

Vienna 2019 Abstract Submission

Title

Defining performance efficiency in wine sector considering environmental parameters

I want to submit an abstract for:

Conference Presentation

Corresponding Author

Tatiana Bouzdine-Chameeva

E-Mail

tatiana.chameeva@kedgebs.com

Affiliation

KEDGE Business School

Keywords

wine, performance efficiency, data envelopment analysis, profit and cost efficiency, sustainability, carbon footprint, French wine.

Research Question

Why the classic definition of efficiency becomes incomplete? How can we assess the operational, environmental and profit efficiency in a unified measure and account for environmental factors?

Methods

The methodology is based on data envelopment analysis; presents the two models - an input-oriented cost minimization problem and an output oriented revenue maximization problem.

Results

The 51 wine-producing companies in the Bordeaux region of France are studied to estimate performance efficiency in the presence of environmental factors. The important vulnerability on several indicators is revealed.

Abstract

The objective of this study is to debate the different views on the performance in wine sector. The use of the word performance is often linked automatically to the word economic and the classic definition of economic performance refers to an assessment for an organization of its success in areas related to its assets, liabilities and overall market strength. There exist different indexes and indicators used to measure the general economic performance of a company. The vast majority of studies on performance are focused on economic performance and do not consider neither social nor environmental parameters.

Many business operators take just regular stock on either a formal or less formal basis to make sure that it remains on the right track financially. Neither social, nor ecological factors are considered in this type of performance analysis. However the sustainability approach which considers the effects of the entire life cycle of wine production - from acquiring the plants and chemical treatments, to fermentation, packaging, transportation, consumption and disposal or recycling at the last stage - becomes more valued in general in the agricultural sector.

Sustainable development firstly introduced and defined in the United Nations Assembly as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations General Assembly, 1987, p. 43) has received remarkable international efforts all over the world, and was obviously reflected in the multiple COP conferences that were held over the last years in different countries. COP aims with the agreement of 195 nations to combat climate change and unleash actions and investment towards a low carbon, resilient and sustainable future. The key to such promised future is to balance

between the economic growth and the sustainable development that requires new tools and new approaches (Hoffren and Apajalahti 2009).

Organizations became increasingly concerned about their organizations' environmental performance and the impact of their activities on the environment. Different studies have shown that ignoring undesirable outputs such as carbon emission or waste product may produce misleading results in assessing the performance efficiency (Fare et al., 1989; Lovell et al., 1995; Fare et al. 2003;). It becomes more and more important to assess the performance of decision making units by accounting for environmental factors., and in assessing performance, it seems reasonable to give credit to decision making units (DMUs, wineries in our case) for producing desirable outputs but at the same time we should penalize them for producing undesirable outputs that cause environmental damage. Wine industry as well as other industries are not innocent from contributing to climate change and global warming due to the existence of different activities such as vineyard practices, packaging, transportation, fermentation and energy consumption that result in carbon emissions and waste production. The literature on performance efficiency or/and sustainability has covered multiple fields such as agriculture, soil, insects, industry, water, animals and many other studying. However the literature on wine regarding efficiency and sustainability is quite poor as addressed below.

To begin with, Schaller (1993) addressed in his paper the reasons for growing interest in agricultural sustainability, the ends and means of sustainability, and the frequent debate issues related to the profitability and the adequacy of food production form sustainable systems. Schaller (1993) discusses two different views. The first is that fine-tuning of conventional agriculture is needed as sustainability is inherently unprofitable and won't feed the world's population whereas others argue that fundamental changes in agriculture are needed in which they believe that sustainable farming can be even more profitable than the conventional ones.

The increase in food production and its environmental costs mainly the rates of nitrogen and phosphorus fertilization were in the focus of Tilman (1999) study. Later on, De Koeijer et al. (2002) studied the agricultural sustainability of the Dutch sugar beets using efficiency theory, in which sustainability was quantified based on herbicides and pesticides figures. Results, revealed that a positive correlation was found between technical and sustainable efficiency. Korhonen and Luptacik (2004) measured the operational and ecological efficiency in a unified manner.

Over the last decade the increase in the number of studies about the wine sector and sustainable practices has affected wine packaging, organic wine making and management practices. (Atkin et al., 2011) investigated whether significant differences exist between wineries that have implemented environmental management systems or not in terms of cost advantage, product differentiation advantage, and performance. (Goode and Harrop, 2011) cautioned the wine industry that sooner rather than later wineries will be required to provide information and justification for their practices to address environmentally concerned consumer demands. (Forbes et al., 2009) studied the views and behaviors of wine consumers in New Zealand concerning the implementation of environmentally sustainable practices in the vineyard. (Ruggieri et al., 2009) proposed composting to recover the organic waste produced in wine production. (Berghoef and Dodds, 2013) investigated the degree of interest in the Ontario wine industry in ecolabel programs and the factors that may motivate or deter industries from participating in such programs. (Merli et al., 2017) examined the sustainability programs in the wine sector in the New World, Europe and Italy. Findings revealed the possibility of merging the best strategies implemented in each program to create an internationally recognized program. (Schaufele and Hamm, 2017) presented a review of 34 papers focusing on consumer perceptions, preferences, and willingness-to-pay (WTP) toward wine with sustainability characteristics. The results suggested that production and marketing of wine with sustainability characteristics is a profitable strategy that is aligned with consumer attitudes and buying motives.

Numerous studies have been developed recently in wine sector for assessing economic performance and include the environmental approach and the sustainability issues. Szolnoki et al. (2013) investigated the notion of sustainability and the different production management systems; organic, biodynamic and sustainable farming in seven countries from a producer's point of view. Ayatac et al. (2016) studied the profitability of wine firms in France proposing an empirical analysis. Galbreath (2017) explored the role of women in leadership of environment sustainability in Australian wineries. Nuebling et al. (2014) measured the subjective and objective knowledge of environmental practices in wine based on three levels of expertise: novice, intermediate and expert. Results revealed that there was no significant difference regarding the participants' environmental concern.

However, these studies which stress the promising potential of incorporating sustainable strategies to improve wine performance suffer from the drawback of assessing and linking economic and environmental performances in a unified manner. The first attempt which has been accomplished in this field referred to cost analysis study (Bouzdine-Chameeva and Jradi, 2018) based on data envelopment analysis. This methodology has been previously

used in the studies on wine sector (e.g. Le Fur and Outreville (2016) who investigate how the market structure of grape varieties affects the performance of the 20 major wine exporting countries).

We address in our study a series of two-fold questions on the producers' side:

1. What is a classic definition of performance and why it becomes incomplete?
2. How can we assess the operational, environmental and profit efficiency in a unified measure?
3. What are the most activities that contribute to carbon equivalent emissions (e.g. vineyard practices, packaging, transportation etc.)?

Secondary questions which are proposed in our study basing on the studied cases are the following:

- How innovations in wine sector could contribute into the resolution of sustainability puzzle? What sustainable practices could be addressed to help in reducing carbon emissions in the wine sector?
- What effective changes could the wine industry actors bring to build a greener wine industry?

Our study contributes by providing an in-depth investigation of the operational performance of wine estates in the presence of environmental indicators. The methodology is based on data envelopment analysis and presents the two models - an input-oriented cost minimization problem and an output oriented revenue maximization problem. The proposed approach is applied to 51 wine-producing companies in the Bordeaux region of France to estimate performance efficiency in the presence of environmental factors. Important vulnerability on several indicators is revealed and could do matter to factors guiding farmers' choice of sustainable practices. We provide improvement targets for the firms, which are inefficient in terms of labor force, net-fixed assets, prices and carbon footprint, are provided. We discuss managerial implications to be put in practice and outline suggestions for future studies.

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