

Measuring the Industry Maturity of the South African Export Table Grape Industry

Corean de Bruyn, Gideon Salomon Horn, and Hendrik Robert Lloyd

Abstract—This paper measures the phase of industry maturity that the South African export table grape industry finds itself in. A combination of variables, and the interactions among these variables, indicate the stage of industry maturity. Based on the industry life cycle model, each variable has different characteristics in the four phases of maturity. Knowing the stage of maturity of the industry enables the various role-players to implement the necessary strategies to improve the industry's competitiveness in the international market.

Index Terms—Industry maturity, industry life cycle model, economic development, variables.

I. INTRODUCTION

South Africa is the sixth largest exporter of table grapes worldwide [1]. Over 85.0% of South African table grapes produced are exported and the bulk of these exports are destined for northern hemisphere countries during their winter and spring seasons. The majority of sales are by means of contractual agreements via preferred category suppliers to the large supermarket chains. Various export organizations or agents conduct work on the basis of consignment sales on behalf of the growers or packers. The industry operates in a deregulated environment where prices are determined by the market forces of demand and supply.

As such, the South African export table grape industry plays an important role in the South African agricultural sector. Reasons for the increase in table grape exports in recent years include the growth in the production of new cultivars and seedless varieties; the deregulation of the industry in 1997; access to more markets with the expansion of democracy; the emergence of new production techniques; post-harvest technology innovation; and more effective production inputs. The five main export table grape regions in South Africa are the Hex River Valley region, the Berg River region, the Olifants River region, the Orange River region and the Northern Province region.

The five regions contribute to a staggered harvest period. The Northern Province starts off the South African harvest period, followed by the Orange River region, which is also the second largest production region. The Olifants River region, the smallest production region, sets off its harvest period in the third place, followed by the Berg River region,

which is fourth. The last to begin harvesting and to finish the South African harvest period in week 20 is the Hex River region, which is South Africa's largest export table grape region. Climatic conditions and cultivar choices are the biggest determinants of the respective harvest times.

South Africa's main export destinations are the European Union, the United Kingdom, Africa, the Far East and Russia. The main cultivars exported are Crimson Seedless, Prime, Thompson Seedless, Flame Seedless, Sugraone, Redglobe and Autumn Royal [2]. With increased competition in the global market, there is a need to understand the industry life cycle and phase of maturity in which the South African export table grape industry finds itself in. By knowing the characteristics of each phase, role-players in the industry can identify the current phases of maturity and develop appropriate competitive strategies accordingly. Additionally, the knowledge will enable the South African industry to assess the phase of maturity of their major international competitors relative to their own phase.

The industry's phase of development, and therefore its state of maturity, depends on a number of variables that interact with one another. The obvious ones include the entrance of more competitors, new varieties, improved production and packing methods, as well as the overlapping of the harvesting times of its main competitors such as Brazil, Namibia, Peru, Argentina and Chile [3]. However, all the variables need to be identified to determine the industry's phase of maturity and assist with strategic decision-making and ultimately to enhance the industry's performance internationally.

This paper is based on a recently completed Master's study. The main purpose of the paper is to gain in-depth knowledge of the underlying variables in the South African export table grape industry with the aim of identifying the specific phase of industry maturity it finds itself in. This is done by analyzing the complexity and interaction of all the variables that are possibly present in and influence the maturity of the industry. In support of the primary objective, the secondary objectives are as follows:

- Based on the literature review, to identify as many variables as possible that are present in the industry that serve as indication of its maturity.
- To empirically identify and analyze the variables, and to test the differences of the identified variables among the five export table grape regions in South Africa.
- To construct a model hypothesizing the relationship between the variables and the maturity of the industry.

II. LITERATURE REVIEW

The literature review for this study was sub-divided into

The manuscript received April 22, 2019; revised October 13, 2019. This study and work was self-supported and financed in full by C. de Bruyn.

The authors are with the Nelson Mandela University, South Africa (e-mail: Gideon.Horn@mandela.ac.za).

the industry life cycle research and related previous research in the agricultural environment.

As in any industry, growth in the export table grape industry is not a linear process, but follows an S-shaped curve of innovation and the development of new products [4]. Although there are some slight differences, there is general consensus among development researchers regarding the existence and basic shape of the industry life cycle. From [5] using three phases, [6] identifying four phases, and [7] showing five phases, the movement from one phase to the next is generally described as being based on product and process innovation together with the entry and exit of competitors in the industry. All of the mentioned authors agree that each phase is characterized by a complex variety of elements of which innovation and competitor movement are but two of the elements.

Developing a competitive strategy is the main driving force for identifying the phase of maturity, and this is the application value of the industry life cycle model. The study conducted by [8] on the rationale for industry policy based on industry maturity, highlights the importance of incorporating as many of the variables as possible when attempting to identify the phase of maturity. Together with other analytical tools, for example, the comparative cost advantage analysis, the industry life cycle model is a powerful instrument for any business and industry to build and expand on for competitive strategies. Competitive strategies are critical for the survival and growth of all firms and industries.

However, research pertaining to the industry life cycle model application in agricultural produce has been limited to the study conducted by [9]. There appears to be a large gap in the agricultural sector with regard to published papers on identifying and analyzing industry maturity.

Porter's industry life cycle model of 1980 has been used and adjusted by many researchers to analyze the evolutionary path of a variety of industries. However, the original life cycle model, as developed by Porter, is still considered to be the cornerstone of life cycle analysis, and was a main focus point to measure the maturity of the South African export table grape industry. According to [10], the four phases of development of an industry are the introduction phase, the growth phase, the maturity phase and the declining phase [5].

Whereas the introductory phase is where producers try to build awareness about the product in a market where there is less or no competition, the growth phase is the period during which the product eventually and increasingly gains acceptance among consumers, the industry, and the wider general public. The product becomes accepted in the market, and as a result sales and revenues start to increase. A mature industry is characterized by standardized production processes, a significant decrease of entries and exits of producers, modern infrastructure, the achievement of economies of scale, expanded international competition, the emergence of forward and backward integration within the supply chain, transparency of information, high levels of product innovation, well-defined markets and sophisticated consumer preference. The declining phase of the product life cycle is the terminal stage where sales drop, production is ultimately halted, profitability falls eventually to the point where it is no longer profitable to produce, and production will stop.

A combination of variables, and the interactions among these variables, determine and indicate the stage of industry maturity. Each variable has different characteristics in the four phases of development and maturity. As was indicated earlier, knowing the stage of maturity of an industry enables the various role-players to improve their planning and implement the necessary strategies to improve the industry's competitiveness in the international market.

III. RESEARCH METHODOLOGY

To achieve the objectives of this study and to test the proposed hypotheses, both a secondary and primary study was undertaken. The secondary study consisted of a comprehensive literature review that was conducted to identify as many factors as possible that could indicate the phase of maturity of the South African export table grape industry. Sources of secondary data that were consulted, include text books, journal articles, industry publications, the internet and other published work.

For the primary research, a non-experimental quantitative design was adopted for this study with the aim to explore the field and to discover the main constructs and dimensions [11]. Based on the variables identified in the literature review, a questionnaire was developed and used as self-administered measuring instrument to obtain the necessary data for the study. Specifically, the measuring instrument gathered data on the characteristics which serve as indicators of industry maturity. The questionnaire had three sections to corroborate stratification validity and to identify both the phase of maturity of the industry as well as possible variations in the development in the five different production regions present in South Africa. The questionnaire was drafted, together with a covering letter, describing the purpose of the study to all the producers/managers who were willing to participate in the study. The anonymity of the questionnaires provided a non-threatening manner of collecting the data.

The target population was limited to the producers of export table grapes in the country. A randomly selected sample of 214 export table grape producers in the five main export table grape production regions completed the questionnaire. A cluster random sampling method was used as the population is naturally divided in geographic clusters and to reduce the likelihood of selection bias. The sample identified was proportionate to the size of the total study population and represented in excess of 70% of the total number of the export table grape producers in South Africa. Some 68% of the respondents have in excess of 21 years of experience in the export table grape industry.

To ensure the validity and reliability of the questionnaire, a pilot survey was conducted on a limited number of subjects from the target population. Errors that were detected were corrected and adjustments were made to the questionnaire where necessary. A revised questionnaire was then administered for the full sample.

An exploratory factor analysis (EFA) was used to disentangle the data obtained and identify the main variables that measure and determine the phase of maturity that the South African export table grape industry finds itself in [12]. The data collected was statistically analyzed using the computer software programs Microsoft Excel and Statistica.

The descriptive statistics were calculated with the purpose of describing the sample data from the measuring instrument and included the mean, standard deviation and frequency distribution.

A t-test was conducted to assess the possible differences in the development of the selected variables between the five export table grape regions. Pearson's Product Moment correlations were calculated for the purpose of investigating the correlations between the variables used in this study. The analysis was followed by employing Cronbach's coefficient alpha to confirm the reliability and internal consistency of the measuring instrument.

IV. EMPIRICAL RESULTS

Based on the literature review, a hypothetical model was constructed and used to investigate the variables which indicate the phase of maturity of the South African export table grape industry. The independent variables indicating the phase of industry maturity as they appear in the literature review, are: process innovation, entry and exit of producers, logistical infrastructure, economies of scale, international competition, standardization, integration, information transparency, product innovation, market structure and consumer sophistication.

The following hypotheses were prepared with the purpose of testing the relationships in the proposed hypothetical model:

H¹: The combined characteristics of the independent variables can be used to identify the specific phase of industry maturity of the South African export table grape industry.

H²: There are regional variations in development with regard to the first four independent variables, namely, *process innovation, entry and exit of producers, logistical infrastructure and economies of scale*.

H³: The remaining independent variables are in the same phase of development for the entire South African export table grape industry.

The exploratory statistical factor analysis revealed a reduction and regrouping of the items into six new factors. Descriptions and definitions as defined by [13] were used for renaming the factors. From the exploratory factor analysis that was used for further analysis, including descriptive statistics, only the following four distinct factors emerged as determining the specific phase of maturity of the South African export table grape industry: Manufacturing and Distribution; Demand; Research and Development; as well as Buyer Segmentation. The Cronbach's alpha revealed insufficient internal reliability for the other two of the six factors, therefore, only the four distinct factors mentioned, emerged. The other factors that were found to be valid, but not reliable, were thus excluded from further analysis.

As a result of the retaining, regrouping and renaming of the items into only four distinct factors, and the deletion of some factors, it was necessary to revise the hypotheses.

The revised hypotheses for testing in the model are as follows:

H¹: There are regional variations between the five export table grape regions in South Africa, for the development of *Manufacturing and Distribution*.

H²: There are regional variations between the five export table grape regions in South Africa, for the development of *Demand*.

H³: There are regional variations between the five export table grape regions in South Africa, for the development of *Research and Development*.

H⁴: There are regional variations between the five export table grape regions in South Africa, for the development of *Buyer Segments*.

In order to provide a better understanding of these four variables, they were analyzed both descriptively and by comparing them among the five export table grape regions in South Africa.

A. Manufacturing and Distribution

Manufacturing and Distribution reported the lowest combined mean score (3.419) of the variables analyzed. This means that there is considerable opportunity for growth in this sphere for the industry. The mean score also indicates that Manufacturing and Distribution has evolved beyond the introductory phase, but is still at the lower end of the growth phase. There are, however, significant differences between the five South African export regions.

The Hex River Valley region and the Olifants River regions respectively had mean scores of 3.979 and 3.939. In comparison the Orange River region had the lowest mean score of 2.822. This is a significant difference, indicating that the Orange River region is lagging in its development of Manufacturing and Distribution. The main reasons for the lag in its development of Manufacturing and Distribution is that the Orange River region is geographically the furthest removed from an export point. The region also experiences high congestion on its roads and a shortage of carriers to and from this region in peak season periods. In contrast, the Hex River Valley, Olifants River and Berg River regions are all relatively close to the main export harbour (Cape Town), allowing for a greater degree of freedom for development. Furthermore, extreme temperatures during harvest times along the Orange River influence harvest capabilities for this region. The other four export regions with more moderate day time temperatures have longer picking times and more leeway for manufacturing development.

The variability in the geographic and climatic conditions between the regions explain why 30.24 per cent of the sample group disagreed with the items indicating Manufacturing and Distribution development and 48.46 per cent agreed. The Orange River region is the second largest export region in South Africa, thus, the number of respondents from this region will influence the outcome for development of Manufacturing and Distribution.

B. Demand

Demand provided the second highest mean score for the industry as a whole, registering a score of 3.995. Although the t-test reported significant differences between the regions, both the t and p values were much smaller than for Manufacturing and Distribution, and all five regions turned up relatively high mean scores.

The Berg River region generated a mean score of 4.486 and in second place was the Olifants River region. The Orange River and Hex River regions follow in third and fourth position, respectively, with mean scores of 3.956 and

3.677. The Northern Province region trails with the lowest score of 3.392. The Northern Province region is South Africa's youngest export table grape region and is the least known to the industry's markets, which would most likely explain the lag.

Having a combined mean score of 3.995 indicates that export table grapes from South African producers have a loyal customer base. Added to the loyalty is an indication that the markets are still growing and that there is adequate opportunity for increasing the market share. Combined, these two indicators point to the South African export table grape industry being in the growth phase of the industry life cycle model.

C. Research and Development

A mean score of 4.242 was reported for Research and Development in the industry. Items measuring this variable recount that the South African export table grape industry is committed to ongoing research and development in harvesting techniques, as the industry is still extremely dependent on manual labour for harvesting the produce.

Additionally, market research is focused on the penetration of new markets. Broadening of the market base indicates that the industry has the capacity to further expand its supply, which is indicative of the South African export table grape industry being in the growth phase.

The Olifants River region leads the five regions with a high mean score of 4.591, closely followed by the Hex River region and the Orange River region, respectively, providing mean scores of 4.429 and 4.221. The Berg River region also offered a mean score of above four, at 4.076. Trailing, with the only region to have a mean score below four, is the Northern Province region delivering 3.923.

D. Buyer Segmentation

Buyer Segmentation in the South African export table grape industry presented a mean score of 3.806, meaning that the industry is exhibiting further characteristics of being in the growth phase of the industry life cycle model. As with Demand, the Olifants River region and the Berg River region came up with the highest mean scores. The Olifants River region reported a mean score of 4.545 and the Berg River region offered 3.954. Marginally behind the Berg River region was the Hex River Valley region with a mean score of 3.910.

Buyer Segmentation was the only variable in which the Northern Province region did not have the lowest mean score and reported a score of 3.706 in fourth place. Finally, in the last position, was the Orange River region with a mean score of 3.639.

Internationally, newer cultivars have been developed and cultivated which have, in part, been responsible for creating niche markets for the South African export table grape producers. These cultivars are, however, only available for production by producers who can get hold of the license from the developer to grow them and the number of licenses provided to the growers are limited.

Market segmentation was largely formed by export company efforts to search for special market conditions and sourcing table grapes from specially selected local producers. High quality specification associated with these and limited

cartons exported to these niche markets allow for higher realised prices for the producers.

V. CONCLUSION

From the investigation conducted, greater insights have been acquired into the South African export table grape industry. It is evident from the empirical results that the South African export table grape industry has evolved, markedly, since the introduction of table grape production in South Africa. The t-tests clearly indicate substantial variations in development among the five South African export table grape production regions. The five export table grape regions appear to be at different stages in the growth phase of the industry life cycle model. Each of the five regions has stronger areas of development and each area has aspects that need further development.

The southern regions, namely the Hex River Valley region, the Berg River region and the Olifants River region display higher levels of development than the Orange River region and the Northern Province region. The southern regions have been producing and exporting for a longer period of time than the other two regions. These regions have had time to accumulate experience and knowledge. The development of the Orange River region is possibly hampered by its poor geographic location and climatic conditions. This could, however, be an advantage, as the region will be forced to become more innovative if it wants to remain competitive.

The Northern Province region is the youngest region, but has the advantage of backwardness. This region can import already tried and tested methods, and accumulated knowledge from the other regions which will allow it to follow the path of evolution at an accelerated pace.

The lack of correlation among the variables indicates that different influencing factors are not functioning as an integrated system. In order for an industry to progress on the path of evolution, all the variables that contribute to the success of the industry must be more coordinated.

The industry is vibrant as much effort is put into being innovative and conducting research for growth and expansion. It is hoped that the results of this study will provide the South African export table grape producers with greater insight into the areas of the industry that need to be developed with the purpose of maintaining international competitiveness. A foundation has been laid for further research to be conducted in the industry life cycle of the South African export table grape industry.

As far as recommendations for further research are concerned, disentangling and clearly defining variables which serve as indication of the specific phases of maturity, should improve the ability of researchers to identify industry maturity. Additionally, research focused on developing a standardized framework and measuring instrument is recommended.

Furthermore, research on the reasons for the uncoordinated nature of the influential variables of the South African export table grape industry is recommended. Research on measuring the pace of possible accelerated growth for the two regions that are lagging behind, namely, the Orange River region and the Northern Provinces region, is also recommended.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Author A was the Master's student who conducted the research, collected the data and analyzed the data.

Author B was the supervisor for the Master's study and wrote the paper.

Author C was the co-supervisor for the Master's study.

All the authors had approved the final version.

REFERENCES

- [1] South African Table Grape Industry (SATI). (2016). [Online]. Available: <http://www.sagti.co.za/>
- [2] Department of Agriculture Forestry & Fisheries (DAFF), *A Profile of the South African Table Grape Market Value Chain*, Arcadia: Directorate Marketing, 2015.
- [3] Department of Agriculture Forestry & Fisheries (DAFF), *A Profile of the South African Table Grape Market Value Chain*, Arcadia: Directorate Marketing, 2014.
- [4] M. E. Porter, *Competitive Strategy, Techniques for analysing industries and competitors with a new introduction*, New York: Free Press, 1989, pp. 147-158.
- [5] R. Vernon, "International investment and international trade in the product life cycle," *Quarterly Journal of Economics*, vol. 80, no. 2, pp. 190-207, May 1966.
- [6] M. E. Porter, *Competitive Strategy. Techniques for Analysing Industries and Competitors with a New Introduction*, New York: Free Press, 1989, pp. 147-158.
- [7] M. Gortand and S. Klepper, "Time paths in the diffusion of product innovations," *The Economic Journal*, vol. 92, no. 367, pp. 630-653, 1982.
- [8] F. Liversey, "Rationales for industry policy based on industry maturity," *Springer Science and Business Media*, pp. 349-363, May 2011.
- [9] S. Bano and F. Scrimgeour, "New Zealand kiwi export performance: Market analysis and revealed comparative advantage," Working Paper in Economics, Hamilton: University of Waikato.
- [10] M. E. Porter, *Competitive Strategy. Techniques for Analysing Industries and Competitors with a New Introduction*, New York: Free Press, 1989, pp. 147-158.
- [11] P. Kline, *An Easy Guide to Factor Analysis*, London: Routledge, 1994, pp. 1-22.
- [12] D. George and P. Mallery, *SPSS for Windows step by step: A simple Guide and Reference*, Boston: Allyn and Bacon, 2003, pp. 134-246.
- [13] R. M. Grant, *Contemporary Strategy Analysis*, London: John Wiley & Sons Ltd., 2010, pp. 270-271.

Copyright © 2019 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)).



Corean de Bruyn is currently a lecturer in the Department of Economics at the Nelson Mandela University. She obtained her master's degree in economics in 2019 from the Nelson Mandela University. She lectures in economics and logistics.



Gideon Salomon Horn retired as the head of the Department of Logistics at the Nelson Mandela University. He obtained his doctor degree of commerce in economics in 1991 from the Nelson Mandela University. His research interests include economic development, logistics and supply chain management. Gideon Salomon Horn is an emeritus professor. His publications include the following:

G. S. Horn, *Supply Chain Management: A Logistics Approach*, Cape Town: Oxford University Press, 2015.

G. S. Horn, M. E. Horn, and H. R. Lloyd, "Key safety, security and service measures required for the successful quality management of a guesthouse," *African Journal of Hospitality, Tourism and Leisure*, September 2015.

G. S. Horn, M. Mokheseng, and A. G. Klopper, "Supply chain solutions to improve the distribution of antiretroviral drugs (ARVs) to clinics in rural areas: A case study of the QwaQwa District," *Health SA Gesondheid*, February 2017.



Hendrik Lloyd is currently the dean of the Faculty of Business and Economic Sciences. He obtained his doctor degree of commerce in economics in 1995 from the Nelson Mandela University. His research interests include development economics, regional economics and managerial economics. His publications include the following:

H. R. Lloyd and C. Ettmayr, "Local content requirements and the impact on the SA renewable energy sector: A survey-based analysis," *South African Journal of Economic and Management Sciences*, 2016.

H. R. Lloyd and S. van Zyl, "Private sector implementation of responsible tourism: Stake's instrumental case study approach," *SA Journal of Hospitality, Tourism and Leisure*, 2017.

H. R. Lloyd and M. Mey, "Ethics and organizational culture," *Global Encyclopedia of Public Administration, Public Policy and Governance*, 2018.