Non-parametric analysis for the explanation of competitive advantage through innovation and environmental management[1]

Análisis no paramétrico para la explicación de la ventaja competitiva a través de la Innovación y la gestión ambiental

Análise não paramétrica para justificar a vantagem competitiva através da inovação e da gestão ambiental

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Abstract

The purpose of this work is to measure the relationship of innovation and environmental management with the competitive advantage of avocado exporting companies located in Uruapan, Michoacán, Mexico. This research has a qualitative-quantitative, descriptive, correlational design. Literature was reviewed to generate the model of variables for this study, the measurement instrument was prepared, and 211 questionnaires were applied. An exploratory and confirmatory analysis was carried out with the information gathered, the SPSS 23.0 and the SMARTPLS-SEM softwares were used, the Spearman's correlation was measured for non-parametric variables, and the proposed hypotheses were verified. Competitive advantage has a relationship with innovation and environmental management; however, the variable that most affects competitive advantage is innovation. In addition, the evaluated model has adequate adjustments; therefore, the results coincide with the existing theory. This document makes a significant contribution to the measurement, since the correlation of the entire model of variables is measured, that is independent variables, dimensions, and indicators, identifying with greater precision the existing relationship, which can give certainty in decision making. The limitations were mainly the access to the research subjects, since distrust and fear are constant in these people due to the presence of organized crime.

Keywords: competitive advantages, environmental management, innovation

Resumen

El propósito de este trabajo es medir la relación de la innovación y la gestión ambiental con la ventaja competitiva de las empresas exportadoras de aguacate ubicadas en Uruapan, Michoacán, México. Esta investigación tiene un diseño cualitativo-cuantitativo, descriptivo correlacional, se revisó la literatura para generar el modelo de variables para su estudio, se elaboró el instrumento de medición, se aplicaron 211 cuestionarios, con la información se realizó un análisis exploratorio y confirmatorio, la Se utilizó SPSS 23.0 y el SMARTPLS-SEM, se midió la correlación de Spearman para variables no paramétricas, se verificaron las hipótesis propuestas. La ventaja competitiva tiene relación con la innovación y la gestión ambiental, sin embargo, la variable que más incide en la Ventaja Competitiva es la innovación, además el modelo evaluado tiene unos ajustes adecuados, por lo que los resultados coinciden con la teoría existente. Este documento hace un aporte significativo a la medición, ya que se mide la correlación de todo el modelo de variables, es decir. Variables independientes, dimensiones e indicadores, identificando con mayor precisión la relación existente y que puede dar certeza en la toma de decisiones. Las Limitaciones fueron principalmente el acceso a los sujetos de investigación, ya que la

desconfianza y el miedo son constantes en estas personas por la presencia del crimen organizado.

Palabras clave: Ventajas competitivas, gestión ambiental, innovación

Resumo

Este trabalho visa medir a relação da inovação e da gestão ambiental com a vantagem competitiva das empresas exportadoras de abacate localizadas em Uruapan, Michoacan, México. Esta pesquisa foi feita com um desenho qualitativo-quantitativo, descritivo-correlacional, a bibliografia foi avaliada para gerar o modelo de variáveis para estudo, desenvolveu-se o instrumento de medição, aplicaram-se 211 questionários, realizou-se uma análise exploratória e confirmatória com as informações, utilizou-se o SPSS 23.0 e SMARTPLS-SEM, mediu-se a correlação de Spearman para variáveis não paramétricas e verificaram-se as hipóteses propostas. A vantagem competitiva relaciona-se à inovação e à gestão ambiental, entretanto, a variável que tem maior impacto sobre a vantagem competitiva é a inovação e o modelo avaliado contém ajustes adequados, de modo que os resultados coincidem com a teoria existente. Este documento contribui significativamente para a medição, pois mede a correlação de todo o modelo de variáveis, isto é, variáveis, dimensões e indicadores independentes, identificando com maior precisão a relação já existente que pode conferir certeza na tomada de decisões. As limitações foram acima de tudo o acesso aos tópicos de pesquisa, pois a desconfiança e o medo são constantes entre essas pessoas devido à presença de organizações criminosas.

Palavras-chave: Vantagens competitivas, gestão ambiental, inovação.

Introduction

Achieving a competitive advantage admits that a company must build a unique position, but this way of thinking is related to a partially stable environment. However, it is difficult to forecast the implications of business changes, which translate to swaps in both business and the environment. (Sołoducho-Pelc & Sulich, 2020). It is known that the dynamic of the current world is constantly evolving, due to growing competition and the incessant search of companies to satisfy customer needs; in recent years, among other factors, environmental management has gained more importance and requires more planning and investment. Factors such as increasing customer expectations, the globalization of competition, and technological advancement have made organizations manage their creative processes through innovation so that they can maintain their market share and obtain economic growth.

Having a competitive advantage places an organization in an ideal position to build and maintain a unique position, however, this concept is given with a predictable and relatively stable environment. This makes it very difficult to intuit the derivations of the changes in the companies, which lead to modifications in the actions of the business as well as in the environment. (Sołoducho-Pelc & Sulich, 2020). Oftentimes, today's businesses of all types and sizes face very complicated challenges, differentiated by constant renewal and uniqueness, extensive reach, and exaggerated volatility due to pressure on business (Beliaeva et al., 2019). In coincidence with the above, academics and researchers highlight the emergence of new competitors and the perpetual search of corporations to meet the needs of buyers; these are two of the main reasons that preserve the unstable activity of the market, therefore, strategic actions must be aimed at achieving or maintaining competitive advantage (Eller et al., 2020), directly causing a social, economic and environmental impact. However, the vertiginous financial growth and the constant change of the general conscience of the consumer towards the care of the environment have also caused modifications to the rules of business competition and the commercial models of global manufacturing (Dechezlepretre & Sato, 2017).

The vertiginous advance of knowledge economies, the continuous shrinkage of product life cycles, and the complicated and ephemeral needs of consumers have led to more accelerated market competition, highlighting the importance of innovation (Coccia, 2017) to face the changing environment. It is widely accredited that competitive advantage is one of the key concepts in strategic management as it establishes the competitive position of the institution and gives it the ability to establish a defensive position against its competitors. And in some cases, competitive advantage is an important component that drives innovation in the organization (Distanont & Khongmalai, 2018). Therefore, competitive advantage stems from the unrivaled and valuable possession of scarce resources, as well as from relationships with customers and suppliers (Chahal & Bakshi, 2015). However, a competitive advantage does not come from any individual resource but through the combination and integration of a set of resources.

Through the continued use of competitive advantages, these become better and more difficult for competitors to understand and imitate. This allows companies to achieve a permanent competitive advantage (Barney J., 1991). In this study, we draw on the lens of innovation and environmental management to develop a vision that these activities would be important sources of competitive advantage for companies. The company's competitors form a competitive network from

which you can gather information on innovative ideas, product markets, and related industries. This information helps you gauge market opportunities, update your resource base, and eventually strengthen your competitive advantage (Wang, & Gao, 2020). The purpose of this study is to analyze and measure the relationship between innovation and environmental management as a distinctive source of competitive advantage for avocado exporting companies located in Uruapan, Michoacán, which are exporting to the North American market.

A company's competitive advantage is used as a primary determinant for its performance and duration (Leiblein, Chen, & Posen, 2017). How organizations achieve and maintain a competitive advantage is the fundamental argument in the strategic management scene. Abundant lines of research on this topic have pointed to the role of a company's competitors. The emergence of new contenders can wear out the leaders' excellent capabilities or affect their positions in the market, mainly in systems of alternate change in the environment (Wang & Gao, 2020). An exploration of the theory shows that numerous scientists have been involved in the competitive advantage discussion so far. And the concept of competitive advantage is recognized in the field of strategic management (Sigalas, 2015). The established strategic management helps the corporation in exploring possible solutions to the changes that are typical of the current moment (Švárová & Vrchota, 2014). Therefore, the basic objective of strategic management is to create a competitive advantage as the most important circumstance for business success. All the potential of the company is aimed at achieving this objective through daily executing decisions based on a long-term strategy. Competitive advantage is one of the key concepts in the literature that determines the firm's competitive position and gives the organization the ability to create a defensive position against its competitors (Safari et al., 2020). The concept of competitive advantage has taken a center stage in business strategy discussions. Statements about competitive advantage abound, but a precise definition is elusive. The competitive advantage that some companies have achieved through the adoption of the strategy has its beginnings in the basic concept of the late 1930s, called "competitive adaptation" (Alderson, 1937), in which, intellectual activities and relationships with suppliers are the main sources of competitive advantage. This is one of the first pieces of literature on competition in which the author stated that a fundamental aspect of competitive adaptation is the specialization of suppliers to meet the variation in buyer demand. Competitive advantage is defined as: "Having superior skills and resources constitutes the launching pad of competitive advantage for companies." (Serhan et al., 2015). These sources are recognized as

structural determinants or cost or differentiation advantage drivers. Therefore, current companies are required to identify and manage the needs of buyers, develop products and services demanded by those customers, and focus on delivering product value to customers (Shehata & Montash, 2020). It should be noted that in the field of strategy, the company can achieve temporary competitive advantage or sustained competitive advantage.

Innovation has been recognized over time as a generator of competitive advantage and development. In this sense, the relationships between competitive advantage and innovation, highlight the need for an innovation process for the competitiveness of companies; these heve been abundantly studied in the literature (Battisti et al., 2020). Unquestionably, science is a conduit to an end that can be assembled in different ways, but the focus must be on what consumers want. The private sector knows it, but the public sector often seems to be unaware of it. The need to innovate is not trivial (Campos, 2021).

Similarly, the literature on strategic management shows that pioneer companies in innovation catalyze their performance and, therefore, competitive advantage (Bäckström & Bengtsson , 2019). Likewise, unlike the company's exercise (banking, services, operational), practical studies have paid a lot of attention and have collated the supposed positive effect of innovation on competitive advantage (Hon & Lui, 2016). Indeed, to innovate and gain sustained competitive advantages in the market, companies must take advantage of other intrinsic elements, such as knowledge (Wang et al., 2010). To mitigate the concentration of competition, innovation is a significant component that promotes competitive advantage (Distanont & Khongmalai, 2018). And in the face of today's global market scenario, explained by the sudden change in buyers' predilections, the increase in competitive challenges, short product lifetimes, and temporary advantage, it is necessary to have the ability to respond and innovate (Chih, 2019). That is why constant innovations are the primary sources of sustainable competitive advantage (Distanont & Khongmalai, 2018).

In addition, the degree of innovation is related to the culture of organizational learning and decision-making, which can harm the survival of the organization and its long-term development (Abeysekara et al., 2019). It is unavoidable to emphasize that, although the opportunities for innovation are enormous, they are not automatic. There are also growing demands for innovation, not only to support progress and job creation but also to face a wide range of social and global challenges. However, currently, very scarce research and innovation funds are explicitly related to programs of Environmental Development (OECD, 2018).

There is no doubt that innovation plays a decisive role in achieving transcendental competitive advantages in improving and sustaining business performance (Becheikh et al., 2006). In addition, the most innovative and successful companies have evolved in their approach by managing innovation due to changes in the external environment, in an attempt to safeguard or boost their competitive advantage (Ortt & Smits, 2006). It should be noted that individual creativity as the main element for innovation is key to innovation at the organizational level (Shanker et al., 2017).

The foregoing produces the capacity to innovate in the company, which enables efforts to use and process technologies to develop new products that meet the needs of the market and, therefore, exclude competitive threats (Ferreira & Coelho, 2020). Innovation is referred to as the insurmountable endogenous element that provides the possibility for all companies to achieve and maintain a sustained competitive advantage, even in a situation of limited resources (Ren et al., 2010). The full implementation of the innovation strategy will positively affect the competitive advantage (Tu & Wu, 2020).

Resource use and emissions as a result of population and economic growth have increased the burden on the environment (United Nations, 2019). Currently, the scientific evidence of harmful effects and undesirable social and environmental effects has been accentuated. As a result of this trend, external pressure has increased on companies to react to these challenges and deal with issues concerning climate change and social and environmental degradation (El-Kassar & Singh, 2019). Faced with this scenario, it has been observed that nations and companies show a progressive trend toward caring for the environment (Eurostat, 2020), and this is supported because environmental management is linked to greater profitability, efficiency, and competitiveness. Consistent with this view, there are explanations as to why environmental management can establish a competitive advantage by offering products manufactured taking care of the environment, as this is an efficient way to take advantage of the opportunities linked to the increase in customers who are concerned about the environment and society. Therefore, it can affect product differentiation, increase the consumer base, and achieve a better brand positioning (Hermundsdottir & Aspelund, 2020). There is evidence of the frequent interest and work of academics and researchers to determine the dependency between environmental management and competitive advantage, however, the findings have been fragmented and inconclusive (Rezende et al., 2019). Similarly, more and more managers discover that the development of new products must show more ecological characteristics

(Zameer et al., 2020). In this sense, First and Khetriwal (2015) examined the role of environmental guidance and its impact on brand equity. Similarly, Yu and Huo (2019) investigated the extent to which the company's environmental orientation is paramount to suppliers' green management practices. Some others focused on investigating the relationship between environmental orientation and the sustainable performance of companies (Keszey, 2020). The execution of internal corporate initiatives of environmental management demands productive change management, support, and qualification, including good dissemination systems. Green leaders can introduce effective green policies with explicit goals, with the dedication of their leaders, upper and middle management, and together with their staff, everyone should be involved in the procedures and explicit propagation of interests, including procedures to all involved personnel. This should provide the verification and preservation of environmental management strategies (Amoako, 2020).

With all the aforementioned, caring for the environment and its impact on business allow us to have a clear vision of contemporary changes in competitive advantage. This is a compelling and true reason because environmental issues are currently significant representative of current business conditions and in the future (Berchicci & King, 2007). Some research has argued that a proactive environmental strategy creates entry barriers for competition and is a source of competitive advantage in markets (Aragon-Correa & Sharma, 2003).

It is irrefutable that Mexico is a leader in avocado production and exportation; however, when analyzing its success in detail, weaknesses are revealed in Michoacan avocado exporting companies. The main avocado consumption market in the world is the United States of America, this makes it attractive for avocado producers around the world, unleashing a frontal battle between the main producing countries to export avocados to that destination. The total volume of conventional Hass avocados sold in the United States during 2018 grew to 2.48 billion pounds, representing an increase of 19.6% over the previous year, making this the largest year in history. Furthermore, if the increase in consumption is maintained at current levels, the production system will not be able to supply the current rate of demand growth (Board, 2018). Among the most important competitors, at the international level, for Mexican avocado producers are Peru, Chile, the Dominican Republic, and recently Colombia. In the North American market, and as a permanent competitor, avocados are grown in California (Tridge, 2020).

In addition, an internal weakness of Michoacan avocado producers is productivity. They are not the most efficient in the production of avocado per hectare. According to the report of the Food and Agriculture Organization of the United Nations (FAO), the countries with the highest yields in avocado production in the world are Samoa with 29.8 tons per hectare, Morocco with 26.3, Dominican Republic with 25.9, Peru with 10.8, Mexico with 10.1, and Chile with 4.3 tons per hectare (FAO, 2019). The most recent competition was introduced by avocado producers in the state of California: they created a new type of avocado called GEM, which is a variety with high production per hectare that allows an efficient harvest (freshplaza, 2020). The introduction of this new avocado represents high competition for all avocado producers that sell their product in the North American market, but mainly for Michoacan producers.

Methodology

This is scientific research and its design is non-experimental, hypothetical deductive-inductive, and descriptive-correlational. In this work, we seek to measure the degree of relationship between the independent variables innovation and environmental management with the dependent one, competitive advantage. The literature was examined and the theoretical model of variables under which this research was carried out was built.

The universe of the study was formed by the avocado exporting companies, located in Uruapan, Michoacán, and the research subjects are the owners, managers, administrators, or the head of the production of the avocado exporting companies. The representative sample was calculated with a 95% confidence level and a maximum error level of 5%. The sample was made up of 211 companies. A 54-item measurement instrument was developed to collect the information; it comprised 10 sociodemographic questions and 44 questions to measure the two independent variables: innovation and environmental management. In addition, a Likert-type scale of five intervals was used, which goes from the minimum value 1 corresponding to the very low range, 2 to the low range, 3 to the medium range, 4 to the high range, and 5 to the very high range. Once the questionnaire was available for the research, a pilot test was carried out, for which 16 questionnaires were applied among the different companies. People surveyed made some observations in relation to the writing and quantity of the questions as well as about the technical language of the variables used. Finally, 211 questionnaires were applied. The SPSS was used to perform the analysis of the sociodemographic variables, the Cronbach's Alpha was measured, and the

correlation between the entire research model, independent variables, dimensions, and indicators against the dependent variable was measured after preparing the data. The exploratory factor analysis (EFA) was carried out, whose main purpose is to evaluate the construct validity of an instrument when it is being initially developed, in addition to establishing an underlying structure between the analysis variables, based on correlation structures between them or define groups of variables (better known as factors) that are highly correlated with each other. The EFA was carried out with the KMO tests and Bartlett's sphericity test and the matrix of rotated components, which provided the factorial load of the items in the respective variables, eliminating the items that did not comply with the respective factorial load, leaving a total of 33 items to carry out the confirmatory factor analysis for which the Smart-PLS software was used, the structural equation model to compare the results of the investigation with the existing theory.

Results

In this section the results are shown, which are exposed according to the stated objective: Table 1 shows the level of academic preparation of avocado nurserymen, producers, and packers, with a higher education level in packers, since 81.8% have a bachelor's degree and 18.2% a master's degree.

Table 1. Level of studies

	Basic education	Middle education	Bachelor's degree	Master's degree	Total
Nurserymen	46.7%	50.0%	3.3%	0.0%	100%
Producers	10.0%	42.0%	42.0%	6.0%	100 %
Packers	0.0%	0.0%	81.8%	18.2%	100 %

Source: Own elaboration with research data

Table 2 shows the positions ofthe surveyed research subjects in the different avocado companies (nurserymen, producers, and packers), inferring that the information is relevant due to the experience and knowledge of the people surveyed.

Table 2. Position held in the company

	Management advisor	Owner	Operations manager	General manager	Total
Nurserymen	0.0 %	100 %	0.0 %	0.0%	100 %
Producers	48.0 %	52.0%	0.0 %	0.0%	100 %
Packers	4.5%	0.0%	18 %	77.5 %	100 %

The Cronbach's alpha was measured, and the alpha coefficient can be used as an index of the internal robustness of the measurement instrument. The results that were obtained were the Alpha of the total instrument and the Alpha by nurserymen, producers, and packers; Table 3 shows these results.

Table 3. Cronbach's Alpha (reliability)

Element	Cronbach's Alpha
Total questionnaire0	0.982
Nurserymen	0.940
Producers	0.933
Packers	0.988

Source: Own elaboration with research data

Spearman's Correlation Analysis

Spearman's correlation coefficient is a non-parametric measure; it measures the strength and direction of the association between two classified variables. This coefficient is used when one or both scales of measurement of the variables are ordinal. The Spearman's correlation coefficient provides a range that allows us to easily identify the degree of positive or negative correlation that two variables have. Table 4 shows the correlation results of the of the measurement of independent variable differentiation, dimensions, and indicators against the dependent variable.

Highlighting the relationship between the indicators of environmental management.

Table 4. Spearman's Correlation Analysis

Dependent variable	Independent variable	Dimensions	Indicators	
Competitive advantage	Differentiation 0.954	Environmental management 0.685	Supplies	0.332
			Legislation	0.314
			Processes	0.271
		Innovation 0.662	Product Innovation	0.456
			Process Innovation	0.495
			Organization Innovation	0.601
			Marketing Innovation	0.568
			Design Innovation	0.614

Source: Own elaboration with research data

Exploratory Analysis Factor

The term exploratory factor analysis can refer to both a set of statistical techniques and a unique method of interdependence (Kahn, 2006), which is used in order to reduce a large number of operational indicators in a lower number of conceptual variables, it is also a data reduction technique used to find homogeneous groups of variables from real variables. It minimizes the number of variables that have saturation between each factor and simplifies the interpretation of the factors, optimizing the solution per column.

Table 1. Results of the exploratory factor analysis

Innovation	Factorial load	Environmental management	Factorial load
P83	0.809	P153	0.806
P92	0.772	P146	0.757
P85	0.745	P155	0.751
P93	0.744	P147	0.743
P97	0.733	P150	0.736
P96	0.724	P149	0.735
P89	0.713	P156	0.731
P84	0.707	P151	0.716
P76	0.701	P158	0.712
P77	0.699	P145	0.682
P95	0.697	P143	0.660
P90	0.676	P144	0.656
P81	0.666	P154	0.641
P100	0.651	P157	0.568
P80	0.628		
P86	0.576		
P99	0.573		
P82	0.544		
P78	0.506		

Source: Own elaboration with research data

Table 5 shows the results of the Exploratory Factor Analysis (EFA). Before performing the EFA, we performed the Bartlett sphericity test and obtained the measure of sample adequacy of Kaiser-Meyer-Olkin (KMO). To assess the suitability of our data, the KMO value is 0.855, and the Bartlett's test of sphericity = 2407.328 indicated that the data were adequate for EFA. The exploratory factorial study through the test of the rotated component matrix revealed that several items showed a factorial load lower than 0.50. As it had been predisposed for this study, these elements were removed from the study due to their low scores. For the purposes of this research, factor loadings greater than 0.50 were considered practically significant. Using this threshold, we found that 19 items

loaded adequately in the innovation variable, and 14 items loaded in the same way aligned to the environmental management variable.

Confirmatory Analysis Factor

Figure 1 shows the estimation of the designed model. This is the first step of the evaluation process proposed by Hair, Hult, Ringle, and Sarsted (2017). It contains three theoretical constructs (latent variables) graphically represented by a circle. The Environmental Management (GA) variable and the Innovation (I) variable are exogenous constructs that take on the role of predictor variables, and the Competitive Advantage (VC) variable represents the endogenous construct that is going to be predicted.

Various manifest variables (items) represented graphically with rectangles are also observed. In this case, the items are reflective indicators because they are expressed as a function of the construct, in other words, they are manifestations of the unobserved variable, as graphically indicated by the unidirectional arrows that relate the construct to its indicators (from the circle to the rectangles).

The estimated model shows the different loads that the indicators have with their respective latent variable, it also shows the relationship that exists between the independent variables and the dependent variable. The relationship between constructs is called the path coefficient and is shown in Table 6. Within the table, the values shown in the Competitive advantage column are the standardized coefficients of the relationships between the exogenous constructs with the endogenous construct through their indicators and the constructs created, each of these coefficients represents the strength of the relationship.

Table 6. Path coefficients of the model

	Environmental management	Innovation	Competitive advantage
E. management			0.204
Innovation			0.692
Competitive advantage			

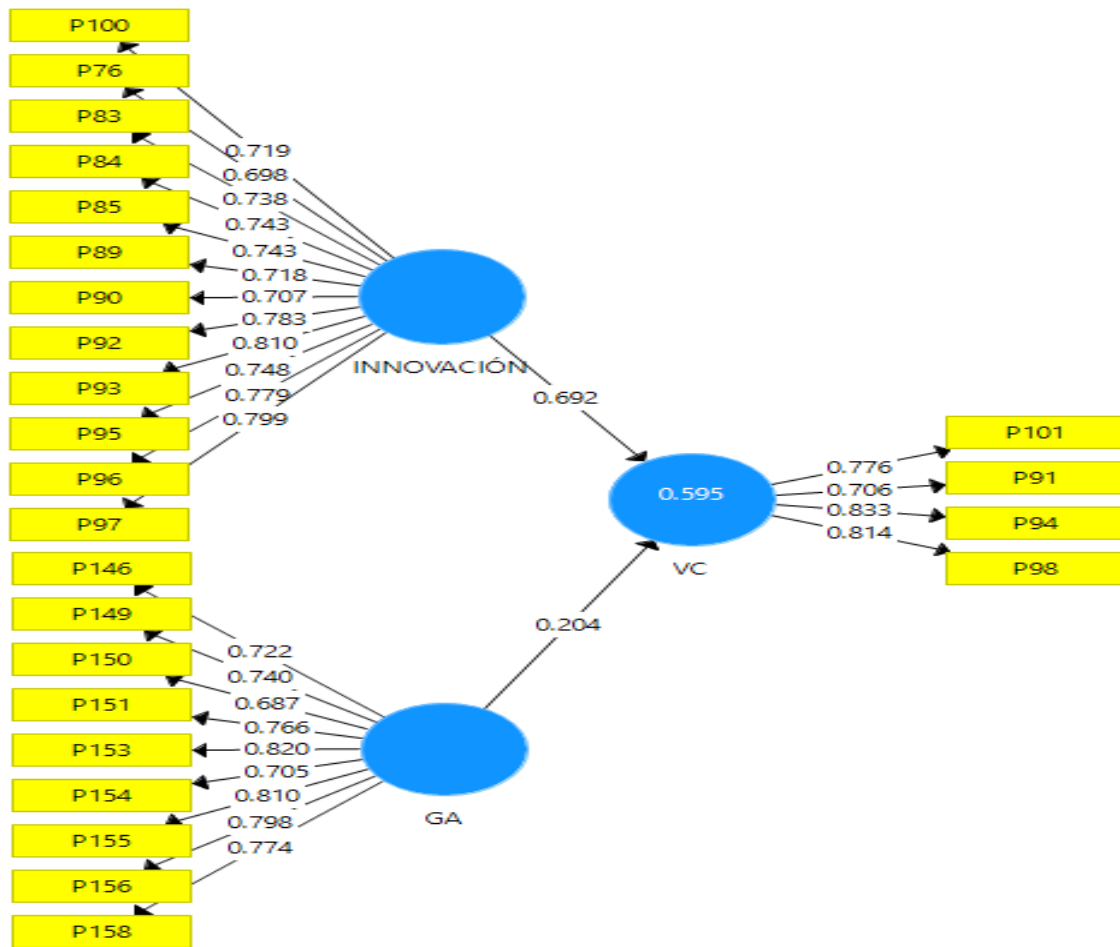Source: Own elaboration with research data

Figure 1. Estimated SEMPLS model

Source: Own elaboration with research data

The first step to evaluate the measurement model consists of analyzing the external loads (λ) of the items, that is, the simple correlations of the indicators with their construct. For this, an analysis of factors is carried out following the following criteria: if the indicator has a load equal to or greater than 0.707, it must necessarily be kept within the construct; if the indicator load is less than 0.40, the item must be eliminated from the construct; and if the load of the indicator is between 0.40 and 0.707, it must be decided whether the item is eliminated or remains according to its effects on the composite validity of the model (Hair et al., 2017). With the model data, the external loads for each item were estimated and their values are shown in Table 7. The results show that the items of the three constructs have loads greater than 0.40 and their contribution to the model is significant, which is why its permanence is necessary.

Table 7. External Loads

	E. management	Innovation	Competitive advantage
P146	0.722		
P149	0.740		
P150	0.687		
P151	0.766		
P153	0.820		
P154	0.705		
P155	0.810		
P156	0.798		
P158	0.774		
P100		0.719	
P76		0.698	
P83		0.738	
P84		0.743	
P85		0.743	
P89		0.718	
P90		0.707	
P92		0.783	
P93		0.810	
P95		0.748	
P96		0.779	
P97		0.799	
P91			0.706
P94			0.833
P98			0.814
P101			0.776

Source: Own elaboration based on the results of the estimated model

The next criterion used to evaluate the measurement model is the internal consistency reliability analysis. To do this, the value of Cronbach's Alpha coefficient and the composite reliability measure are studied. The Cronbach's Alpha coefficient is an estimate of reliability based on the intercorrelations of the indicators of the constructs (Hair et al., 2017). The accepted value for this coefficient is 0.7 for a modest level of reliability in the early stages of research and 0.9 for basic research (Nunnally, 1978).

For its part, the composite reliability (ρ_c) has the advantage of not being influenced by the number of items in a scale since it uses the loads of the items as they exist in the causal model (Fornell and Larcker, 1981). The ρ_c assumes results that vary between 0 and 1. The higher the value of ρ_c, the higher the level of composite reliability. A composite reliability level between 0.60 and 0.70 is considered acceptable in exploratory research. In advanced stages of research, the value of ρ_c should preferably be between 0.70 and 0.90 to be satisfactory (Hair et al., 2017). The results of the estimation of Cronbach's Alpha and the composite reliability are shown in Table 8. As can be seen, the value of the Cronbach's

Alpha coefficient and the value of the composite reliability measure are greater than 0.70 in each of the three constructs studied, this demonstrates the validity and internal consistency of the variables.

Table 8. Internal consistency reliability of the model

	Alfa de Cronbach	Composite reliability
E. management	0.909	0.924
Innovation	0.929	0.939
Competitive advantage	0.791	0.864

Source: Own elaboration based on the results of the estimated model

To evaluate the convergent validity of the model, the Mean Extracted Variance was used (AVE). The AVE is a measure that provides the amount of variance that a construct obtains from its indicators relative to the amount of variance due to measurement error. The AVE values must be equal to or greater than 0.50, thus ensuring that the construct explains at least half (50%) of the variance of the indicators (Fornell and Larcker, 1981), see Table 9.

Table 9. Average Variance Extracted

	AVE
E. management	0.576
Innovation	0.562
Competitive advantage	0.614

Source: Own elaboration based on the results of the estimated model

To globally evaluate the model (Henseler et al., 2016), the standardized root mean squared residual (SRMR) is used (Hu & Bentler, 1999). When the value of SRMR is less than 0.08, the model is considered to have a good fit, when the value of SRMR is less than 0.05, the model is considered to have an acceptable fit, and a value of 0 for SRMR indicates a perfect fit (Byrne, 2008). The SRMR in the studied model has a value of 0.077; this means that the model has a good fit for the data.

Table 10. Hypothesis Test

	Coeficiente path	t-value	Result
H1: Environmental management is the variable that explains the competitive advantage of the links in the value chain of avocado exporting companies located in Uruapan, Michoacán	0.204	3.558	**Don't reject**

	Coeficiente path	t-value	Result
H2: Innovation is the variable that explains the competitive advantage of the links in the value chain of avocado exporting companies located in Uruapan, Michoacán	0.692	15.510	**Don't reject**
General Hypothesis: Environmental management and innovation are the variables that explain the competitive advantage of the links in the value chain of avocado exporting companies located in Uruapan, Michoacán.	R² 0.595		**Don't reject**

Source: Own elaboration based on the results of the estimated model.

The results in Table 10 validate the working hypotheses. In this sense, the general hypothesis and the specific hypotheses are accepted.

Discussion

The data collected in this research have been examined ensuring validity and reliability in their results; the estimation of the model has provided empirical measures of the relationships between the indicators and the constructs, as well as between the constructs themselves. These allowed comparing the structural models and the two theoretically defined coincided with reality, which is represented by the sample data, that is, the theory fits the data. Therefore, in this descriptive research, the correlational relationships between a set of latent constructs and their respective variables and items were analyzed, and the underlying assumption has a solid basis in theoretical tests.

The implications of the results through the empirical evidence show the little interest of the companies in requesting the suppliers certified environmental care inputs, in the same way, the results of the process indicator, evidence the lack of pro-environmental procedures and for the legislation indicator, the results also show the little theoretical and practical knowledge that avocado exporting companies show about environmental legislation. It is evident that these poor pro-environmental practices have commercial repercussions since countries such as the ones in the European Union require good practices in caring for the environment for agricultural products that are marketed on their territory. Despite the above, this Michoacan avocado is highly sought after by North American consumers. In addition, the avocado exporting orchards are certified by the United States Department of Agriculture (USDA), which show these are free of pests, mainly screwworm, and also that they are free from the use of pesticides. The

innovation variable turned out to have a greater relationship with competitive advantages, with the indicators being design, marketing, and organizational innovation, which show that these companies constantly investigate mainly the packaging system to export avocado and storage and refrigeration. However, entrepreneurs must incorporate good environmental practices through the three indicators studied.

The current reality requires producers to know, learn, and apply international environmental legislation, also to have certified suppliers in environmental practices, in addition to the fact that businessmen apply environmental practices in their different processes in organizations, once the above have been established, companies would be positioned to expand exports to markets such as Europe and Japan, which would bring economic benefits to the region.

The results of this research show that the differentiating activities of innovation and environmental management developed by the avocado exporting companies have significantly positive effects with the competitive advantage since, in the evaluation of the structural model, the analysis of the path coefficients shows the relationships of the research model hypotheses. The Coefficient's Path that shows the relationship between the exogenous constructs and the endogenous construct has positive values, which confirms that there is a positive relationship between the variables studied. When confirming that the sign is adequate, the value of the coefficient is evaluated. The variable that most explains Competitive Advantage is Innovation since it has both a positive relationship and an explanation incidence of 0.692. This result agrees with the theory, according to Wang et al., (2020), a company's competitive advantage can be built on innovation, Alike, innovation can be the modern-firms driver for a set of Competitive Advantages (Azeem, Ahmed, et al., 2021). Environmental Management, for its part, also has a significant level of influence on Competitive Advantage, since it shows a positive relationship and an explanation of 0.204 on the variable. It is observed in Figure 1 the model is reflexive-formative, first because the arrows start from the independent variables towards the indicator, also because it shows the formative relationships between the independent variables innovation and environmental management with the dependent variable competitive advantages. The construct Environmental Management, Innovation, and Competitive Advantage present a Cronbach's Alpha of 0.909, 0.929, and 0.791, respectively, all values are acceptable for the model. In the case of composite reliability, the values 0.924, 0.939, and 0.864 for the constructs Environmental Management, Innovation, and Competitive Advantage, respectively, are acceptable values in the model. The

value of the coefficient of determination R² is calculated as the square of the correlation between an endogenous construct and the predicted values. There is no rule to establish the accepted value of R^2, but according to Chin (1998) when R^2 assumes the 0.67, 0.33, or 0.10 values it means that its explanatory power is substantial, moderate, or weak, respectively. The value of the coefficient of determination for the developed model is 0.595, this means that the model has moderate explanatory power. So, Innovation and Environmental Management explain 59.5% of Competitive Advantage. In both constructs, it is shown that they have a satisfactory level of reliability and an acceptable level of reliability. In the hypothesis test, the two specific and the general hypothesis were accepted.

Theoretical Implications

The findings in this research on the relationships between innovation and environmental management with competitive advantages contribute to the literature according to the following points. First, the findings broadly align with Hermundsdottir & Aspelund (2020), who mention that environmental management is associated with greater profitability, efficiency, and competitiveness. Related to this view are arguments as to why environmental management can create a competitive advantage. Offering products manufactured with care for the environment is an efficient way to take advantage of the opportunities associated with the growing number of customers concerned about the environment and society. Therefore, it can result in product differentiation, a growing customer base, and better brand positioning. About innovation, the results of this research agree with Battisti et al. (2020), who mentions that innovation has long been identified as a driver of competitive advantage and growth. In this sense, the links between competitive advantage and innovation, underline the importance of the innovation process for the competitiveness of companies and are widely studied in the literature (Battisti et al., 2020). Of course, the findings impact the two independent variables, suggesting making strategic decisions that involve them to reconfigure the way of competing in a changing North American market and with a great opportunity to attack the large existing market that demands this fruit. The findings support differentiating activities as a dynamic tool that can be used to obtain competitive advantages and, consequently, improve the competitive positions of avocado exporting companies from Michoacán.

References

Amoako, G. K. (2020). A conceptual framework Corporate environmental management activities and sustainable competitive advantage. *Management of Environmental Quality: An International Journal, 31*(2). https://www.doi.org/10.1108/MEQ-09-2019-0187

Management, 23(2), 273-290. https://www.doi.org/10.1108/EJIM-09-2018-0211

Abeysekara , N., Wang, H., & Kuruppuarachchi, D. (2019). Effect of supply-chain resilience on firm performance and competitive advantage. *Business Process Management Journal, 25*(7), 23. https://www.doi.org/10.1108/BPMJ-09-2018-0241

Alderson, W. (January 1º, 1937). A marketing view of competition. *Journal of Marketing*.

Aragon-Correa, J., & Sharma, S. (2003). A contingent resource-based view of proactive corporate environmental strategy. *Academy of Management Review, 28*(1), 71-88.

Azeem , M., Ahmed, M., Haider, S., & Sajjad , M. (2021). Expanding competitive advantage through organizational culture, knowledge sharing and organizational innovation. Technology in Society, 10. doi: https://doi.org/10.1016/j.techsoc.2021.101635

Bäckström, I., & Bengtsson , L. (2019). A mapping study of employee innovation: Proposing a research agenda. *European Journal of Innovation Management, 22*(3), 468-492. https://doi.org/10.1108/EJIM-05-2018-0101

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*.

Battisti, , E., Miglietta , N., & Niri, N. (2020). Value creation, innovation practice, and competitive advantage Evidence from the FTSE MIB index. *European Journal of Innovation*

Becheikh, N.; Landry, R.; Amara, N. (2006). "Lessons from innovation empirical studies in the manufacturing sector: a systematic review of the literature from 1993-2003". *Technovation, vol.26*, 644-64.

Beliaeva, T., Ferasso, M., Kraus, S., & Damke, E. J. (2019). Dynamics of digital entrepreneurship and the innovation ecosystem. A multilevel perspective. *International Journal of Entrepreneurial Behavior & Research, 26*(2), 266-284. https://doi.org/10.1108/IJEBR-06-2019-0397

Berchicci, L., & King, A. (2007). Postcards from the Edge: A Review of the Business and Environment Literature. *ERIM Report Series Research in Management*, 60.

Board, T. H. (2018). *The HAB Effect 2018 Annual Report.* California: The Hass Avocado Board.

Byrne, B. (2008). *Structural Equation Modeling with EQS: Basic Concepts, Applications, and Programming.* Nueva York: Psychology Press.

Campos, H. (2021). *The Innovation Revolution in Agriculture: A Roadmap to Value Creation.* Lima, Peru: Springer.

Coccia, M. (2017). Sources of technological innovation: radical and incremental innovation problem driven to support competitive advantage of firms. *Technology Analysis & Strategic Management, 29*(9). https://doi.org/10.1080/09537325.2016.1268682

Chahal, H., & Bakshi, P. (2015). Examining intellectual capital and competitive advantage relationship: role of innovation and organizational learning. *International Journal of Bank Marketing, 33*(3), 376-399.

Chih, C. J. (2019). Developing a model for supply chain agility and innovativeness to enhance firms' competitive advantage. *Management Decision, 57*(9), 1511-1534. https://www.doi.org/10.1108/MD-12-2017-1236

Dechezlepretre, , A., & Sato, M. (2017). The impacts of environmental regulations on competitiveness. *Review of Environmental Economics and Policy, 11*(2), 183-206. https://www.doi.org/10.1093/reep/rex013

Distanont, A., & Khongmalai, O. (2018). The role of innovation in creating a competitive advantage. *Kasetsart Journal of Social Sciences*. https://doi.org/10.1016/j.kjss.2018.07.009

El-Kassar, A. N., & Singh, S. K. (2019). Green innovation and organizational performance: the influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting and Social Change*, 483-498.

Eller, F. J., Gielnik, M. M., Wimmer, H., Thölke, C., Holzapfel, S., Tegtmeier, S., & Halberstadt, J. (2020). Identifying business opportunities for sustainable development: Longitudinal and experimental evidence contributing to the field of sustainable entrepreneurship. *Business Strategy and The Environment, 29*(3), 1387-1403. https://doi.org/10.1002/bse.2439

Eurostat. (2020). *Sustainable Development in the European Union Monitoring Report on the Progress towards the SDGs in an EU Context.* Luxembourg: European Union. https://ec.europa.eu/eurostat/documents/3217494/11011074/KS-02-20-202-EN-N.pdf/334a8cfe-636a-bb8a-294a-73a052882f7f

FAO. (2019). *El Estado mundial de la Producción de Alimentos, Progresos en la lucha contra la pérdida y el desperdicio de alimentos.* Roma: Organización de las Naciones Unidas.

Ferreira, J., & Coelho, A. (2020). Dynamic capabilities, innovation and branding capabilities and their impact on competitive advantage and SME's performance in Portugal: the moderating effects of entrepreneurial orientation. *International Journal of Innovation Science*. https://www.doi.org/10.1108/IJIS-10-2018-0108

First, I., & Khetriwal, D. S. (2015). Exploring the relationship between environmental orientation and brand value: is there fire or only smoke. *Business Strategy and the Environment*, 19(2), 90-103.

Fornell, C., & Larcker, D. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement. *Journal of Marketing Research*, 18, 39-50.

freshplaza. (July 13, 2020). *freshplaza.* Retrieved from freshplaza: https://www.freshplaza.es/article/9193714/

Hair, J., Hult, G., Ringle, C., & Sarsted, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (SEM-PLS).* Thousand Oaks: Sage.

Henseler, J., Hubona, G., & Ray, P. (2016). Using PLS path modeling new technology research: updated guidelines. *Industrial Management & Data Systems, 16*(1), 2-20.

Hermundsdottir, F., & Aspelund, A. (2020). Sustainability innovations and firm competitiveness: A review. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2020.124715

Hon, A. H., & Lui, S. S. (2016). Employee creativity and innovation in organizations: Review, integration, and future directions for hospitality research. *International Journal of Contemporary Hospitality Management, 28*(5), 862–885. https://doi.org/10.1108/IJCHM-09-2014-0454

Hu, L., & Bentler, P. (1999). Cutoff criteria for fitindexes in covariance structure analysis: conventional criteria versus new alternative. *Structural Equation Modeling, 6*(1), 1-55.

Kahn, J. H. (2006). Factor analysis in Counseling Psychology research, training and practice. *The Counseling Psychologist, 1*(36), 34.

Keszey, T. (2020). Environmental orientation, sustainable behaviour at the firm-market interface and performance. *Journal of Cleaner Production, 243*(10), 118.

Leiblein, M. J., Chen, J. S., & Posen, H. E. (2017). Resource Allocation in Strategic Factor Markets: A Realistic Real Options Approach to Generating Competitive Advantage. *Journal of Management, 43*, 2588-2608. https://doi.org/10.1177/0149206316683778

Nunnally, J. (1978). *Psychometric Theory.* New York: McGraw-Hill.

OECD. (2018). *OECD Science, Technology and Innovation Outlook 2018: Adapting to Technological and Societal Disruption.* Paris: OECD Publishing. https://www.doi.org/10.1787/25186167

Ortt, J., & Smits, R. (2006). Innovation management: different approaches to cope with the same trend. *International Journal of Technology Management, 34* , 296-318.

Pisano, G. (2015). You Need an Innovation Strategy. *Harvard Business Review, 96*(6), 44-54.

Reeves, M., Haanaes, K., & Sinha, J. (2015). *Your Sstrategy Needs a Strategy.* Boston: Harvard Business Review Press.

Ren, L., Xie, G., & Krabbendam, K. (2010). Sustainable competitive advantage and marketing innovation within firms A pragmatic approach for Chinese firms. *Management Research Review, 33*(1), 79-89.

Rezende, L. D., Bansi, A. C., Alves, M. F., & Galin, S. V. (2019). Take your time: examining when green innovation affects financial performance in multinationals. *Journal of Cleaner Production, 233*, 993-1003. https://doi.org/10.1016/j.jclepro.2019.06.135

Safari, A., Adelpanah, A., Soleimani, R., Aqagoli, P. H., Eidizadeh, R., & Salehzadeh, R. (2020). The effect of psychological empowerment on job burnout and competitive advantage. *Management Research: Journal of the Iberoamerican Academy of Management*, 47-71. https://www.doi.org/10.1108/MRJIAM-06-2019-0935

Serhan, Y. N., Julian, C. C., & Ahmed, Z. (2015). Time-based competence and performance: an empirical analysis. *Journal of Small Business and Enterprise Development*, 288-301.

Shanker, R., Bhanugopan, R., Van Der Heijden, B. I., & Farrell, M. (2017). Organizational climate for innovation and organizational performance: the mediating effect of innovative work behavior. *Journal of Vocational Behavior, 100*, 67-77.

Sigalas, C. (2015). Competitive advantage: the known unknown concept. *Management Decision, 53*(9), 2004-2016.

Shehata, G. M., & Montash, M. A. (2020). Driving the internet and e-business technologies to generate a competitive advantage in emerging markets. *Information Technology & People*, 389-423. https://www.doi.org/10.1108/ITP-10-2017-0360

Sołoducho-Pelc, L., & Sulich, A. (2020). Between Sustainable and Temporary Competitive Advantages in the Unstable Business Environment. *Sustainability*, 12. https://www.doi.org/10.3390/su12218832

Švárová, M., & Vrchota, J. (2014). Influence of competitive advantage on formulation business strategy. *Procedia Economics and Finance*, 687-694. https://www.doi.org/10.1016/S2212-5671(14)00394-3

Tu, Y., & Wu, W. (2020). How does green innovation improve enterprises' competitive advantage? The role of organizational learning. *Sustainable Production and Consumption*, 504-516. https://doi.org/10.1016/j.spc.2020.12.031

Tridge. (2020). *Seasonal Market Report: Avocado.* South Korea: Tridge.

Uotila , J., Maul, M., Thomas , K., & Zahra, S. A. (2009). Exploration, exploitation, and financial performance: analysis of S&P 500 corporations. *Strategic Management Journal, 30*(2), 221-231. https://doi.org/10.1002/smj.738

Wang, , L. L., & Gao, Y. (2020). Competition network as a source of competitive advantage: The dynamic capability perspective and evidence from China. *Long Range Planning International Journal of Strategic Management*. https://doi.org/10.1016/j.lrp.2020.102052

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*. https://doi.org/10.1002/smj.4250050207

Yasmeen, H., Wang, Y., & Zameer, H. (2019). Modeling the role of government, firm, and civil society for environmental sustainability. *International Journal of Agricultural and Environmental Information Systems, 10*(2), 82-97. https://www.doi.org/10.4018/IJAEIS.2019040104

Young, D., Reeves, M., & Gerard, M. (2020). Why the New Competitive Advantage Demands Sustainability. *Boston Consulting Group*. https://www.bcg.com/en-mx/publications/2020/why-the-new-competitive-advantage-demands-sustainability

Yu, Y., & Huo, B. (2019). "The impact of environmental orientation on supplier green management and financial performance: the moderating role of relational capital. *Journal of Cleaner Production*, 211, 628-639.

United Nations. (2019). *The Sustainable Development Goals Report 2019.* Nueva York: United Nations. https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019_Spanish.pdf

Wang, Y.-L., Wang, Y.-D., & Horng, R.-Y. (2010). Learning and innovation in small and medium enterprises. (E. G. Limited, Ed.) *Industrial Management & Data Systems, 110*(2), 175-192.

Zameer, H; Wang, Y; Yasmeen, H. (2020). Reinforcing green competitive advantage through green production, creativity and green brand image: implications for cleaner production in China. *Journal of Cleaner Production, 247*, 20.

Zameer, H., Wang, Y., & Yasmeen, H. (2020). Green innovation as a mediator in the impact of business analytics and environmental orientation on green competitive advantage. *Management Decision*, 20. https://www.doi.org/10.1108/MD-01-2020-0065