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Diversification in Spanish Dairy Farms: Key Drivers of Performance

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Abstract

Recent downward trends in milk prices and the abolition of European Union (EU) milk production quotas have raised questions among Spanish farmers exploring whether diversification initiatives are profitable. The objective of this paper is to provide empirical evidence measuring the financial performance of value-added dairy farm ventures. The study analyzes forty-nine farms in Northern Spain that have diversified activities through milk commercialization and related niche products. Data collected through in-depth interviews with farmers shows that knowledge management, management control systems (MCS) and a differentiated value proposition for customers positively affect performance. Contrary to what is expected, networks and the technological level of the ventures (innovation of the production process and the use of IT systems) do not assure positive performance outcomes.

Keywords: farm diversification, resource-based view, balanced scorecard, Spain, dairy farms

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Introduction

The restructuring of the agricultural sector resulting from globalization and the Common Agricultural Policy (CAP) reforms in the European Union (EU) has driven numerous farms to defend their competitive position via diversification activities (Rønning and Kolvereid 2006; Grande 2011; Vik and McElwee 2011). One type of diversification promoted by the EU and supported by the new CAP 2014–2020, consists of incorporating value-added to agricultural products through food processing and direct marketing (Santini and Paloma 2013).

Specifically, in the EU since 2003, a series of reforms to CAP have led to market forces now being the main determinant of milk prices. Consequently, milk prices have fallen due to cuts in intervention prices, becoming more in line with world prices. After the latest CAP reforms and quota abolition in 2015, both farmers, as well as the processing industry will need to learn how to survive in a more market-oriented context. Most producers are characterized by low bargaining power in the food chain and are focused on milk production as a commodity—the price of which is highly volatile and dependent on global market conditions.

Although annual milk production in the EU exceeds consumption of dairy products, milk production in Spain does not cover the Spanish demand. Total milk consumption in Spain amounts to approximately 9.5 million tons of milk equivalent, and only 74% of which is covered by domestic production. The deficit between domestic consumption and production is supplemented with imports, almost all of which come from other European countries. Cheese accounts for more than half of these imports. The Spanish dairy industry is focused on liquid milk, and the store brands have 55% of the market share of drinking milk and fresh products. With the removal of quotas, there is an opportunity to improve the level of coverage of domestic demand, although there are new threats such as competition from other European countries that are expanding production and the risk of abandonment of production in less competitive regions (Sineiro and Vázquez 2014).

In this context, there are dairy farms that try to survive adopting a niche market strategy that is more attentive to local food demand, getting into the business of processing and adopting more sophisticated marketing schemes. The definition of the term ‘local food’ applied in this work is focused on the quality dimension as opposed to the geographical dimension of the concept. Under this approach the product is not necessarily consumed in the same region or locality of origin and ‘is identified and distinguished using product labels, certification systems and other production parameters such as artisanal, traditional, farm-based, organic or natural to define and differentiate the quality of the specific product coming from a geographic area’ (Abatekassa and Peterson 2011: 44). These initiatives allow farmers to reduce risks such as those related to over-dependence on a small number of clients and the downward pressure on agricultural and livestock raw material prices exerted by the agri-food industry and large-scale distribution companies. Nevertheless, direct marketing strategies generate new commercial risks, as well as increased costs due to, among others, additional labor force requirements (Santini and Paloma 2013).

Value-added ventures may provide a way of supporting milk production in less favored areas after quota abolition (Committee of the Regions 2014). Moreover, local products can be a source of a differentiated supply with future export potential, as in the case of Italy— a country with milk production below consumption and at the same time with significant exports of traditional

cheeses (Jongeneel 2011: 250). Different agents with interests in the dairy sector, such as entrepreneurial farmers, their advisers, and public administrations, are interested in understanding the critical factors that explain the success of these value-added ventures.

This study explores the effect of intangible resources and capabilities on the performance of rural enterprises that diversify their activity via new value-added business. For this purpose, we have studied the case of Spanish dairy farmers that have undertaken this type of entrepreneurial initiative through the elaboration and commercialization of different dairy products such as, among others, liquid milk, cheese and yogurt.

A growing amount of literature exists in relation to the diversification of agricultural holdings and the potential advantages that this type of business strategy offers: increased profits, positive effects on employment, introduction of business dynamics, the stabilization of rural populations (e.g. Carter 1998, 2001; Barbieri and Mahoney 2009; Grande 2011; Vik and McElwee 2011). Thus, previous studies have explored the different types of diversification in the agricultural sector (McNally 2001; McElwee and Bosworth 2010) and the motives underpinning these initiatives (Barbieri and Mahoney 2009; Vik and McElwee 2011; Amanor-Boadu 2013). However, few empirical studies have uncovered evidence on the effect of diversification on financial performance. In fact, the evidence available suggests that the expected profits are not always achieved, further highlighting the need for more research on the factors influencing the economic success of these types of strategies.

A review of the research suggests that there is not a consensus about the main explanatory factors of performance, perhaps because the theoretical literature on rural entrepreneurship is still incipient (Pato and Teixeira 2013). This also explains in part the predominance of qualitative research, which has resulted in different authors demanding statistical studies in order to improve the validity of results (Haugen and Vik 2008; Grande 2011; Walley et al. 2011).

The objective of this paper is to help fill the research gaps described above and provide empirical evidence regarding the performance drivers and diversification strategies of milk processing and the sale of dairy products. For this purpose, we use a conceptual model based on the Balanced Scorecard framework (henceforth, BSC) (Kaplan and Norton 1992) that reflects how value is created in firms.

The BSC is the performance measurement model receiving the greatest attention from companies and researchers in management in recent years. The principal advantage of BSC is that it offers a template in which financial-related measures complement other operational, non-financial measures of customer satisfaction, internal processes, learning, and growth. The non-financial measures grant some insight into those intangible resources (such as human capital) and capabilities which, according to the resource-based view (RBV), play a decisive role in the performance of new farm-based ventures (Grande 2011; Grande et al. 2011; Walley et al. 2011). The financial and non-financial measures are linked by causal relationships which reflect the value-creation process in companies (Bryant et al. 2004).

The empirical analysis has used data provided by a sample of forty-nine dairy farms located in Northern Spain to study whether knowledge management, networks, internal processes (application of management control systems or MCS and technological level) and customer value proposition have an influence on financial performance. In order to test the established

hypotheses between drivers and performance, a model of structural equations is employed applying the technique of Partial Least Squares (PLS).

Subsequent sections of this paper are organized as follows: a literature review and development of the research hypotheses and methodology employed in the study; a presentation of results and discussion of contributions; followed by a section presenting the conclusions and limitations of the study.

Theoretical Framework and Hypotheses

Resource-Based View

The resource-based view (RBV) supports the idea that in order to create and maintain a sustainable competitive advantage, organizations should develop internal capabilities which allow them to optimize resources and achieve greater returns (Teece et al. 1997). Resources include diverse elements which can be used to implement strategies for the creation of value for a firm and can be classified as physical, human and organizational. Those resources considered valuable, rare, inimitable and non-substitutable, can lead to the achievement of a sustainable competitive advantage which cannot be easily replicated by competitors (Eisenhardt and Martin 2000).

Although possessing resources that are difficult to imitate assures that an organization has the potential to improve its performance in the long-run, it's the firm's ability to exploit them that permits a sustainable competitive advantage over time (Eisenhardt and Martin 2000). Organizational capability can be defined as the firm's ability to use resources: integrate, reconfigure, gain and release resources—to match and even create market change (Teece et al. 1997). Among those capabilities necessary for achieving competitive advantages are organizational learning, networking capability, innovation, market orientation and entrepreneurial spirit (Henri 2006; Chen et al. 2009).

The RBV has been used in previous studies of farms which have followed initiatives for diversification (Alsos and Carter 2006; Grande 2011; Grande et al. 2011; Walley et al. 2011). A review of this research suggests that intangible assets, such as human capital, or determined business capabilities, such as organizational learning, networking or entrepreneurial spirit play an important role in the economic success of agricultural diversification.

The Balanced Scorecard (BSC)

The Balanced Scorecard (BSC) is, probably, the most popular and widely known among causal performance measurement approaches. The BSC was developed to overcome the tendency of managers to focus almost exclusively on short-term financial performance measures while disregarding non-financial performance measures (Kaplan and Norton 1992). The BSC framework measures the performance of an organization from four perspectives, one financial and three non-financial: learning and growth, internal processes and customers.

The model includes lag measures (measures of results such as financial) with lead measures (performance drivers, such as the skills of human resources, new products introduction or customer satisfaction) for the four perspectives already mentioned and linked via causal

relationships. This can be described as a relatively simple value-creation process where each perspective incorporate outcome measures that are drivers of only the next perspective in the hierarchy (Bryant et al. 2004): learning and growth → internal processes → customers → performance. However, previous empirical work has shown that the causal relationships between perspectives can be seen more as a 'complex' value-creation process, in which the improvement of each perspective not only affects the next one in the hierarchy ('simple' value-creation process) but also the rest of the higher level perspectives (Bryant et al. 2004; Cohen et al. 2008; Bento et al. 2013).

Although the BSC is used mainly as a management tool, in this study we use it as a conceptual framework in order to articulate the links between leading inputs, processes, and lagging outcomes (Abernethy et al. 2005). On the other hand, the inclusion of non-financial measures proposed by BSC allows us to reflect those intangible resources and capabilities that, as mentioned above, could explain the economic success of agricultural diversification. Furthermore, BSC is sufficiently flexible to allow the incorporation of variations to suit each organization.

Using the BSC framework, Figure 1 displays our research model, where H_i are the hypotheses. The model shows that the learning and growth perspective (human capital and networks) influences the internal processes (application of management control systems or MCS and the level of technology), which in turn affects the customer value proposition (offer of a traditional product with high standards of welfare, environmental or of another type), which impacts performance. Additionally, in line with the 'complex' value-creation process, each perspective influences all the higher-level perspectives. The discussion of the variables used and the causal relationships proposed are summarized below.

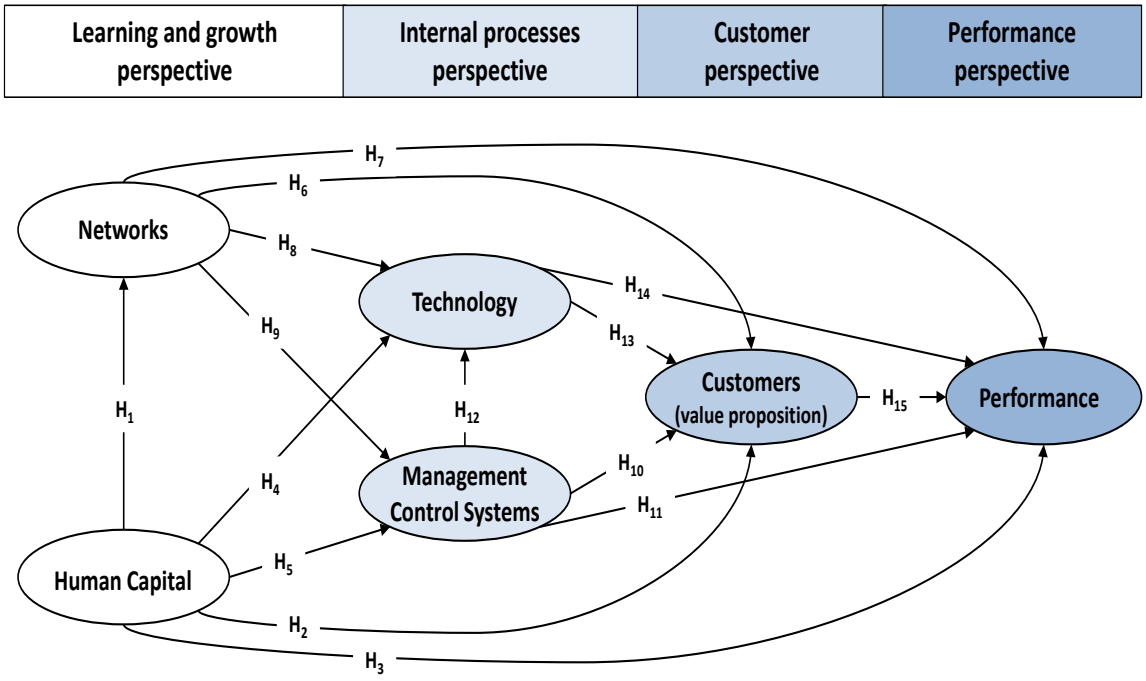

Figure 1. Research Model

Financial Perspective: Performance

The financial perspective describes the results of the strategy in traditional financial terms. The metrics included in this area are considered lagging measures since they are the result of previous actions, mainly of a qualitative nature.

The goals that drive the decision to undertake diversification initiatives are both financial and non-financial, such as the continuance of farming, or the enhancement of family's quality of life (Barbieri and Mahoney 2009), so an appropriate measurement of performance should include financial and non-financial indicators. Nevertheless, previous studies of the sector have only used financial indicators to reflect performance (Skuras et al. 2005; Alsos and Carter 2006; Grande et al. 2011), in part, because the generation of additional income continues to be the predominant objective, given the economic nature of any business venture.

Furthermore, various studies use qualitative metrics (based on the perceptions of the businessmen interviewed) of financial performance, where the firm compares itself to competing firms within the same industry (Alsos and Carter 2006; Grande et al. 2011). The use of qualitative indicators tries to overcome some of the limitations found in quantitative indicators based on accounting data. Hence, accounting profit can experience an alteration due to the way the accounting criteria is applied and can be understood more as a measure of past rather than present or future success. Moreover, accounting data for farms is not always readily accessible.

Learning and Growth Perspective: Human Capital and Networks

The learning and growth perspective reflects the intangible assets necessary for achieving the other three perspectives (Kaplan and Norton 2000). A review of the literature reveals two critical assets in agricultural enterprises: human capital and networks.

Human capital management. Human capital comprises a combination of skills, aptitudes, and attitudes of the employees. Previous studies have found a positive effect of human capital in the returns from agricultural holdings (Skuras et al. 2005; El-Osta 2011) and underlined its importance for diversification (Haugen and Vik 2008). These papers use proxy measures such as age and/or the education of the entrepreneur in order to reflect the human capital employed. However, human capital management goes far beyond the level of human capital possessed by the manager of the farm.

Farms which embark upon diversification initiatives tend to be characterized as being micro-enterprises containing a significant family labor component, closely related to the entrepreneurs and the persons responsible for decision-making. The success of these initiatives is determined to a great extent by the capacity of persons to work as a team and to establish agreements with other entities. In order to achieve competitive improvements in production and commercialization, workers must display a proactive attitude towards building new knowledge which can be shared and applied.

Thus, appropriate knowledge management is required, and the following hypotheses are proposed:

H1: Knowledge management is positively related to the creation of appropriate networks.

H2: Knowledge management is positively related to the customer value proposition.

H3: Knowledge management is positively related to performance.

H4: Knowledge management is positively related to the level of technology.

H5: Knowledge management is positively related to the use of MCS.

Networks. The capacity for networking (also known as social capital, external links or personal networks*)* refers to the ability to identify, establish, coordinate and develop relationships with different market 'players' (Chen et al. 2009). The use of networks facilitates access to information, resources, and markets. Its importance will be greater for small and rural enterprises facing less favorable conditions in terms of location, information sources, market proximity, and the possibility to develop their own R&D (Grande et al. 2011). The appropriate networks can help them to maintain themselves updated with respect to new technologies and market changes, contributing towards offering adequate responses to opportunities or emerging threats (Chen et al. 2009).

In the literature on agricultural diversification, various studies have highlighted the important role played by the construction of formal (professional) and informal networks (social) in the success of new initiatives (Clark 2009; Grande 2011). Other work reveals that networks can also be prejudicial if relationships are unbalanced, in particular—those formed with large distribution companies, or excessively traditionalist—those preoccupied with preserving craft knowledge (Alsos and Carter 2006; Blundel 2002).

Based on the above and given the possible importance attributable to the construction of appropriate networks for obtaining information, resources and knowledge in the farms developing new projects, we pose the following hypotheses:

H6: The ability to construct networks is positively related to the customer value proposition.

H7: The ability to construct networks is positively related to performance.

H8: The ability to construct networks is positively related to the level of technology.

H9: The ability to construct networks is positively related to the use of MCS.

Internal Business Processes Perspective: Management Control Systems and Technology

This perspective identifies the key processes necessary to provide a customer value proposition (Kaplan and Norton 1992). Two internal processes can be considered relevant for accomplishing the value proposition: the use of MCS and the technological level of the farm (innovation and quality in the production process and use of IT systems).

Management control systems (MCS). Although the management capacity of dairy farms has normally been treated in the literature as a 'black box' due to the complexity of its measurement, some papers have considered this key factor as a way of improving farm efficiency (Hansson

2008). Previous studies in other sectors acknowledge the effect of the use of MCS on economic results (performance) and its importance in the innovation process (Chapman 1997).

Furthermore, for the value proposition to be sustainable, customers should be prepared to pay a premium price for the attributes which they perceive in the product. Achieving prices which are not too high in relation to conventional products demands cost control from those holdings focused on local farming.

Consequently, it can be hypothesized that the use of MCS allows appropriate decision-making which contributes to an improvement in the value proposition to customers, internal processes and, ultimately, will positively affect the economic results of the company:

H10: The use of MCS is positively related to the customer value proposition.

H11: The use of MCS is positively related to performance.

H12: The use of MCS is positively related to the technological level.

Technology. The level of technology refers to the processes which contribute towards fulfilling customer expectations: innovation and quality of the production process and the use of IT systems. In the food sector, innovation includes the adoption of new technologies which allow companies to achieve higher quality standards, new ways of presenting traditional products, diversification of the products offered or new functions incorporated into products (Capitanio et al. 2010). In fact, for the farms focused on value-added processing, innovation does not imply outlays of R & D, but instead is implemented, for example, by increasing their portfolio with higher value-added products or by differentiated packaging; likewise, holdings seeking a certificate of protected designation of origin (PDO), or an organic label require investment in the technology of the production process which will permit them to maintain constant quality standards adapted to the conditions required by the appropriate regulatory board.

Furthermore, the capacity for market orientation can be defined as the generation by the organization of market information on present and future consumer needs, dissemination of this information among personnel and the response by the whole organization to it, in a search for increased returns (Kohli and Jaworski 1990). The use of IT systems facilitates information flows and permits a substantial improvement in all administrative activities within the companies.

In light of the above, it is suggested that the technological level has a positive effect on the customer value proposition (providing attributes valuable to the latter such as traceability, the PDO label, etc.) and on performance (more modern and efficient technology and the use of IT systems that can contribute towards cost control):

H13: The technological level is positively related to the customer value proposition.

H14: The technological level is positively related to performance.

Customer Perspective

This perspective defines the value proposition used by the company to secure sales from target customers. A generic measure of this appearing in the BSC found in the majority of organizations is

client satisfaction, although other attributes should be considered in accordance with the value proposition which, if satisfied, allows the company to retain and expand its client database (Kaplan and Norton 2000).

Farms which undertake initiatives of processing and commercialization of traditional products have little margin to compete price wise in terms of economies of scale. Their strategy is based on industry differentiation, and they seek to achieve a market niche populated by consumers who demand traditional products requiring high *welfare* standards, environmental or otherwise (Gilg and Battershill 1998). Different studies show that consumers like purchasing local agri-food from products for varying reasons, such as environmental, a quality perception of these products, contribution to the maintenance of rural economies and communities, etc. (Santini and Paloma 2013). Based on this the following hypothesis is posed:

H15: The ability to fulfil the customer value proposition is positively related to performance.

Methodology

Sample Selection and Description

Although most of the milk produced by Spanish dairy farms is sold directly to the processing industry, a certain number of entrepreneurial farmers have embarked on the implementation of diversification strategies. No specific register exists for dairy farms that perform activities of production and commercialization of dairy products and for this reason we resorted to identifying them through searches on the Internet and enquiries to agents from the dairy sector (cooperatives, advisors, producer organizations, regulatory organisms of the different PDO and organic agriculture, etc.). This study centred on four regions of Northern Spain (Asturias, Cantabria, Galicia and the Basque Country), where according to 2013–2014 data supplied by the Ministry of Agriculture, Food and Environment, 79% of the farmers and 59% of Spanish dairy production is located (Ministerio de Agricultura 2015). Collaboration was requested from the eighty cases identified, resulting in the participation of forty-nine farms—fourteen of which are certified organic and of the product references sold, 16% possessed a PDO label.

In the early months of 2011, an initial draft of the questionnaire was prepared. During the last months of 2011 more than twenty interviews were held with farms owners in order to achieve the best possible knowledge concerning the activity being undertaken. The study also benefited from a collaborative group of twenty-five Spanish experts possessing in-depth knowledge of the dairy activity and the rural sector (farm advisers, scientists, farm union staff, government representatives, industry managers, etc.), who provided opinions regarding successful farming diversification initiatives. For these experts, the most important factors were the management ability of farmers and the differentiation of their production within the market via various channels such as packaging, direct contact with consumers, sales in specialized shops, PDO, an organic label, and the attributes of the local and traditional product.

The results from this process were used to elaborate the definitive questionnaire used during 2012 in order to collect information for use in this study via on-farm interviews.

The sample answers revealed the following characteristics of interest corresponding to the data for the year 2011:

- The median quantity of processed milk per farm amounted to 280,000 liters, with percentiles of twenty-five and seventy-five, equal to 146,000 and 450,000 respectively. Approximately 50% of the sample farms transforms more than 40% of the milk produced on the farm, with 24% of the sample farms processing a volume of milk surpassing that produced by their herd, subsequently requiring external procurement of the milk. Cheese represents 54% of total sales, liquid milk 23%, yogurt 11% and other products 12%.
- In terms of marketing channels, sales to end consumers represents 35%, hospitality 21%, shops 30%, and large-scale distribution 14%.
- The average amount of investment dedicated to processing and marketing of dairy products amounted to Euros 258,500 per farm, 76% allocated to assets related to milk processing and the rest of product marketing and distribution.
- The average number of workers per farm was 4.8: approximately two-thirds of these were engaged in activities related to the processing and marketing of products, with the remaining third being assigned to the livestock activity.

Variables

Each variable was constructed through various items, using as previous reference papers and, in some cases, adapting them to the characteristics of the dairy farms. The constructs used in the analysis are presented in Table 1.

The dependent variable, performance, was constructed using three items. The interviewees were asked what they considered the situation of their company to be compared with competitors in terms of (a) optimization of the investment in assets, (b) competition from the company and (c) profitability of the company. A 5-point Likert scale was used to quantify the answers in each case, ranging from 1, ‘very inferior to competitors’ to 5, ‘very superior to competitors’.

The independent variables were constructed using the items shown in Table 1. For the purpose of measuring the perspectives for learning and growth and for internal processes the interviewees were asked to value the degree of implementation of the different practices over the past three years on a scale ranging from 1, ‘very little implementation,' until 5, ‘a lot of implementation.' In order to measure the customer perspective, interviewees were asked to value three aspects of their company as compared with the competition: (a) ability to make quality products, (b) the responsibility of the company with respect to the environment, (c) customer satisfaction. The measurement of each item was conducted with a scale ranging from 1, ‘very inferior to competitors’, until 5, ‘very superior to competitors’.

Table 1. Constructs used in the analysis

Items	Previous Studies
Financial Perspective: Performance	Alsos and Carter (2006);
(From 1, 'very inferior to competitors', until 5, 'very superior to competitors')	Grande et al. (2011)
P1. Optimization of the investment in assets	
P2. Competitiveness of the company	
P3. Profitability of the company	
Learning and Growth Perspective	
(From 1, 'very little implementation', until 5, 'a lot of implementation')	
Human Capital	Bontis et al. (2000);
HC1. Workers propose innovations in the tasks related to production & processing	Massa and Testa (2009)
HC2. Workers benefit from continuous learning dynamics	
HC3. Workers share new knowledge with colleagues	
Networks	Clark (2009)
N1. A working relationship is established with customers	
N2. A working relationship is established with competitors	
N3. A working relationship is established with other agri-food companies	
Internal Business Processes Perspective	
(From 1, 'very little implementation', until 5, 'a lot of implementation')	
Management Control Systems (MCS)	Chenhall and Langfield-Smith (1998);
MCS1. Calculation and analysis of product costs and/or services for decision-making	Henri (2006);
MCS2. Feasibility studies for investments	Hansson (2008)
MCS3. Economic and financial analysis of the company´s situation	
MCS4. Profitability analysis of products and services	
Technology	Maranto-Vargas and Gómez-Tagle (2007);
T1. Mechanisms exist for obtaining, transmitting and sharing information of interest to the company	Van Hemert et al. (2013)
T2. Information technologies are usually employed	
T3. The company usually proposes innovation with respect to the production process	
T4. It procures to avail itself of the necessary means in order to perform the major part of the company´s production process	
Customer Perspective	Gilg and Battershill (1998);
(From 1, 'very inferior to competitors', until 5, 'very superior to competitors')	Santini and Paloma (2013)
C1. Ability to make quality products	
C2. Responsibility of the company with the environment	
C3. Customer satisfaction	

Partial Least Squares (PLS)

We use PLS to analyse the hypotheses proposed. PLS is a technique based on structural equations that allows specification of models with complex relationships between observable and latent variables. A latent variable is not directly observable, being instead a construct made from other variables that theoretically form (formative indicators) or reflect (reflective indicators) a factor of interest for the study (represented by the latent variable). This technique has been widely used to analyse relationships between variables obtained from survey responses.

PLS path modelling is recommended in the early stage of theoretical development in order to test and validate exploratory models, being particularly suitable for prediction-oriented research (Henseler et al. 2009).

A PLS path analysis is based on two models, one of which is a measurement model, also called the outer model, relating the indicators to their own latent variable, and a structural model or inner model, relating some endogenous constructs to others. In our measurement model we use reflective indicators, which implies that the non-observed construct gives rise to observed indicators. PLS works well with small samples and complex models. The size of our sample, forty-nine cases, complies with the recommendations on the minimum sample size set by Hair et al. (2014: 20-22).

Estimation and Results

Measurement Model: Internal Consistency

The measurement model addresses relationships between each construct and its indicators and is based on the calculation of the principal components. The constructs must fulfil certain internal consistency properties: unidimensionality, reliability, convergent validity and discriminant validity.

Unidimensionality. A principal component analysis is carried out for each construct. A construct may be considered unidimensional if the eigenvalue of the first principal component is greater than 1 and smaller than 1 for the others. Another important factor is the percentage of variance explained: the first component being required to explain most of the variance. Table 2 shows that the requirement of unidimensionality is met for all the constructs analyzed.

Reliability. This measures the consistency of the indicators that make up the construct. All of the indicators should be measuring the same concept. Cronbach's alpha (Cronbach 1970) and the composite reliability (Werts et al. 1974) are calculated, ranging from 0 (absence of homogeneity) to 1 (maximum homogeneity). Cronbach's alpha assumes a priori that each indicator of a construct contributes in the same way, while the composite reliability uses the loadings of items as they exist in the causal model. When speaking of reliability, the usual requirement is that the values of both indices should be above 0.7. It can be seen in Table 2 that these indices exceed this minimum threshold in all cases.

Table 2. Unidimensionality, reliability and convergent validity of constructs.

Constructs and indicators	Unidimensionality				Reliability		Convergent Validity	
	Eigenvalue		(%) Variance explained by		Cronbach's α	Composite Reliability	AVE	Loadings
	1st P.C.	2nd P.C.	1st P.C.	2nd P.C.				
Networks	3.44	.84	68.76	16.91	.767	.858	.671	
N1. Customers								.903
N2. Competitors								.746
N3. Other agri-food companies								.800
Human Capital	2.61	.44	80.17	13.64	.876	.921	.797	
HC1. Workers propose innovations								.828
HC2. Workers in learning dynamics								.923
HC3 Workers share knowledge								.924
Performance	1.92	.56	68.24	19.98	.767	.865	.683	
P1. Investment optimization								.774
P2. Profitability								.895
P3. Competitiveness								.807
Customers	1.29	.37	71.07	20.70	.748	.856	.667	
C1. Quality								.908
C2. Environmental Responsibility								.780
C3. Customer satisfaction								.755
MCS	3.67	.57	71.68	11.18	.865	.904	.705	
MCS1. Cost calculations								.765
MCS2. Feasibility studies for investments								.823
MCS3 Financial analysis of the company								.881
MCS4. Profitability analysis of products and services								.884
Technology	2.63	.67	62.02	25.75	.776	.855	.599	
T1. Information systems								.825
T2. Use of IT								.829
T3. Innovation in the production process								.634
T4. Production process performed entirely by the company								.792

Convergent validity. This is the degree to which the indicators reflect the construct. The Average Variance Extracted (AVE) indicates the extent to which the construct variance can be explained by the chosen indicators (Fornell and Larcker 1981). The minimum recommended value is 0.5 (Baggozi and Yi 1988), which means that over 50% of the variance of the construct is due to its indicators. Table 2 shows that the AVE of all the latent variables exceeds the value of 0.5. A second approach to analysing the fulfilment of convergent validity is to check whether the factor loadings of the principal component matrix are greater than a given value for each of the indicators. Jöreskog and Sörbom (1993) recommend a value greater than 0.5, while Chin (1998)

recommends a value greater than 0.7. The last column of Table 2 shows that the more stringent criterion (i.e., value greater than 0.7) is met in all cases except in one (T3).

Discriminant validity. This means that each construct should be significantly different from the other constructs. A factor loadings matrix was obtained to analyse the discriminant validity, as well as the cross-factor loadings. The factor loadings are Pearson correlation coefficients between the indicators and their own construct. The cross-factor loadings are Pearson correlation coefficients between the indicators and the other constructs. The factor loadings should be greater than the cross-factor loadings. Therefore, the indicators should be more closely correlated with their own construct than with the other constructs. This criterion is met in the proposed model, as shown in Table 3.

Table 3. Factor loadings matrix.

	Networks	Human Capital	Performance	Customers	MCS	Technology
N1	**.903**	.356	.179	.292	.465	.533
N2	**.746**	.218	–.210	.047	.199	.343
N3	**.800**	.314	–.045	.035	.186	.310
HC1	.230	**.828**	.346	.316	.087	.301
HC2	.235	**.923**	.393	.445	.179	.298
HC3	.462	**.924**	.395	.506	.395	.535
P1	.125	.331	**.774**	.360	.292	.030
P2	–.013	.391	**.895**	.50	.388	.073
P3	–.031	.325	**.807**	.445	.275	.093
C1	.190	.444	.536	**.908**	.338	.474
C2	.383	.451	.364	**.780**	.448	.463
C3	–.140	.284	.426	**.755**	.063	.251
MCS1	.181	.037	.182	.247	**.765**	.244
MCS2	.197	.195	.271	.173	**.823**	.230
MCS3	.405	.255	.397	.266	**.881**	.433
MCS4	.405	.338	.380	.441	**.884**	.472
T1	.433	.365	.103	.362	.385	**.825**
T2	.507	.231	.028	.290	.435	**.829**
T3	.306	.342	–.179	.278	.166	**.634**
T4	.335	.435	.198	.550	.350	**.792**

A second criterion for verifying the discriminant validity is to check that the square root of the AVE of the construct is greater than the correlation between that construct and all the others (Chin 1998). Table 4 shows the correlation coefficients between the constructs. The square root of the AVE is shown on the diagonal. The condition of discriminant validity is also met following this criterion. Furthermore, for Bagozzi (1994) the correlations between the different factors that make up the model should not be higher than 0.8—as occurs in this case.

Table 4. Latent variable correlations.*

	Networks	Human Capital	Performance	Customers	MCS	Technology
Networks	**.821**					
Human Capital	.370	**.893**				
Performance	.025	.424	**.827**			
Customers	.194	.488	.545	**.817**		
MCS	.387	.278	.390	.360	**.840**	
Technology	.509	.448	.080	.495	.444	**.774**

Note. *The square root of the AVE is on the diagonal

We have seen that the requirements ensuring internal consistency (unidimensionality, reliability, convergent validity and discriminant validity) are met. Latent variables can then be used to test the relationships in the model.

The Structural Model

PLS is used to estimate the structural equations with the aid of the SmartPLS software (Ringle et al. 2005), which allows standardized Beta regression coefficients called 'path coefficients' to be obtained. These coefficients are the basis for testing whether the proposed hypotheses are supported or not. Table 5 shows the standardized path coefficients and the *t* statistics. Because PLS makes no distributional assumption, traditional parametric techniques prove inadequate for analyzing the significance of the estimated parameters, and therefore resampling procedures such as bootstrapping are used. We applied a bootstrapping procedure with 5,000 samples that provides the standard error for each path coefficient. This information permits a Student's t-test to be performed for evaluating the significance of path model relationships.

The results shown in Table 5 reveal eleven significant path coefficients, allowing us the following observations:

- Knowledge management is associated positively with networks, customers, technology and performance, with no significant effect attributable to the use of MCS.
- The creation and development of networks affects the use of MCS and the technological level of these initiatives in a positive way. However it does not affect customers and performance significantly. These results would seem to indicate that networks have an effect on the internal processes of these farms, while not affecting in any direct manner the customer value proposition or performance.
- The use of MCS is associated in a direct way with the technological level and with performance, while it is not significant in relation to customers.
- The technological level displays two significant effects but with differing signs: a positive effect is associated with customers but a negative effect exists with respect to performance.

Table 5. Relationships between constructs.

	Beta	**t-statistic**
H1: Human Capital → Networks	.371***	2.67
H2: Human Capital → Customers	.348**	2.26
H3: Human Capital → Performance	.311*	1.93
H4: Human Capital → Technology	.261*	1.74
H5: Human Capital → MCS	.115	.96
H6: Networks → Customers	–.184	1.27
H7: Networks → Performance	–.119	.89
H8: Networks → Technology	.316***	2.59
H9: Networks → MCS	.330**	2.14
H10: MCS → Customers	.178	1.26
H11: MCS → Performance	.350***	2.58
H12: MCS → Technology	.249**	2.10
H13: Technology → Customers	.355**	2.25
H14: Technology → Performance	–.395***	2.70
H15: Customers → Performance	.487***	3.06

Note. *** 1% level of significance, ** 5% level of significance, * 10% level of significance

With a view to analysing the effect of control variables such as the age of the value-added venture and its size, estimations were performed with these variables but their effect on performance proved insignificant.

Table 6 shows the R^2, whose values measure the amount of variance of the constructs that are explained by the model. The R^2 of performance is 0.499. In order to evaluate the contribution of the remaining constructs to the R^2 for performance, the indicator f^2 effect size was determined to quantify the effect of the omission of each explanatory construct on the R^2 for performance. The interpretation of f^2 adopts the following threshold values: 0.02 for the small effect of the exogenous latent variable, 0.15 for the medium effect and 0.35 for the large effect (Cohen 1988). According to the values presented in Table 6 customers is the variable which exerts the greatest influence on the R^2 for performance.

The Q^2 test is used to assess the predictive relevance of the endogenous constructs. In line with our model, Q^2 values larger than zero imply that the model has predictive relevance. Similarly to f^2, the q^2 effect size is used to evaluate the relative effect of the remaining constructs on the predictive relevance of performance, showing that customers represents the construct with the largest impact.

Table 6. Evaluation of the structural model.

Constructs	R^2	f^2	Q^2	q^2
Networks	.137	.030	.086	.016
Human Capital	–	.136	–	.060
Performance	.499	-	.317	–
Customers	.373	.287	.237	.163
MCS	.171	.172	.110	.090
Technology	.389	.176	.229	.086

An analysis was performed of the total effects of each explanatory construct on performance. Using a bootstrapping procedure with 5,000 samples, t-statistics were calculated for each total effect, with those relating to customers, human capital and MCS being statistically different from zero, but not significant in the case of networks and technology (Table 7).

It is worth highlighting that these results are consistent with the valuation made by the panel of experts consulted, who indicated that the management ability of farmers and differentiation vis-à-vis the industry are the most relevant factors in the success of these new initiatives.

Table 7. Total effects on performance.

Constructs	Total Effects (Direct + Indirect)	t-statistic
Networks	–.153	.95
Human Capital	.425***	3.41
Customers	.487***	3.06
MCS	.381***	2.67
Technology	–.222	1.39

Note. *** 1% level of significance

Characteristics according to performance groups

With a view to describing the value-added ventures according to their level of performance, and thereby complement the results of the model described, the sample was ordered as per the estimated value of the variable performance to establish two groups, one with low profitability comprising twenty-five units with the lowest values and the other—high profitability, featuring twenty-four units with the highest values. Table 8 presents the average data for several of the variables which characterise the ventures as low or high, according to their level of performance.

Products are classified in four broad categories: liquid milk, yogurt, cheese and others. Four sales channels are considered: direct to final consumers, hospitality, shops and large-scale distribution.

The Mann-Whitney U test was used to investigate the existence of significant differences between the two groups. It is worth noting that the group with the high level of performance tries to adapt to a large extent its supply to different consumer segments and as such markets more product references, which correspond to different products and display formats. Likewise, the

'high' group centres its supply more on those products with more added-value than liquid milk, such as yogurt and cheese, just as the sales of organic products carry more weight in said group. These results are consistent with the importance of the customer value proposition as a variable which explains to a large extent the success of these initiatives of farming diversification.

We calculated the ratio for sales of dairy products to the investment undertaken for the processing and marketing of the former products, observing that the high performance group has the greater value, which supposes a higher level of asset turnover ratio in keeping with the behaviour of the construct performance. The return on investment in technical resources such as production installations, refrigeration and transport demands obtaining a specific total contribution margin to be reached with an adequate combination of sales volume and the per-unit contribution margin of the products.

Table 8. Characteristics according to performance groups.

	Low (25)	**High (24)**	**Significance**
Age of the venture (years)	13	10.2	
Sales of dairy products ('000s of €)	235.198	279.318	
Sales of liquid milk (%)	29	15.7	
Sales of yogurt (%)	8.3	14.4	*
Sales of cheese (%)	50.4	57.6	
Sales to final consumers (%)	32.7	34.8	
Sales to hospitality (%)	22.6	18.9	
Sales to shops (%)	27.7	31.7	
Sales to large-scale distribution (%)	13	14.6	
Number of product references	4.9	6.9	***
Organic farms (%)	16	41.7	**
Sales of organic products (%)	8.8	41.4	***
Sales of products with PDO (%)	18.3	26	
Number of workers on the farm	5	4.7	
Processing & marketing workers[1]	66.6	57.7	
Family workers (%)	52	66	
Sales of dairy products/Investment (€)	1.18	1.38	*

Note. [1]Percentage of total workers. *** significant difference at 1% level, ** significant difference at 5% level, * significant difference at 10% level

Discussion

A consequence of a more open and competitive EU dairy market has been the development of new initiatives in order to incorporate value-added into the production of farms, including the elaboration and commercialization of different dairy products such as liquid milk, cheese, yogurt and others. This study explores the effect of intangible resources and capabilities on the performance of these value-added ventures using original qualitative data from forty-nine

Spanish farms obtained through in-depth interviews. We applied a BSC framework in order to articulate the links among intangible resources, capabilities and performance, and thus describe the value creation process in these ventures.

We used a qualitative measure of performance where the firm compares itself to competing firms within the same industry. This measure is based on farmer's perceptions and represents the present and future success of the business. In this way we overcome some of the limitations of indicators based on accounting data. In accordance with previous studies of the farm sector (Skuras et al. 2005; Grande et al. 2011), we decided not to use financial data as part of our study since it was not easily accessible, difficult to standardize, and perceived as being less reliable.

Although there are Spanish dairy farms enrolled in voluntary record-keeping programs conducted by cooperatives and regional governments, these systems provide information about livestock activities but not value-added ventures. Moreover, the farms that have implemented the value-added initiatives are geographically dispersed and heterogeneous in their production systems and in market orientation, which makes it difficult to implement a specific record-keeping system.

However, the design and implementation of a management accounting system would be of great help when it comes to performing benchmarking processes, based on technical and homogeneously-calculated economic indicators (revenue, variable costs and contribution margins for each product, revenues and unit costs of the products according to the distribution channels, overheads, production capacity and level of use of production capacity, etc.). These financial indicators would be useful for studies about farm venture success.

Our results show that knowledge management, the application of MCS and the value proposition to customers have a positive effect on performance, while networks and the technological level did not generate the expected effects. Knowledge management is a basic factor in the success of these ventures, so farmers, advisers, governments and different entities interested in them should favor training and learning processes in the dairy sector. This will contribute to positioning products attractively for customers as well as promote the efficient use of resources. Our results also identify weaknesses in the process of value creation of these farms, such as networks and technology, which should be analyzed in greater depth.

Although networks have a positive effect on internal processes, they do not significantly affect customers or performance. It seems that these farms should improve networks, which would help meet customer needs and increase business profitability. However, farmers frequently mentioned future projects containing new platforms aimed at improving marketing processes; exports and marketing via the Internet, which until now carried little weight in the farms. Similarly, farms dedicated to the production of cheese (certain PDO) with an important number of producers revealing a degree of disappointment because marketing strategies based on price cuts subsequently eroded profits. Likewise, although marketing agreements with large-scale distributors enable higher production volumes, they are accompanied by a perception that sales concentrated on a reduced number of important customers impose certain risks. Moreover, large distributors exert downward pressure on selling prices as compared with those obtained by direct sales to final consumers.

In Spain, cooperatives have a limited role in the transformation and commercialization of dairy products, with a market share of about 21% of the total milk processed (Sineiro and Vázquez 2014). With an aim at improving the effect of networks on the performance of value-added ventures, we understand that cooperatives face future challenges gaining prominence in marketing local dairy products. Furthermore, cooperatives could boost exports of these products.

Technology is relevant in producing and commercializing products which fulfil attributes valued by consumers. Nevertheless, investments in technical resources do not always ensure positive returns. Our results justify the role of technology in developing the value proposition to customers (positive effect: technology → customers) but we also observe an adverse effect on performance (negative effect: technology → performance), which could be related to an excess of productive capacity. In this regard, it was shown that ventures with lower performances also made lower sales per invested euro. Furthermore, despite investments in technology, not all ventures are successful—possibly because work force proficiency occurs over time.

Among the reasons accounting for the negative impact of technology on performance include: the existence of firms with sales levels inferior to their break-even point; the existence of substantial investments with a reduced level of use (excess capacity); and business models based on products and marketing channels with reduced profit margins. One such case concerned the sale of liquid milk via vending machines, requiring major investments. Farmers expressed serious doubts about the feasibility of this type of business.

Conclusions

Diversification via processing and direct marketing is one strategy that farmers can utilize to survive and maintain competitive positions in the global dairy market.

Building on the RBV, this work contributes to the literature using BSC as the conceptual structure to analyze the explanatory factors of performance through a sample of Spanish dairy farms which diversify their activities via production and product marketing.

Findings suggest that a differentiated value proposition, knowledge management and the use of MCS all have a positive effect on performance. A value proposition focused on quality products, coming from a specific geographic area, responding to the highest levels of environmental responsibility, and covering the attributes demanded by the consumers of this type of product contributes in a relevant way to the economic success of these ventures. Knowledge management is an important factor for organizing internal production and management processes with which to satisfy the customers value proposition and, ultimately, to achieve the economic objectives.

Our empirical analysis reveals that courses of action are needed to increase profits through improved technology and networks. According to the perceptions of farmers, the level of technology in the context of production and organization does not affect performance significantly, when considering the total picture. Something similar occurs with networks, which do not appear to have a significant effect on performance. Actually, the study adds to findings from previous research that networks can be very challenging (Grande 2011), or even prejudicial if relationships established are inequitable (Blundel 2002).

The reasons why technology and networks fail to contribute to economic success must be identified in order to find solutions. Therefore, new diversification initiatives in the dairy sector should pay special attention to obtaining technology which can be capitalized, as well as securing networks that can contribute towards improving performance. Excess capacity could be properly managed through agreements with other producers, suggesting the need to create networks that contribute to profitable investments in technology.

For management scholars, this study underlines the value of BSC as framework in order to articulate the links between those intangible resources and capabilities, that previous research suggest play an important role in the economic success of agricultural diversification. The results are consistent with a 'complex' value-creation process (Bryant et al. 2004), revealing a large variety of significant relationships among the factors contemplated. The results also support the 'simple' value-creation process represented by the hierarchical formulation of BSC (learning and growth → internal processes → customers → performance).

The results of this work can prove useful to entrepreneurial farmers, advisers and public administrations interested in promoting diversification initiatives. New diversification projects should be subjected to an appropriate feasibility study which contemplates all the relevant factors for its economic success, proposing business models which consider differentiation in an explicit way, through intangible resources and management abilities (customer value proposition, knowledge management, MCS, networks). In the design of new value-added ventures, farmers have to understand and pay attention to the links among all four BSC perspectives in order to not compromise the future feasibility of these initiatives.

Public policies to support farm diversification initiatives should not be restricted to investment in facilities and technology. In light of our results, these policies should also cover intangible resources and core competencies to achieve success in these ventures.

Finally, this work suffers from a number of limitations and possible lines of development exist that should be considered in future research. The sample size is small and refers to only one year, and therefore the results should be interpreted with due caution. On the other hand, the variable for performance has been measured qualitatively, employing the perception of the entrepreneurs with respect to the achievement of economic objectives. Future work should investigate in greater depth the study of economic results measured using different quantitative variables (ROI, ROE, Productivity). This requires the construction of accounting data bases based on homogeneous criteria, currently unavailable, which are crucial to developing benchmarking processes in order to improve the performance of these ventures. In the same way, further research is needed on how these farms use technology and networks in order to generate competitive advantage and explain what the weak points of this process may be.

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