciation	4/9		
		(237)	
The tangible value added belongs to:			63
Employees (wages)	6/6		
Business financier (interest)	0		
Owners (dividends and retained earnings)	39/4		
Government (tax)	0		
Other Beneficiaries	17		
+ The intangible added value belongs to:			2394
Employees (intellectual capital)	0		
Consumer	1100		
Government	784		
Community (environment, public, etc.)	510		
Social value added			2457

The numbers in social value-added statement are based on fact and are obtained from a case study at Zagros Motor Oil Company. Therefore, the observed value added is not an estimate and is only assumed to be zero based on the assumption of non-financing of the company as well as non-payment of taxes due to being placed in the knowledge-based product group. However, if this two figures are not zero in one business unit, they have to deducted from the owners value added of the business unit and added to their value added, but there will be no change in the final outcome of social value added. In order to calculate the intangible value added of Nano-engine oil, three factors were considered in this case study as follows:

1. Consumer social value added: this factor itself consists of two components;

First: value added of buying the product. To calculate this value added,

the difference between the fuel used in the vehicle (in kilometers) for the two Nano and base engine oils has been calculated and taken into account. Second: value added of reduction in fuel consumption. To calculate this added value, the reduction in fuel consumption of a car is assumed to be based on the use of each of the basic and Nano engine oils.

2. Government-owned social value-added for fuel consumption: Since some governments, especially in Iran, claim to paying subsidies to auto-fuel producers, it can be consider that with reducing fuel consumption, the government subsidies cost will be reduce.

3. Social Value Added Due to Air Pollution Reduction: Government agencies are forced to pay non-value added costs annually to reduce air pollution and environmental degradation, which also reduces their costs if air pollution is reduced. To calculate this added value, data from relevant official organizations and the relative proportion of movable pollutant emissions are used.

Conclusion

There has been a great deal of research about product and company value added by researchers at universities and governmental institutions, and there are different theories about the actual value created and added during the production process. Value added is the value that is added to the value of intermediate goods in the production process. In the previous models, these factors only included wage, interest, tax, and profits of shareholder and company. But some intangible values created in the business unit such as environmental and social impacts, saving in national and natural resource, and etc. is very important to the society. Social value added comprises the sum of the tangible and intangible value added of production. The environmental and social impacts of production are important and are added to previous models. This model can have many applications for business units, society and governmental organizations and is a good incentive for all business institutions to pay more attention to the environmental and social impacts of their products.

The social value added model removes Sustainability accounting shortcomings and provides a more complete perspective on the performance of business units with regard to social and environmental benefits. Critics see sustainability-based reporting challenges as ambiguity and complexity, and lack of a clear and understandable definition of sustainable development. They also say that one of the main problems of these models is the relation of sustainability and business objectives of the company to maximize capital

growth and the interests of shareholders and stakeholders. In addition, the use of traditional accounting systems makes it difficult to measure the external impacts of an organization's operations. In this research, to test the proposed social value added model, nanotechnology engine oil was selected randomly and the test was performed using paired comparison of data. The results of the research showed that social value added statement can be an appropriate report for evaluating the economic and social performance of a business unit. Nanotechnology engine oil has a social value added of 3797.2 percent compared to regular engine oil, 15 percent of which is related to tangible value added and 85 percent to intangible value added.

The main limited of the present study was the lack of access to information required by business units. Since nanotechnology is a new and emerging technology, the companies who use this technology are infrequent in Iran and as a result receive information from such companies due to confidentiality of technical and financial information is difficult and sometimes impossible.

It is also suggested that future researchers examine the role of social value added reporting of products on business incentives, considering the effects of this type of reporting on society, so that if the results are positive, business units will be more motivated to improve the quality and therefore environmental and critical resources are conserved.

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