A Sustainable Performance Measurement System for the Chilean Wine Industry's Supply Chain

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Abstract:

Purpose: To propose a sustainable performance measurement system for the Chilean wine industry's supply chain. The new system is based on industry's current performance measurement systems and Elkington's sustainability approach (1997), allowing wine companies to manage the business in two dimensions: 1) Sustainability, which will measure how sustainable is the business and 2) Spatial dimension, which focuses on measuring the performance of the actors that comprise the industry's supply chain.

Design/methodology/approach: In order to attain the objective before raised, a research initiative is to be developed on industry sustainability and inter-organizational performance measurement systems, along with a diagnosis of the Chilean wine industry. The work is supported by a series of in-depth interviews to executives from 50 of the main Chilean wineries.

Findings: On the basis of the diagnosis made of the current state of Chile's wine industry, the study confirms that the conditions for a future implementation are given.

Keywords: Sustainability, Performance Measurement Systems, Wineries, Supply Chain

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1. INTRODUCTION

There is no doubt today that sustainability is a very relevant and desirable characteristic for any industry worldwide, especially the agricultural sector, where the wine industry is no exception. The wine industry has been hard pressed by customers and regulators to assess, reduce and communicate its environmental and social performance (Christ and Burritt, 2013), reason why it has had to incorporate sustainability into its management. However, management control systems have sought to measure sustainability, focusing mainly on the impact that production inputs and processes have on the environment and economic performance, leaving aside social perspectives (Henri and Journault, 2009, 2010). In light of this scenario, where sustainable control systems do not generally consider the three dimensions of sustainability, the present work undertook two methodological approaches: the first consisted of a literature review on sustainability and inter-organisational performance measurement systems. This made possible to generate the necessary theoretical basis for a sustainable performance measurement system for the wine industry's supply chain (SMDSCS) to help measure business sustainability. At the same time SMDSCS helps measures the performance of the players comprising said supply chain. The second consisted of carrying out a diagnosis of the wine industry through a survey of 50 in-depth interviews to executive level management of a selected sample of Chilean wineries to know the reality of industry in terms of performance measurement so as to assess the viability of the new model being proposed.

Therefore the main goal of this article is to propose a sustainable performance measurement system (SMDSCS) for the Chilean vineyards' supply chain. In order to achieve this, the following objectives were set: Review of the literature on sustainability and inter-organisational performance measurement systems; diagnose the wine industry current performance measurement systems and propose a conceptual framework for the SMDSCS implementation.

2. LITERATURE REVIEW

2.1. Sustainability

Recognizing that there is no consensus on its definition (Gjølberg, 2009), we used the most widely accepted model to understand sustainability which is that of Elkington's triple bottom line (1997). This model defines the three principles that underlie it: environmental integrity, social equity, and economic prosperity. Although sustainability has already been discussed in the literature of management control systems (MCS) to describe the emergence of sustainable control systems (SCS) such as eco-control, this line of research focuses mainly on the impact of such systems on the environmental and on the company's financial performance (Henri and Journault, 2009, 2010). Yet little is known about the nature and mode of integration of SCS with more traditional MCS (Durden, 2008).Nevertheless, SCS can effectively contribute to the integration of sustainability into the company's strategy only when they are integrated with MCS and not used as autonomous strategic tools (Burgelman, 1991; Simons, 1995). Sustainable control systems include: Sustainability BSC for environmental services (Dias-

Sardinha et al., 2007); Sustainability planning and Control (Bonacchi and Rinaldi, 2007) and Sustainability BSC (Hubbard, 2009).

2.2 Inter-organizational Performance Measurement System

Attention has been given to the design of performance measuring systems (PMS) inside of the organization (Intra-Organizational), although the development of PMS to assess performance standards among companies (Inter-organizational) is taking on growing relevance, as a result of a more competitive and integrated world, where the increase in integration leads to better performance (Narasimhan and Wook 2001).The development of an inter-organisational performance measurement system requires an extended vision of the company, which can be achieved with a supply chain management (SCM) perspective. SCM is to be understood as one of the most integral parts of business management in the design of the different services, from suppliers to customers (Five Winds International, 1999; Christopher, 1998). The integration of the supply chain actors is studied from the perspective of internal integration which examines the interaction among the different areas of the same organization, and also from the external integration perspective, which examines the integration at the interfaces of the different organizations (Flynn et al., 2010). Gunasekaran et al. (2001, 2004), pointed out the need to study performance measures and metrics in the context of the SCM due to the lack of a balanced approach and the lack of clarity among metrics used at the strategic, tactical and operational level. A first proposal to design a supply chain measuring system was made by Van Hoek (1998), which provided a first look at how ─ in the context of supply chain performance measurement ─ the contents of the measuring system can vary, depending on the operation format of the supply chain and on the strategic focus or the evolution of the strategies employed. Indeed SCM has a strong and profound impact on the environment, since it deals with resources procurement and administration for a company's production of goods or services (Mentzer et al., 2001). Therefore it has an impact on the exploitation of renewable and non-renewable resources (Srivastava, 2007). Purchasing practices can also impact suppliers to improve their management of sustainability, using purchasing power to instil good environmental and social practices in small and medium-sized enterprises through the supply chain (Hart, 1995); World Commission on Environment and Development, 1987). Nonetheless, there is a scarce integration of sustainability in supply chain activities, due to lack of knowledge of how to integrate them, both internally and externally (Wolf, 2011). Likewise, Seuring (2013) also suggests that the intersection of sustainability with SCM needs further research, especially from a quantitative perspective to improve support to decision makers. An investigation of Taticchi et al. (2014), concludes that more research is needed on indicators measuring the dimension of sustainability in the SCM. Within sustainable control systems one can highlight: Supply Chain Operation Reference Model (SCOR) Supply Chain Council (1996), Balanced Supply Chain Scorecard (BSCS) (Park et al., 2005), and performance measurement system in the wine industry logistics (García et al., 2012). Additionally we highlight a research, which, among its various findings emphasizing the social dimension, becomes a key element in order for organizations to achieve a more competitive performance, aligning the company with its customers' preferences. (O'Brien, 2015)

3. METHODOLOGY FOR THE DIAGNOSIS OF THE CHILEAN WINE INDUSTRY.

In order to know the industry's needs and elaborate a theoretical proposal for the SMDSCS that is connected with the reality of the Chilean wine industry, an industry's diagnosis was carried out in three stages (choice of sample, survey design, and field work) which was followed by a statistical analysis of the data gathered by the survey. The sample was selected from 99 exporting vineyards in 2012, all members of the Wines of Chile association, which represented 28% of the 351 wine companies currently present in the country (Fundacion ProChile, 2012); and because these companies are present in the most competitive international markets, which implies that a greater technological and management systems development exists. The design of the survey began with 26 questions and after three months of evaluations by a panel of experts (professionals of the business world and academics), it was reconfigured in two parts totaling 36 questions (open type, multiple choice, dichotomous and psychometric scale). Out of the 99 wine companies selected, 94 agreed to be contacted wherein the general manager or area manager were invited to take part in the research interviews. Finally 50 companies (May 2013 - September 2014) agreed to be interviewed and responded the survey. This represents 50% of the total sample and 14.2% of the universe of Chile Wines. The interviews applied structured survey questions, and were conducted by the principal researcher, recorded in audio and transcribed in writing, of sessions lasting between 30 minutes and 1 hour.

4. DIAGNOSTIC RESULTS

As a result of the survey's design structure, the 50 companies interviewed produced two distinct set of results: characterization of the sample and main findings. Of the 50 respondents, 18% are CEOs, 43% correspond to areas managers, 9% sub-managers and 30% to heads of areas. 51% of the sample corresponds to large companies with an annual turnover exceeding $ 4.5 million; 31% are medium-size companies that billed between US$1,050,000 and US$ 4,500,000; 16% are small enterprises with billing ranging between the US$100,787 and US$ 1,050,000; and 2% are micro-businesses with a billing range of less than US$100,786.The labour profile distribution of the workforce was also investigated in the survey. In this regard, the distribution of the labour force in these companies, as it is commonly found in companies within the agricultural industry sector, showed the following: 81 % of employees are technical or non-professional, 12% are engineers, and the remaining 7% are other professionals. Figure Nº 1 below identifies the supply chain players of the Chilean wine industry, something which was supported by the information gathered from the interviews and by Chandes & Estampe (2003) and García et al. (2012).

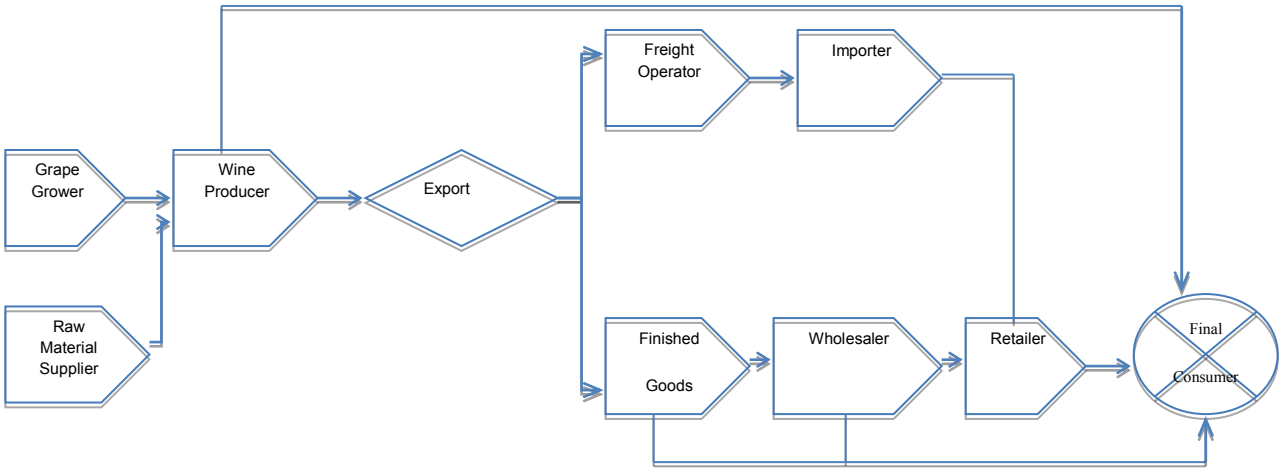

Figure No. 1: The supply chain players of the Chilean wine industry. Source: own elaboration.

- Grape Grower: responsible for the production and harvesting of the grapes.

- Raw Material Supplier: supplier of other inputs required for the production, filling and packaging of the wine.

- Wine Producer: Chilean companies that are usually responsible for harvesting the grapes, ferment wine, control the wine in barrels or ponds, mix the wine, bottling, labeling process and the palletizing process. Next is Table N ° 1, where industry activities are classified in: centralized activities (own vineyard), externalized (a collaborator develops it), or mixed (some developed internally and the others outsourced).

ACTIVITY	CENTRALIZED	OUTSOURCED	MIXED (centralized and outsourced)
Grape harvest	40%	6%	54%
Wine fermentation	80%	0%	20%
Control of wine in barrels or tanks	86%	0%	14%
Mixing of wine	90%	0%	10%
Bottling process	82%	10%	8%
Labelling process	86%	6%	8%
Palletizing process	92%	4%	4%

Table 1: Distribution of activities in the production of wine in Chile.

• Freight Operator: the provider of the transport of products from the warehouse to the importer or another player (Distributor, wholesaler, retailer, etc.).

• Importer: buyer of the wine companies' products. It is responsible for the reception, storage, inventory management and dispatch of finished goods.

• Finished Goods Distributor: responsible for the reception, storage, inventory management and dispatch of finished goods.

• Wholesaler: agents which receive the pallets from the distributors of finished products, and then ship products to the retail stores.

• Retailer: retailers receive finished products from wholesalers or distributors of finished products and sell directly to customers.

• Final Consumer: final consumer of the product.

5. Conceptual proposal of the SMDSCS

The basis for the SMDSCS will be the supply chain of the wine industry and sustainability in its three dimensions: environmental, social and economic. Table 2 below presents the objectives and respective measurements (in brackets) that ought to be pursued by each of the players that takes part of the industry's supply chain in order to achieve sustainability of the vineyard. The approach takes into consideration only upstream and downstream activities of the supply chain. The level of sustainability is therefore dependent on the strategic coherence and performance alignment of the company. Hence sustainability is to be achieved to the extent that the interrelationships that exist among the company objectives and their respective performance indicators are duly identified and matched. The latter should ensure a positive impact on the economic results of the vineyard.

Axis operations and sustainability	Suppliers	Vineyard	Distributor
Operations	1) Develop high quality suppliers. (Right quality grapes percentage) 2) Achieve just in time delivery. (New demand response time) 3) Reduce logistic costs of reception. (Electronic buys percentage) 4) Increase productivity. (Resources utilization percentage)	1) Reduce production costs. (Cost per unit of production) 2) Improve processes continuously. (Percentage of defective products) 3) Improve capacity used in fixed assets. (Process duration) 4) Identify new products. (Number of new products) 5) Develop rapport with customers. (Qualification provided by Premium customers)	1) Improve the quality of the delivered products. (Percentage of flawless products delivered) 2) Improve delivery cycle time. (Delivery cycle time). 3) Reduce logistic costs of delivery. (Storage and delivery cost to customers) 4) Increase productivity. (Resources utilization percentage)
Social	1) Own codes of ethics. (Own codes of ethics) 2) Respect the workers. (Rates of injury, occupational diseases, lost days) 3) Increase engagement with the community. (Number of Community programs)	1) Improve working conditions. (Rates of injury, occupational diseases, lost days, and absenteeism) 2) To increase engagement with the community. (Amount of community support programs) (3) Consumption healthier and safer. (Solution of potential problems arising from products) 4) Respect for the privacy of consumers. (Claims for misuse of customers' information)	1) Own codes of ethics. (It has a code of ethics. Displays ethical practices) 2) Respect the workers. (Rates of injury, occupational diseases) 3) Increase engagement with the community. (Amount of community support programs)
Environmental	1) Increase the quality and use of water. (Percentage of technified irrigation systems use) 2) Improving the management of solid waste. (Total weight of waste by type and disposal method) 3) Increase energy efficiency. (Initiatives to provide energy-efficient or renewable energy based products and services) 4) Reduce greenhouse gases. (Initiatives to reduce greenhouse gas emissions and reductions attained)	1) Increase the quality and use of water. (Percentage of technified irrigation systems use) 2) Improving the management of solid waste. (Total weight of waste by type and disposal method.) 3) Increase energy efficiency. (Initiatives to provide energy-efficient or renewable energy based products and services) 4) Reduce greenhouse gases. (Initiatives to reduce greenhouse gas emissions and attained reductions. 5) Reduce the use of chemicals. (Percentage of chemicals use).	1) Increase energy efficiency (Initiatives to provide energy-efficient or renewable energy based products and services).

Table No. 2: Proposal of structural objectives of the SMDSCS

6. CONCLUSIONS

The need for a more effective and efficient use of resources in the wine industry supply chain must be accompanied by the means to measure not only economic and environmental performance metrics but also the social ones in order to achieve true sustainability. Based on the work carried out, it can be concluded that it is feasible to propose a conceptual design for a sustainable performance measurement system for the wine industry's supply chain (SMDSCS). Such a system is expected to allow vineyards to manage their supply chain from both, the operational and the sustainability perspective of the vineyard. That is why, as a way to continue with the validation of the SMDSCS, we will implement the proposed system and validate its application in three Chilean vineyards which have already been contacted and have confirmed their interest in participating.

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