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ENVIRONMENTAL INNOVATION: ADVANCING THE RESOURCE-ADVANTAGE THEORY OF COMPETITION

Gricelda Juárez-Luis, Instituto Politécnico Nacional
Patricia S. Sánchez-Medina, Instituto Politécnico Nacional
René Díaz-Pichardo, South Champagne Business School & Université de Technologie de Troyes

ABSTRACT

The Resource-Advantage Theory of Competition states that a comparative advantage in resources leads to a competitive advantage in the marketplace. This research aims to expand this theory by including the role of innovation, particularly environmental innovation, as a moderating variable in the relationship between resources and competitive advantages. Empirical evidence of this moderating effect is obtained through factor and regression analyses with survey data collected from 130 small agricultural businesses located in Oaxaca, Mexico. This is a traditional sector in an emerging economy. Theoretical implications include the importance of environmental issues in competition as well as the applicability of this framework to the agricultural sector. Practical implications for small agricultural businesses are related to the effectiveness of environmental innovation in the enhancement of competitiveness through both cost reduction and value added.

JEL: M21, O00, O13, Q56

KEYWORDS: Environmental Innovation, Small Agricultural Businesses, Competition, Resources

INTRODUCTION

Competitive advantages are defined as conditions in which competitors cannot replicate or acquire benefits that the company obtains through its competitive strategies (Chang, 2011). This study examines resources as antecedents of competitive advantages within the framework of the resource advantage theory of competition (R-A theory). R-A theory proposes that a comparative advantage in resources will yield marketplace positions of competitive advantage (Hunt, 1995, 2012; Hunt & Morgan 1996). This theory also emphasizes innovation as endogenous to the process of firms' competing (Hunt, 2011a). Innovations enable firms to deliver more value to customers than their competitors and are fundamental to business success (Hunt & Duhan, 2002). Then, innovation can have an intervening effect on the relationship between resources and competitive advantages. Although R-A theory refers to innovation in general terms, Hunt (2011b) makes important contributions to the theory from the environmental field, noting that positioning a company as environmentally committed produces a more valuable market offering to consumers. Forsman (2013) stated that, like any innovation, environmental innovation creates value for customers and superiority over competition.

Environmental innovation allows for a more efficient use of resources by generating benefits such as reduced costs for the company. The environment can be seen as a competitive opportunity (Porter & Van der Linde, 1995) and environmental innovation can be a win–win solution for the conflict between competitiveness and environmental protection (Chang, 2011). An evolution or extension of the resource advantage theory towards a broader consideration of the environmental issue occurs. In the field of environmental care, previous studies have not specifically analyzed the moderating role of environmental innovation in the relationship between resources and competitive advantages. Therefore, this study proposes the relationship between resources and competitive advantages becomes stronger when small agricultural businesses implement environmental innovations to a greater degree.

This study was developed in the Mexican context of small agricultural businesses dedicated to the production of greenhouse tomatoes. This context was selected because in Mexico, and in other developing countries, the agricultural sector has substantial productive potential and constitutes an important economic engine (Instituto Nacional de Estadística y Geografía (INEGI) [National Institute of Statistics and Geography] 2007; Macías-Macías, 2013). Agriculture is closely linked to the use of natural resources, and its operations generate significant negative impacts on the environment. Small agricultural businesses operate within a market economy where the demands linked to environmental care have caused them to increasingly consider environmental issues in the development of their operations. This paper contributes to the literature in two ways: first, by highlighting the importance of an evolution or extension of R-A theory towards a broader consideration of environmental issues, and; second, by providing empirical evidence in the context of small agricultural businesses in an emerging economy. This is important given that R-A theory has had a strong theoretical development but empirical research has been scarce. Additional empirical studies are necessary to confirm the fundamental structure of the theory and emphasize the importance of the proposed variables in different contexts. It is particularly important to include less traditional contexts such as the agricultural sector, by incorporating environmental issues in its structure and foundations. This paper has the following structure. The next section of the paper provides a literature review. The third section presents the methodology, data collection. The fourth section analyzes the research findings. Fifth and final section state the conclusions, suggestions and implications

LITERATURE REVIEW

Competitive advantages are the key to the success of firms in the market. A company achieves a competitive advantage when, through its offering(s), it creates more value for its customers relative to its competitors (Kaleka, 2002). R-A theory proposes that as part of the competitive process, firms constantly struggle among themselves for a comparative advantage in the resources at their disposal that will yield a competitive advantage and, thereby, superior financial performance (Hunt, 1995, 2011b, 2012; Hunt & Morgan, 1996). A comparative advantage in resources exists when a firm's resources enable it to produce a market offering that, relative to extant offerings by competitors, (1) is perceived by some market segments to have superior value and/or (2) can be produced at lower costs (Hunt & Morgan, 1995). For R-A theory, resources are heterogeneous and imperfectly mobile and are classified as financial, physical, legal, human, organizational, informational and relational (Hunt, 1995, 2011a, 2012). The first two classifications constitute the tangible resources of the company, while the rest are considered intangible resources. R-A theory also argues that business success depends crucially on innovations that allow firms to offer customers more value than their competitors (Hunt & Duhan, 2002). Competition is seen as a disequilibrium-provoking process in which innovation acts as a means to neutralize and/or leapfrog rival firms (Hunt, 2011a). In the search to improve competitiveness, firms attempt to innovate by imitating resources, finding an equivalent resource, or finding (or creating) a superior resource (Hunt, 2011a, 2011b; Hunt & Morgan, 1997) to deliver more value to customers than their competitors (Hunt & Duhan, 2002). Then, product innovation and process innovation have an effect on the efficiency and effectiveness of firms and therefore on their competitiveness (Hunt & Morgan, 1995).

Although R-A theory refers to innovation, it does not specifically consider environmental issues. Hunt (2011b) makes important contributions to the theory in this field, specifically with respect to sustainable marketing. The author argues that many of the concepts, strategic approaches and discussions, of sustainable marketing are consistent with the structure and foundations of R-A theory. R-A theory maintains that competitive processes do not occur throughout the industry but rather by market segments.

Therefore, the "green consumer" can be considered as a market segment. In addition, although it assumes the primary objective of the firms is to obtain superior financial performance, achieving it may also allow pursuit other goals, such as those emphasized in sustainable marketing (for example, environmental care). Furthermore, positioning a firm as environmentally committed produces a market offering more valuable to consumers with respect to competitors, not only because it is intrinsically more "green," but also because it is produced by a "green" production process (Hunt, 2011b). From this perspective, environmental product innovation and environmental process innovation play important roles in the creation of competitive advantages. Therefore, it is important that R-A theory evolves towards a broader consideration of environmental issues and, in this case, the specific topic of environmental innovation. In this sense, it is possible to consider environmental innovation, which, like the innovation proposed by R-A theory, is also endogenous and results from the process of competition.

R-A theory has been used to explain the actions of large companies in industrialized countries. Companies that can afford significant investments to acquire resources and/or adopt environmental innovations can obtain competitive advantages and remain in the market. In contrast to large companies, small businesses in emerging markets tend to operate in conditions of scarce resources (Sánchez-Medina, Díaz-Pichardo, Bautista-Cruz, & Toledo-López, 2015; Viswanathan, Sridharan, & Ritchie, 2010). Despite their limited resources, particularly physical and financial resources, small agricultural businesses in developing economies have been able to create competitive advantages that allow them to survive and grow in the market. Small agricultural businesses make use of their resources to create offerings of superior value. For example, some small agricultural businesses have ventured into export processes where it must produce offerings at lower costs and/or offer differentiated products such as organic products. Small agricultural businesses also often have changes in their products and processes adopting environmental innovations to improve their competitiveness.

<u>Resources and Competitive Advantages</u>

R-A theory defines resources as the tangible and intangible entities available to the firm that enable it to produce efficiently and/or effectively provide a market offering that has value for some market segment(s) (Hunt, 1995; Hunt & Morgan, 1995). R-A theory postulates that comparative advantages in resources will yield a marketplace position of competitive advantage (Hunt, 1995, 2011a; Hunt & Morgan, 1996). Previous literature establishes a direct and positive relationship between resources and competitive advantages of a firm. For example, Omerzel and Gulev (2011) found that knowledge is a source of competitive advantage since it is an intangible resource that adds value to the company and cannot be easily imitated. Kaleka (2002) showed that tangible and intangible resources are strategic. However, the author noted that possession of intangible resources was more important when it came to obtaining competitive advantages. Another study identified the importance of developing superior resources based on the company's relationship with the natural environment as a source of competitive advantage in costs (Christmann, 2000).

In small agricultural businesses, available resources can be a source of competitive advantages. Small agricultural businesses that have more tangible and intangible resources are more likely to generate offers of higher value and lower costs than their competitors. Increasing levels of resources are associated with increasing levels of competitive advantages (see Figure 1). Therefore, based on these arguments, we posit the following hypothesis:

> *Hypothesis 1 (H1): Resources have a positive and significant impact on the competitive advantages of small agricultural businesses in emerging economies.*

Moderating Role of Environmental Innovation

R-A theory considers that competition causes firms to be involved in a constant learning process to achieve leadership in market segments. A clear manifestation of this learning process are innovations (Hunt 2012). R-A theory views innovation as endogenous to the competition process of firms and is an important factor for its growth (Hunt 2011b). As with innovation, environmental innovation is also an outcome of the process of competition. Environmental innovation refers to new and improved processes, equipment, products, technology, and management systems for preventing or reducing damage to the environment (Forsman, 2013; Kemp, Arundel, & Smith, 2001; Liao, 2016). Previous empirical studies show that environmental innovations are studied from two dimensions: environmental product innovation and environmental processes (Chiou, Chan, Lettice, & Chung, 2011; Liao, 2016; Van den Berg, Labuschagne, & Van den Berg, 2013).

Environmental innovation influences competitive advantages of low costs by improving the reasonable use of raw materials, the reduction of waste and reduction in fines or severe punishments (Liao, 2016). Environmental innovation also helps generate value-added products and improve the company's image (Chiou et al., 2011; Liao, 2016). In this sense, Porter and Van der Linde (1995) stated that environmental innovation could increase the productivity of resources even more and make companies more competitive. However, previous studies have not specifically analyzed the moderating role of environmental innovation in the relationship between resources and competitive advantages in small agricultural businesses.

Small agricultural businesses generate significant negative environmental impacts (e.g., due to the use of agrochemicals); however, studies on environmental innovation are scarce. Due to the demands of institutional and market environments and motivated by the need to remain and grow in the market, small agricultural businesses are beginning to implement environmental innovations that involve the adoption of greener farming techniques. Environmental innovations affect the reduction of costs (due to the high costs of chemical products) and the obtainment of differentiated products (such as organic products), which lead to better opportunities to compete in the market. We propose that when the level of adopted environmental innovation is high, the relationship between resources and competitive advantages is stronger. When environmental innovation is low, this relationship is weaker (see Figure 1). Therefore, we posit the following hypothesis:

> *Hypothesis 2 (H2): Environmental innovation moderates the relationship between resources and the competitive advantages of small agricultural businesses in emerging economies.*

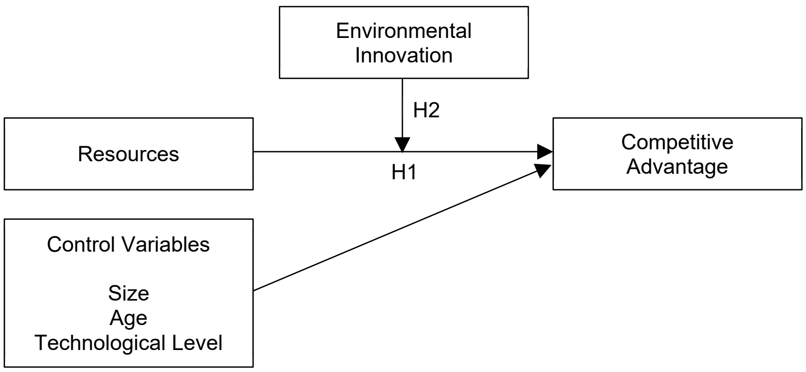
Figure 1 shows the model of resources, environmental innovation and competitive advantages in small agricultural businesses. The proposed model contends that resources influence competitive advantages. However, the magnitude of competitive advantages is moderated by the degree to which small agricultural businesses implement environmental innovations. Size, age and technological level of the greenhouse are included as control variables.

DATA AND METHODOLOGY

Survey Instrument

The survey instrument is composed of several Likert-type scales used to measure variables included in the model. It was developed over a three-step revision process. In the first step, based on existing scales, a semi-structured questionnaire was designed and applied in 10 small agricultural businesses to identify the resources, environmental innovations and competitive advantages. The results served to obtain feedback based on experience and sector knowledge to improve the clarity of the items, to use the appropriate terminology and avoid the omission of items used to measure the variables. In the second step, a structured questionnaire, was applied to 30 owners and managers of small agricultural businesses to test validity and reliability. In the third and final step, the final survey instrument was designed upon the results of the previous step. The questionnaire asked about the availability of resources, the environmental innovations implemented and the competitive advantages achieved by small agricultural business.

Figure 1: Hypothetical Model



The proposed model analyzes the direct relationship between resources and competitive advantages of small agricultural businesses and the moderating role of environmental innovation. It is predicted that a higher level of environmental innovation will reinforce the positive relationship between resources and the competitive advantages of these businesses. Size, age and the technological level of the greenhouse are included as control variables.

Sample

Data come from a collection effort conducted between June and December of 2016. The survey instrument was applied, face to face, in Spanish, to owners and/or managers of small agricultural businesses with at least one year of experience in the production and commercialization of greenhouse tomatoes in the Valles Centrales and Mixteca regions of the State of Oaxaca, México. Only owners and/or managers were surveyed to ensure greater information accuracy. The sampling method was non-probabilistic due to the lack of a formal database that indicates the number and location of existing small agricultural businesses. To reduce the implicit bias of this type of sampling, specific routes were established in the two regions so that small businesses would have a similar probability of being included in the sample. When a small agricultural business was located on the route, the owner and/or manager was identified.

The objective of the research was explained to the owner and/or manager who were then invited to participate by responding to the questionnaire. The questionnaires were applied to those who agreed to be surveyed due to some distrust that owners and/or managers had about the information use. During the routes, 136 small agricultural businesses were located. However, data from six small agricultural businesses could not be obtained because the owners and/or managers were not present in the business. Therefore, the sample consisted of 130 small agricultural businesses (96%). There were 123 male respondents (95%). In terms of literacy, 95 respondents only attended primary school (73%). The age (years of operation) of the 130 surveyed small businesses ranges from 1 to 11 years. The average age of these businesses was 6.3 years, with a standard deviation of 1.5 years. The size of the small agricultural business varies between 400 m^2 and 6 hectares, with an average size of 6003 m^2 and a standard deviation of 1794 m^2.

Measures

Resources. A second-order factor was defined as the degree to which the small agricultural business has tangible and intangible assets for the development of environmental care actions and for the generation of greater ecological value of its products. These advantages enable the firm to efficiently and/or effectively produce a market offering that has value for some market segment(s) (Hunt, 2011a). Tangible and intangible resources were the two dimensions taken from previous studies (Hunt & Morgan, 1995; Li, 2014; Richey, Musgrove, Gillison, & Gabler, 2014). Respondents were asked about their available resources. The items were scaled on a five-point Likert-type scale from one (nothing) to five (substantial). Table 1 provides the items used to measure this variable.

Competitive advantage: A second-order factor was defined as the degree of superiority achieved by the small agricultural business over its competitors by offering lower prices for equivalent benefits and/or offering unique benefits that justify a higher price (López-Gamero, Molina-Azorín, & Claver-Cortés, 2009). The variable was measured based on scales and dimensions of low cost and differentiation competitive advantages that were used in previous studies (Chiou et al., 2011; Liao, 2016; López-Gamero et al., 2009; López-Gamero, Molina-Azorín, & Claver-Cortés, 2010; Murray, Gao, & Kotabe, 2011) and adapted to the context of this research. Respondents were asked about the degree to which their business obtains benefits related to low costs and/or differentiated products compared to their competitors. The items were scaled on a five-point Likert-type scale from one (much lower) to five (much higher). Table 2 provides the items used to measure this variable.

Environmental innovation: A second-order factor was defined as the degree to which the small agricultural business has adopted new ideas in order to preserve the environment (Sánchez-Medina et al., 2015). The variable was measured based on scales and dimensions of environmental product innovation and environmental process innovation that were used in previous studies (Chang, 2011; Chen, 2008; Chiou et al., 2011; Liao 2016; Van den Berg et al., 2013) and adapted to the context of this research. Respondents were asked about the degree to which small agricultural businesses have made changes in terms of products and processes to care for the environment. The items were scaled on a five-point Likert scale from one (strongly disagree) to five (strongly agree). Table 3 provides the items used to measure this variable.

Control variables: Three control variables were included: size, age and the technological level of the greenhouse. To measure the agricultural business size, the area in square meters of the greenhouse used for production was considered. To measure the age, the number of years of operational experience was used. To measure the technological level, a scale of 1 to 5 was used considering the five technological levels proposed by Rijk (2008), who evaluated the typology, equipment, and technology of greenhouses.

For each variable in the model, the content validity and discriminant validity were tested. Discriminant validity was assessed by checking that (at a confidence interval of 95%) the correlation between each pair of items did not contain the value 1. In the confirmatory factor analysis, we observed that each item was loaded on one and only one of the factors. A Kaiser–Meyer–Olkin (KMO) sampling adequacy test that detects cross-loadings between items of different factors was included. The KMO test can demonstrate the discriminant validity between different constructs. To test the reliability of the instrument, a confirmatory factor analysis was performed, and Cronbach's Alpha was calculated. According to Nunnally (1967), constructs Cronbach's alpha values above 0.6 indicate high reliablility (see Tables 1, 2 and 3). The second-order structures of the three factors were confirmed.

Table 1 shows the results of the factor analysis of resources. The first column reports the items that measured the variable. The results in bold in Columns 2 and 3 show the factor loadings greater than 0.5 for each dimension. The table also shows the percentage of variance explained for each dimension. The Cronbach's alpha values suggest that the constructs are highly reliable and the KMO test demonstrates the discriminant validity between the constructs.

Table 1: Factor Analysis of Resources

To What Extent Did Your Small Agricultural Business Have:	1	2	Communality
1. Tangible Resources			
Complete and quality protection equipment	0.709	0.256	0.568
Sufficient water for operations	0.747	0.371	0.696
Quality farm land	0.670	0.328	0.557
Quality agricultural inputs	0.757	-0.110	0.585
Financing of private banks	0.713	0.389	0.660
Government subsidies	0.767	0.330	0.697
2. Intangible Resources			
Regular education of employees in aspects of environmental management	0.270	0.836	0.771
Qualified technical staff	0.223	0.792	0.677
Information about less polluting production techniques	0.248	0.853	0.789
Information about the damages that pesticides cause to health and the environment	0.337	0.787	0.733
Information about the correct disposal of waste	0.378	0.825	0.824
Information about the production techniques and products of the competition	0.058	0.777	0.607
Percentage of variance	30.203	37.824	
Cronbach's alpha	0.859	0.921	
KMO coefficient	0.858		

Rotation method: Varimax with Kaiser Normalization. The rotation has converged on three iterations. Extraction method: principal component analysis. This table contains information about the items used to measure the variable (first column). Coefficients in bold show the factor loadings greater than 0.5 for each dimension. In addition, Cronbach's alpha coefficient is reported, which in both cases is greater than 0.6, indicating that the constructs are considered highly reliable. KMO test demonstrate the discriminant validity between the constructs. The scale anchors for the items were 1, nothing, and 5, substantial.

Table 2 shows results of the factor analysis of competitive advantages. The first column reports items that measured the variable. The results in bold in Columns 2 and 3 show the factor loadings greater than 0.5 for each dimension. The table also shows the percentage of variance explained for each dimension. The values of Cronbach's alpha suggest that the constructs are highly reliable and KMO test demonstrate the discriminant validity between the constructs.

Table 2: Factor Analysis of Competitive Advantages

In Comparison with Its Main Competitor:	1	2	Communality
1. Competitive Advantage of Low Cost			
Costs of agricultural inputs	0.732	0.280	0.615
Costs of production per unit (kg)	0.832	0.193	0.729
Savings in recycling and reuse actions	0.779	0.059	0.610
Sales price to customers	0.797	0.343	0.753
Margin of the distribution channel	0.678	0.344	0.577
2. Competitive Advantage of Differentiation			
Product image	0.256	0.927	0.925
Knowledge of the product in the market	0.256	0.937	0.943
Loyalty of current clients and/or the attraction of new ones	0.248	0.944	0.953
Percentage of variance	39.024	37.285	
Cronbach's alpha	0.857	0.970	
KMO coefficient	0.868		

Rotation method: Varimax with Kaiser Normalization. The rotation has converged on three iterations. Extraction method: principal component analysis. This table contains information about the items used to measure the variable (first column). Coefficients in bold show the factor loadings greater than 0.5 for each dimension. In addition, Cronbach's alpha coefficient is reported, which in both cases is greater than 0.6, indicating that the constructs are considered highly reliable. KMO test demonstrate the discriminant validity between the constructs. The scale anchors for the items were 1, much lower, and 5, much higher.

Table 3 shows the results of the factor analysis of environmental innovation. The first column reports the items that measured the variable. The results in bold in Columns 2 and 3 show the factor loadings greater than 0.5 for each dimension. The table also show the percentage of variance explained for each dimension. The values of Cronbach's alpha suggest that the constructs are highly reliable and KMO test demonstrate the discriminant validity between the constructs.

Table 3: Factor Analysis of Environmental Innovation

The Small Agricultural Business Takes the Following Actions	1	2	Communality
1. Environmental Product Innovation			
Chooses materials that produce the least amount of contamination or toxicity for the planning and production of the product	**0.804**	0.390	0.798
Chooses the least amount of materials that produce the least amount of contamination for the planning and production of the product	**0.852**	0.258	0.793
Analyzes if the product is easy to reuse and decompose for the planning and production of the product	**0.764**	0.372	0.723
Improves and designs environmentally friendly packaging	**0.833**	0.342	0.811
2. Environmental Process Innovation			0.761
The production process effectively reduces the emissions of hazardous substances and wastes	0.397	**0.777**	0.799
The production process reduces the consumption of water, electricity, gasoline, etc.	0.366	**0.815**	0.804
The production process reduces the use of raw materials	0.246	**0.862**	0.681
Recycles, reuses and remanufactures the materials used in the production process	0.385	**0.730**	0.716
Uses cleaner technologies to save and prevent pollution	0.301	**0.791**	0.431
Percentage of variance	40.496	36.027	
Cronbach's alpha	0.905	0.913	
KMO coefficient	0.886		

Rotation method: Varimax with Kaiser Normalization. The rotation has converged on three iterations. Extraction method: principal component analysis. Rotation method: Varimax with Kaiser Normalization. The rotation has converged on three iterations. Extraction method: principal component analysis. This table contains information about the items used to measure the variable (first column). Coefficients in bold show the factor loadings greater than 0.5 for each dimension. In addition, Cronbach's alpha coefficient is reported, which in both cases is greater than 0.6, indicating that the constructs are considered highly reliable. KMO test demonstrate the discriminant validity between the constructs. The scale anchors for the items were 1 strongly disagree, and 5, strongly agree.

RESULTS

Table 4 provides the mean, the standard deviations and the partial correlations (controlling for size, age and technological level) between the dimensions of the study variables. The results indicate that dimensions of resources are positively correlated with dimensions of competitive advantages of small agricultural businesses. The largest correlation between resources and competitive advantage in this sample is between tangible resources and competitive advantage of low costs (r=0.807, $p<0.01$).

Table 4: Partial Correlations

Variable	M	SD	1	2	3	4	5	6
1. Tangible resources	2.535	0.963	---					
2. Intangibles resources	3.033	0.922	0.458**	---				
3. Competitive advantage of low costs	2.852	0.869	0.807**	0.604**	---			
4. Competitive advantage of differentiation	2.546	1.515	0.749**	0.373**	0.386**	---		
5. Environmental product innovation	2.956	0.860	0.711**	0.660**	0.733**	0.532**	---	
6. Environmental process innovation	3.057	0.974	0.466**	0.937**	0.578**	0.377**	0.638**	---

*Control variables: size, age and technological level. ** Correlation is significant at levels equal to or less than 0.01. N= 130.*

A regression model (Model 1) was developed to explore and quantify the relationship between resources and competitive advantages and test hypothesis 1. To test Hypothesis 2, hierarchical regression analysis was used. For each analysis, the variables were introduced in three different models. The first model examined the control variables (Model 2), the second included the independent variable and the moderator variable (Model 3) and the third examined the interaction terms (Model 4). Variance-inflation factor (VIF) values are below the usual cut-off value of 10 (O´brien, 2007), thus indicating limited effects of multicollinearity. The following regression equation was used to estimate the direct effect of resources on competitive advantages (Hypothesis 1):

Competitive advantages = β_1*(Size) +* β_2*(Age) +* β_3*(Technological level) +* β_4*(Resources)*

The following hierarchical moderated regression equation was used to estimate competitive advantages (Hypothesis 2):

Competitive advantages = β_1*(Size) +* β_2*(Age) +* β_3*(Technological level) +* β_4*(Environmental innovation) +* β_5*(Resources) +* β_6*(Environmental innovation x Resources)*

Table 5 describes the simple regressions results. Model 1 show that resources are positively and significantly associated with competitive advantages (*b* = 0.820, *p* <0.01). Resources represent 0.844 of the total variance in the model. This result indicates that resources are a crucial factor in obtaining competitive advantages in small agricultural businesses. Therefore, Hypothesis 1 is supported.

Table 5: Result of the Direct Effects on Competitive Advantage and Moderating Analysis

	VIF	Direct Effect	Moderating Effect		
		Model 1	Model 2	Model 3	Model 4
Size	2.502	0.225**	0.470 **	0.205**	0.202**
Age	2.407	-0.069	0.145	-0.053	-0.064
Technological level	1.563	-0.003	0.071	-0.026	-0.039
Resources	7.869	0.820**		1.162**	0.836**
Environmental innovation	6.963			-0.358**	-0.673**
Resources x Environmental innovation					0.645*
t value		18.842			
R^2		0.844	0.399	0.862	0.868
ΔR^2 (Change in R^2)				0.463**	0.006*
F		168.537	27.921	154.846	134.670

*N = 130. Significance levels are as follow: * p<0.05, and ** p<0.01 (two-tailed test). The standardized coefficients are reported. All results include size, age and technological level as control variables. The second column reports the VIF values that indicate limited effects of multicollinearity. To test hypothesis 1 (model 1) the following regression equation was used: Competitive advantages =* β_1*(Size) +* β_2*(Age) +* β_3*(Technological level) +* β_4*(Resources). To test hypothesis 2 (model 2 to 4) the following hierarchical moderated regression equation was used: Competitive advantages =* β_1*(Size) +* β_2*(Age) +* β_3*(Technological level) +* β_4*(Environmental innovation) +* β_5*(Resources) +* β_6*(Environmental innovation x Resources).*

Table 5 also describes the stepwise regression results (Model 2 to 4). The results indicated the resources x environmental innovation interaction term predicted competitive advantage (*b* = 0.45, *p*<.05; ΔR^2=0.006). Resources x environmental innovation represent 0.868 of the total variance in Model 4. The moderation hypothesis (Hypothesis 2) was also supported. The results suggest that environmental innovation moderates the relationship between resources and competitive advantages. Resources exert a greater effect on competitive advantages when environmental innovation is high. When environmental innovation is weak, competitive advantages are non-significantly improved, although there is an increase in resources. Results show that effects of resources on competitive advantages can be different depending on the level of environmental innovation.

Table 6 summarizes the results of the direct effect and the moderating regression analysis by the dimensions of the variables studied. The third column shows that resources are more positively and significantly associated with competitive advantages of low cost (*b* = 0.897, *p* <0.01). The results of the last column indicated that, individually, interaction terms (resources x environmental product innovation and resources x environmental process innovation) did not significantly predict the competitive advantage.

Table 6: Results of the Direct Effect and Moderating Regression Analysis by Variable Dimensions

	Direct Effect			Moderating Effect	
	Competitive Advantage	**Competitive Advantage of Low Cost**	**Competitive Advantage of Differentiation**	**Independent / Moderator Variable**	**Interaction Term**
Resources	0.820**	0.897**	0.629**		
Tangible resources	0.858**	0.859**	0.704**		
Intangible resources	0.490**	0.611**	0.333**		
Resources				0.741**	0.536**
Environmental product innovation				0.090	-0.083
Resources x Environmental product innovation					0.368
R^2				0.846	0.848
ΔR^2 (Change in R^2)				0.447**	0.002
Resources				1.221**	1.040**
Environmental process innovation				-0.452**	-0.609**
Resources x Environmental process innovation					0.337
R^2				0.894	0.896
ΔR^2				0.495**	0.002

*N = 130. Significance level ** p<0.01 (two-tailed test). The standardized coefficients are reported. All results include size, age and technological level as control variables. To test the moderating effect of the environmental innovation dimensions two hierarchical moderated regression equations were used. 1) Competitive advantages = β_1(Size) + β_2(Age) + β_3(Technological level) + β_4(Environmental product innovation) + β_5(Resources) + β_6(Environmental product innovation x Resources). 2) Competitive advantages = β_1(Size) + β_2(Age) + β_3(Technological level) + β_4(Environmental process innovation) + β_5(Resources) + β_6(Environmental process innovation x Resources).*

DISCUSSION AND CONCLUSIONS

The aim of this research was to study the impact of resources on competitive advantages of small agricultural businesses and the moderating role of environmental innovation in the relationship. The research was based on the core arguments from R-A theory. In the literature, R-A theory insufficiently considers environmental issues. Therefore, this paper proposed the need for an extension or evolution of the theory towards the consideration of environmental issues. Environmental innovation was considered as a moderator of the relationship between resources and competitive advantages.

The study results demonstrate the structure of factors of R-A theory in the context of the research by finding that a comparative advantage in resources yields a marketplace position of competitive advantage, according to Hunt and Morgan (1995, 1996). This implies that, as in conventional companies, small agricultural businesses having more tangible and intangible resources have greater competitive advantages in the market. This result is consistent with previous results (Kaleka, 2002; Omerzel & Gulev, 2011). However, contrary to these earlier studies, this research found that although both types of resources have significant influences, tangible resources are more impactful on the competitive advantages of small agricultural businesses. This context is characterized by limited access to tangible resources (physical and financial). So, small agricultural businesses that have more infrastructure, equipment and financing are more productive and can generate offers of higher value and lower costs than their competitors. Resources were found to have a greater influence on competitive advantages of low costs. This result indicates that although resources influence both types of competitive advantages, given the nature of agricultural products, they have a greater influence on reducing costs than on obtaining differentiated products.

Although the R-A theory has had a strong theoretical development, the incorporation of environmental issues in its foundations is barely noticeable. This research offers empirical evidence supporting the approach of Hunt (2011b), who argued that many concepts, strategic approaches and discussions of the field of environmental management, such as sustainable marketing, are consistent with the structure and the fundamentals of R-A theory. R-A theory refers to innovation as a key factor in the competitive processes of firms (Hunt, 2011a; Hunt & Duhan, 2002).

The results provide evidence suggesting that environmental innovation moderates the relationship between resources and competitive advantages. The supported argument states that, like any innovation, environmental innovation also creates value for customers and superiority over competitors (Forsman, 2013). Both types of innovation are an outcome of the process of competition and also an outcome of the process of competition. Further, considered as a general theory of competence, R-A theory encompasses diverse knowledge where environmental issues have a place. This suggests that environmental innovation can further increase the productivity of resources and make companies more competitive, as stated by Porter and Van der Linde (1995). The results imply the relationship between resources and competitive advantages is enhanced when the implementation of environmental innovations is high.

Small agricultural businesses must strive to obtain greater and better resources and competitive advantages, but they must also implement environmental innovations to be more competitive in the market. The findings here reveal the applicability of R-A theory in less traditional contexts such as the case of the agricultural sector of a developing economy. The agricultural sector differs in structure and functionality from conventional companies in developed economies.

This study has a number of limitations, which also represent fertile directions for future research. First, the sample was not random due to the lack of a formal database indicating the specific location of the greenhouses. By having access to this information, future research could use it to determine a random sample. Second, because the surveys were specifically applied in the context of small agricultural businesses producing greenhouse tomatoes, the generalization of the results may be limited. Therefore, to increase the generalization of results, it may be useful to conduct a comparative study between two or more different contexts. Third, perceptual measures were used to quantify the variables. Future studies could use complementary objective measures. Finally, the study uses cross-sectional data. Future studies can use multiple cross-sectional analyzes in different time frames to improve the generalizability of the results.

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BIOGRAPHY

Gricelda Juárez-Luis, corresponding author, is a doctoral student at the National Polytechnic Institute, Mexico Oaxaca CIIDIR unit. Her research interests are institutional environment, competitive strategies, and environmental management in SME´s. She can be contacted at Instituto Politécnico Nacional – CIIDIR Unidad Oaxaca, México, Santa Cruz Xoxocotlán, Oaxaca.

Patricia S. Sánchez Medina, PhD, is professor in the Management Department at National Polytechnic Institute –CIIDIR Oaxaca, Mexico. Her research interests are environmental management in subsistence business and fragmented industries. Within this research area, she has development and participated in several research projects. Her recent research is in the field of sustainability in family businesses. Dr.

Sánchez-Medina can be contacted at Instituto Politécnico Nacional – CIIDIR Unidad Oaxaca, México, Santa Cruz Xoxocotlán, 71230 Oaxaca.

René Díaz-Pichardo is Ph. D and professor at South Champagne Business School & Université de Technologie de Troyes, France. His research interests are business strategies, business management and marketing. Dr. Díaz-Pichardo can be contacted at South Champagne Business School, France, Troyes Cedex, France or at Université de Technologie de Troyes, Troyes Cedex, France.