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Business models in small and medium-sized cheese enterprises in Aguascalientes, Mexico

Modelos de negocio en pequeñas y medianas empresas queseras en Aguascalientes, México

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Abstract

The aim of this article is to analyze the particularities of the business models of the cheese agroindustry in Aguascalientes, in order to identify possible areas for improvement that will promote the growth of the cheese sector in Aguascalientes. A semi-structured survey was applied to 30 producers, descriptive statistics were used to identify the differences between them and, through a cluster analysis, the groups were integrated according to their business model; a canonical discriminant analysis was carried out for their classification, and the Business Model Structuring Index (IDEMN) was quantified. Based on the above, three business models were identified. I) the traditional, oriented exclusively to produce genuine cheese, process a low volume of milk per day and have low income; ii) the entrepreneurial, specializes in the genuine cheese market segment and is characterized by performing a greater number of key activities; iii) the multilateral, because it serves two segments, each with a different value proposition. It is concluded that companies with a more robust business model, which show better positioning and growth, have higher levels of IDEMN, with key activities and partnerships being the elements that most strengthen their presence in the market.

Keywords: Cheese agribusiness, business models, cluster analysis, cheese.

Resumen

El objetivo de este artículo es analizar las particularidades de los modelos de negocio de la agroindustria quesera en Aguascalientes, con el fin de identificar posibles áreas de mejora que fomenten el crecimiento del sector quesero de Aguascalientes. Se aplicó una encuesta semiestructurada a 30 productores, se utilizó estadística descriptiva para identificar las diferencias entre ellas y mediante un análisis de conglomerados se integraron los grupos de acuerdo con su modelo de negocio; se efectuó un análisis canónico discriminante para su clasificación, y se cuantificó el Índice de Estructuración de Modelo de Negocio (IDEMN). Con base en lo anterior, se identificaron tres modelos de negocio: i) el tradicional, orientado exclusivamente a producir quesos genuinos, procesan un volumen bajo de leche por día y tienen bajos ingresos; ii) el empresarial, se especializa en el segmento de mercado del queso genuino y se caracteriza por realizar mayor número de actividades clave; iii) el multilateral, porque atiende a dos

segmentos, cada uno con una propuesta de valor diferente. Se concluye que las empresas con un modelo de negocio más robusto, que muestran mejor posicionamiento y crecimiento tienen mayores niveles de IDEMN, siendo las actividades y asociaciones clave, los elementos que más fortalecen su presencia en el mercado.
Palabras clave: Agroindustria quesera, modelos de negocio, análisis de clúster, queso.

INTRODUCTION

The production of genuine and artisanal cheeses in Mexico has had a long trajectory. Its validation space has been the domestic kitchens, where through sensory verification it was possible to adapt flavors, textures and visual presentations to the taste of the Mexican consumer, little accustomed to tasting milk, although, contradictorily, an ancestral customer of these cheeses (Villegas de Gante & Cervantes-Escoto, 2014). Their elaboration is located in localized production systems, in addition to being the expression (as gastronomic ethnogoods) of a certain lifestyle and a delimited geographical and natural environment. According to Cervantes-Escoto *et al*. (2019) at the national level, about forty cheeses are genuine and 17 are produced only in an artisanal way. Just to name a few of them we can talk about Cotija cheese, "bola de Ocosingo", "Asadero", "Adobera", "Ground", "Trenzado" and "Prensa" cheese from the Costa Chica region of Oaxaca and Guerrero as the most popular, which gives a closer idea of the current potential of the traditional cheese activity in Mexico.

At the international level and according to what was reported by the OCDE/FAO (2020), cheese trade has shown an increase of 0.5% in 2020, compared to the 3.3% expressed during 2017-2019. In Mexico, cheese consumption per capita still remains relatively low at just over 2.5 kilograms, compared to other countries such as Argentina and France, where it is 14 and over 20 kg respectively (Lara & Alvarado, 2019; O'brien & O'Connor, 2017). However, the truth is that at the national level cheese production has increased at an average annual growth rate of 6.8 % in the period 2000-2019 (SIAP, 2019). With it, cheese consumers of all socioeconomic levels year after year, because cheese intake has been widely documented as a basic mechanism to obtain the adequate protein requirement. It also provides fats and nutrients that can be beneficial to health. Agüero *et al*. (2015) state that cheese consumption can have positive health effects, for example, it can prevent cardiovascular infarctions, decrease plasma triglycerides and increase high-density lipoprotein (HDL) levels.

In order to analyze the growth of markets and mechanisms used by the cheese sector in Mexico and specifically in Aguascalientes State, the birthplace of "Asadero" cheese, we chose to characterize the companies according to the "business model" implemented by each one. This concept has been a fundamental tool for analyzing the way in which companies in all sectors create, contribute and capture value. In addition, it is possible

to identify how they function and adapt to the environment, as well as how they develop their sales strategies and market positioning (Osterwalder & Pigneur, 2010). It should be noted, that changes in consumer trends and an increasingly digital, interconnected and knowledge-based global economy, has forced companies to constantly reconsider the type of business model adopted and if necessary its modification, in order to adapt to increasingly changing economic and business conditions (Fjeldstad & Snow, 2018).

Likewise, and according to Cervantes-Escoto *et al*. (2019), the increase in sales of artisanal and genuine cheeses depends heavily on the ability of factories to reach extra-local markets, that is, on the ability to articulate a strategy oriented to a specific value proposition. For this reason, this article analyzes the business models shown by cheese producing companies in Aguascalientes State. The aim is to identify areas for improvement that will foster the growth of the cheese sector in Aguascalientes, and to rescue lessons applicable to other artisanal cheese producers in Mexico, especially when they can access extra-local markets.

MATERIAL AND METHOD

Study area

The research was conducted in Aguascalientes municipality of Aguascalientes state (Figure 1) where livestock activity is an important source of employment, in general terms the state's agricultural sector contributes 14.6 % of formal jobs and it is estimated that around 30 % if informal jobs are included (CEPLAP, 2016). In this municipality 27.3% of the state's milk production is concentrated, likewise the entity ranks tenth in the country in fluid milk production by 2020 (SIAP, 2021) despite being the second state with the smallest territorial extension in Mexico. A significant portion of the state is an important dairy region both for the degree of technification developed and the average production obtained (Salas-Sánchez, 2013).

Figure 1. Geographical location of the study area

According to Ríos-Flores *et al*. (2016) specialized and semi-specialized systems contribute mainly to the generation of wealth in Zacatecas state, which shares climatic and economic characteristics with Aguascalientes, a state in which the agri-food sector contributes 9% of the state GDP (CEPLAP, 2016).

Identification of producers and data collection

Contact data for cheese dairies were obtained from INEGI's National Statistical Directory of Economic Units 2020 (DENUE), where 150 cheese dairies were identified, distributed in the state's 11 municipalities; however, more than 50 % of these are located in the capital city. Due to the existing difficulty, (not all the cheese dairies in the Aguascalientes municipality are within the Directory. In addition to the lack of incentives for entrepreneurs to participate in the research) to locate all the potential participants in the research, it was decided to use the non-probabilistic sampling method called Snowball (Wasserman, 2013), with which a sample of 30 cheese dairies could be obtained.

This method is described below:

1. Potential and willing subjects to participate in the research were identified from the DENUE database.
2. Respondents were asked to suggest other potential and additional subjects from the same target population, dedicated to the production and commercialization of cheese in Aguascalientes municipality.
3. Sampling ends when the suggested names become repetitive, a fact known as theoretical saturation.

Semi-structured surveys were applied to cheese producers, containing 74 items in total. The details of each section are described in Table 1.

Table 1. Sections and variables considered in the collection instrument

Section	Variables	
Producer profile	-Age	-Experience in the activity
	-Schooling	-Complementary activities
Characteristics of the production unit	-Length of service	-Product offering
	-Location	-Number of employees
	-Production objective	-Family members
	-Type of facilities - Volume processed	-Prices
	-Innovation adoption rate	-Sales volumes
Business model structure	-Customers	-Product promotion
	-Key partnerships	-Key production activities and resources
	-Marketing networks	

Source: Authors' own elaboration based on (Sánchez-Sánchez *et al.*, 2020; Aguilar-Gallegos *et al*., 2015)

The producer profile was analyzed to determine three important variables: age, schooling and experience in the activity, since these can influence the adoption of innovations (Sánchez-Sánchez *et al.*, 2020; Aguilar-Gallegos *et al*., 2015). The characteristics of the production units are important for classifying dairies according to their production levels (Cervantes-Escoto *et al.,* 2021); they are also variables that would explain the effects of using one or another structure of the business model.

Grouping and typification of cheese factory

To estimate the levels of complexity/structure of the business model, and the nine modules that compose it (Osterwalder & Pigneur, 2010), the business model structuring index (IDEMN) was created, for which the formula for calculating the innovation adoption index (INAi), proposed by (Muñoz-Rodríguez *et al*., 2007), was considered. The way it was calculated is described below:

For each cheese factory surveyed, its "Business Model Structuring Index by Category" (key partnerships, value proposition, market segment etc.) should be calculated using the following expression:

$$IDEMC_{ik} = \frac{\sum_{j=\ i}^{n} Activity_{jk}}{n}$$

Where:

$IDEMC_{ik}$ = Business model structuring index of i-th cheese factory in the k-th category.

Activity = Presence of the j-th activity in the k-th category.

n = Total number of activities in the k-th category.

The Business Model Structuring Index (IDEMN) for each of the cheese dairies is the result of averaging the IDEMC values, and it is constructed using the following expression:

$$IDEMN_i = \frac{\sum_{j=i}^{n} IDEMC_k}{K}$$

IDEMN = Business model structuring index of i-th cheese factory.
IDEMC = Business model structuring index of i-th cheese factory in k-th category.
K = Total number of categories

Additionally, Pearson correlation tests performed to measure the strength or degree of association between two quantitative random variables that have a bivariate normal distribution (Restrepo & González, 2007). The variables used were the IDEMN by category and the economic variables of the dairies (profit, sales volumes per week, number of employees, etc.) and the strength of the association was interpreted as described by (Santoyo *et al.*, 2002). In addition, an analysis of variance performed with the Scheffé test for the quantitative variables that describe the business model, depending on the group to which it belongs.

For the grouping of the cheese dairies, a three-stage hierarchical cluster analysis applied to binary data was performed. Euclidean distance was used to determine the similarity between the 30 companies to be studied (Aguilar-Gallegos *et al.*, 2015; Cervantes-Escoto *et al*., 2019). Likewise, Ward's clustering method was applied, which is recommended for hierarchical groups with more than one variable (Pérez, 2004). In previous studies, the use of squared Euclidean distance and Ward's clustering method generated compact groups and proved to be more efficient, (Aguilar-Gallegos *et al.*, 2015). To name the sets obtained and check the effectiveness of the clustering, a canonical discriminant analysis was performed, which used as a dependent variable the groups formed and as independent variables a set of variables that explain the differences between each group. The statistical procedures of cluster and canonical discriminant analysis were processed with SPSS software version 25.0. In addition, 12 variables were used, eight belonging to the business model ¨Lienzo Canvas¨, and four more that explain the variability of the production units (income, number of employees, products offered and overall INAi).

RESULTS

General characteristics of the producer

From respondents (n=30), 23% belong to the female gender. Genuine and artisanal cheeses in Mexico are made by both men and women as reported by Agudelo-López (2018), in the case of "poro" cheese from Balancán, Tabasco, it is made mainly by men, "bolo" cheese from Ocosingo, Chiapas, essentially by women and cheese from Reyes Etlá, Oaxaca by both women and men. Owners of the cheese dairies have an average age of 51 years, a value that coincides with studies conducted in Oaxaca states, Chiapas and Tabasco by Espejel-García *et al*. (2018) and Agudelo-López (2018). The schooling of respondents, has a wide range, since the minimum, claimed to have studied up to the third grade of primary school (1 of n=30), in the opposite case 26.6 % of respondents have completed a bachelor's degree, thus, having an average of eleven years, which corresponds to unfinished high school studies. Sánchez-Sánchez *et al.* (2020), report that entrepreneurs with an average of nine years of schooling lead family agricultural and agroindustrial businesses, and they affirm that the years of academic preparation is a factor highly associated with the adoption of innovations. Therefore, we can confirm that producers in the municipality of Aguascalientes have a greater willingness to change, that is, to adopt innovations.

The average experience that the owners have is 26 years, which shows a broad empirical knowledge of the cheese activity; however, this does not necessarily correspond to the capacity to generate technological change, as part of a process aimed at improving the profitability of the company and not only to make its continuity possible. This arises because in certain cases and circumstances, some older people, may be resistant to change and innovation (Villegas de Gante & Cervantes-Escoto, 2014). However, such resistance can also be explained by the loss of typical characteristics of artisanship and genuineness that make the products unique. It is caused by the "industrialization" of the process (Camacho-Vera *et al*., 2019). Comparatively with the above, in Reyes Etla municipality, Oaxaca, several studies have been conducted on the production of "quesillo", where the owners are characterized by having an average schooling of nine years and 31 years of experience in cheese making (Espejel-García *et al.,* 2018).

Clustering and typification of the cheese dairies

The results of the hierarchical cluster analysis of the variables present in the business model "Lienzo Canvas" are presented in Figure 2. According to the visual-qualitative examination of the dendogram and performing the cut-off at value 15 of the re-scaled agglomeration distance, three groups of cheese dairies are observed. To name and characterize them, the results of the canonical discriminant analysis were used (Table

2). According to the above, 96.4 % of the dairies are correctly grouped. Likewise, two canonical functions were obtained, where the dependent variable is made up of the three groups resulting from the cluster analysis, in addition to the fact that the eigenvalues were greater than one in both functions.

Function number one explained 84.9 % of the variability of the 12 traits introduced, and function number two explained the remaining 15.10 %. In the first, there are two variables that discriminate or differentiate the groups, i) the market segment they serve, and ii) cheese yield. These act on the "X" axis, while in function two, there is an important group of variables that discriminate; however, this paper focused on three, because they were considered the most influential: i) diversity of products offered, ii) income, and iii) key activities.

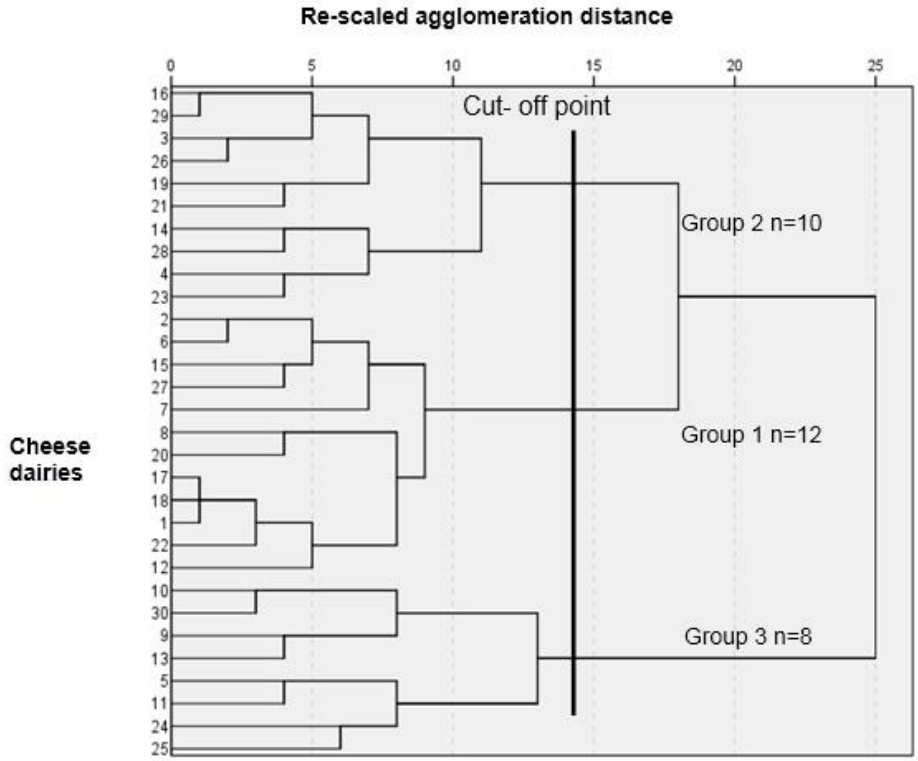


Figure 2. Groups resulting from the hierarchical cluster analysis

With the results in Table 2 and supported by Figure 3, it can be seen that the resulting groups are well defined, and that there are differences between them. The distribution of the three groups of dairies, according to their scores in the canonical discriminant functions, can also be seen. In one, the significantly correlated variables were market segment and cheese yield.

Table 2. Matrix of structures of the canonical discriminant analysis

Variable	Canonical discriminant function 1	Canonical discriminant function 2
Market segment	**.517***	-.117
Output	**-.245***	-.175
Products offered	.044	**.412***
Revenue	-.023	**.404***
Key Activities	.175	**.394***
Employees	.074	.376
Sources of Income	.020	.368
INAi	.049	.294
Key partnerships	.172	.229
Value proposition	.083	-.197

*The highest absolute correlation between each variable and any discriminant function

This implies that the cheese dairies in group 3 (far from groups 1 and 2 on the horizontal axis), differ particularly in these two aspects. This group has the characteristic of serving the two proposed market segments: the demand for genuine cheeses, and also extended or mixed cheeses, as well as analogues, which are made without a single liter of milk.

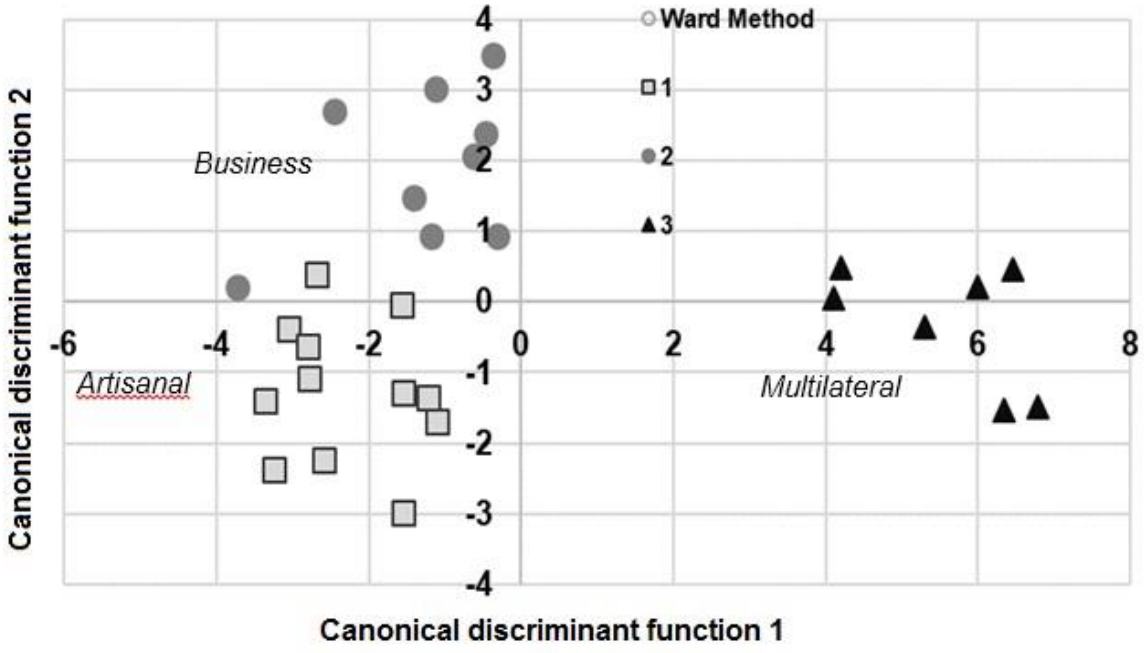
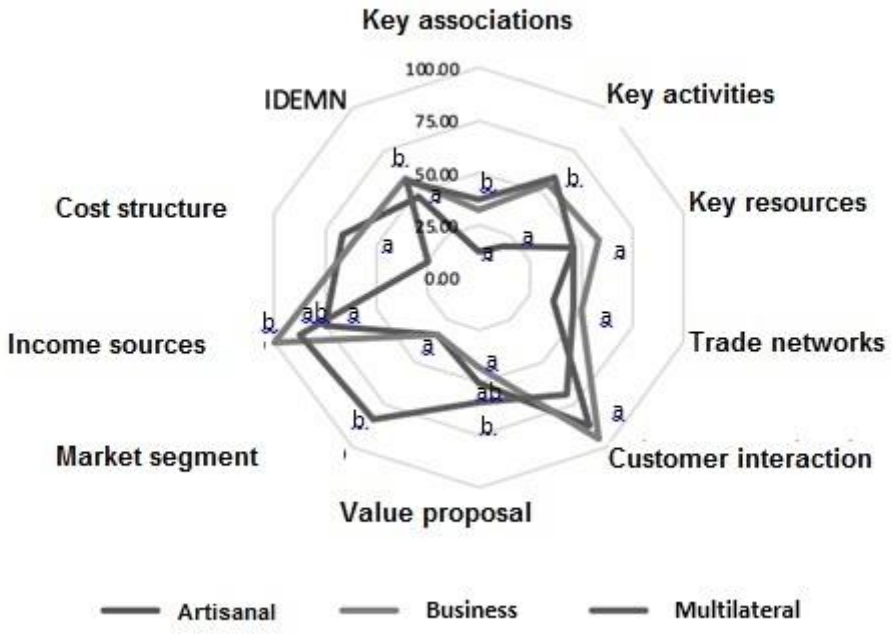


Figure 3. Distribution of the 30 cheese dairies analyzed by canonical discriminant analysis

Each group is named according to the characteristics identified. The business model used by the cheese dairies in-group 1 was called "artisanal", since it is aimed exclusively at producing genuine cheeses; they process 2,380 liters of milk per day, offer few products and have the lowest income. In the case of group 2, the business model was called "business", since it is characterized by also serving only one market segment, obtaining higher income, the volume of milk processed is greater than the other two, approximately 4,000 liters per day, and it carries out more key activities. The business model used by group 3 was called "multilateral", mainly because it serves two market segments each with a different value proposition, distinguished by market prices and a source of income associated with each of them (Osterwalder & Pigneur, 2010) the cheese yield (kg of cheese per 100 kg of milk),. It is also a fundamental characteristic of this group, since it presents the highest values, i.e. they use a smaller amount of milk to obtain a kilogram of cheese, due to the addition of non-milk raw materials that generate higher yields, and they are known therefore as extended cheeses.

Business models

Results of each group are shown in Figure 4, where the values of the categories that make up the IDEMN can be observed.



Values with different literals are statistically different based on the Scheffé test (p<0.10)
Figure 4. Business models in the cheese agroindustry of Aguascalientes

Artisanal model

It is characterized by serving a specific segment, a market niche dedicated to the purchase and sale of genuine cheeses, made from 100% milk, without additives or preservatives. Its value proposition is defined as an offer of products with quality of origin, with a traditional know-how that represents genuineness. There are some dairies focus on authenticity and they add the concept of functionality, due to the typical characteristics of the cheese they produce. An example of this is the ability to melt "Asadero" cheese, typical of Aguascalientes.

The most commonly used commercial ways are two: i) local route for grocery stores, and ii) their own points of sale; however, the cheese factories use other ways such as direct sales, etc. According to the data obtained, the frequency of use of the first type of channel is 83% (of the total number of dairies), while for the second it is 75%. Some other dairies prefer indirect sales systems by distributing through commission agents. Twenty-five percent deliver to the agricultural market in Aguascalientes. Approximately

50% of dairies that use this model send product to different cities such as Monterrey, Saltillo, Ciudad Acuña, Guadalajara, San Luis Potosí, among others.

Interactions with customers are direct, mainly with end consumers, but there is also a long-distance link with buyers in other states. These relationships are maintained over the years due to the trust generated. Sometimes shipments are made by parcel service, and sometimes the cheesemakers deliver personally. Sales represent the only source of income for them, making it the most important of their activities. Among the main cheeses they offer are "Asadero", Fresh, "Ranchero", "Panela" and Aged.

The key resources they have are years of experience in cheese production; 100% of the cheese factories have at least 15 years in operation. In addition, the workforce can be classified as family, since half of the companies have 50 % or more of their employees belonging to the family nucleus. According to Camacho-Vera *et al*. (2019), artisanal food production should be understood as a livelihood activity in broad terms; that is, as an activity that contributes to the development of the livelihood of individuals and families. It is what is recognized as a social reproduction strategy at the family level.

One of the weaknesses of this model is the key activities, since artisanal cheese dairies lack a well-defined commercial strategy; thus, it would seem that their only objective is to recover expenses and obtain scarce profits, with the aim of ensuring the permanence of the enterprise, but without going beyond that, so that the net profit obtained is usually small. In some cases, there is no initiative to increase production, seek new customers, carry out marketing campaigns, etc.

According to Porter (2011), strategy can be defined as the set of distinctive activities of the company, which allow it to offer a unique mix of value. In this group, key associations are scarce, and only those that are generated through the complements located in its value network. This model is not focused on reducing and/or optimizing costs, as 66% of the respondents stated that they are not important in the business, since customers are willing to pay a premium, due to the "artisanal nature" of the products. The value of the cheeses is determined by the value that the customer attaches to them, and this can be a great strength for this group.

Business model

It differs from the other two in that they process 82% more milk per day, hire 2.13 times more employees than the artisanal model, have innovation adoption rates of 63.66 statistically higher than the artisanal model with a rate of 44.36 and 86% higher gross income. The market segment they serve is specific, they are dedicated to the exclusive sale of genuine cheeses, but in a more entrepreneurial and diversified scenario. The value proposition varies from one business to another, but in its essential elements it is composed of a set of attributes and goods (products, services, experiences) that seek to position themselves favorably to provide answers to the needs and preferences of the segments that make up the target market where they choose to compete (Ross, 2014).

The business model is characterized by highlighting the importance of cheeses made with 100% fluid milk, so they add the phrase "attention and service"; 70% of the surveyed cheese factories of this type, claim that this feature makes customers decide to consume their products. The development of the relationship between a company and its marketing via entails a series of commercial, operational and resource management challenges (Ross, 2014). It was found that there is a statistically significant positive correlation between the marketing channels index and profits ($p<0.05$, $r=0.378$), and with the diversity of products that companies offer ($p<0.05$, $r=0.388$). Both correlation coefficients indicate that there is a moderate association according to the classification of Santoyo *et al.* (2002). This means that the more channels they have and the more products they offer, the higher the profits are. As in the traditional model, cheese sales represent the only source of income. The main types of cheese offered include "Asadero", "Fresco", "Ranchero", "Panela", "Gourmet", "Manchego" and "Chihuahua", among others.

The main key resources of this model are physical resources, since 100% of the cheese, plants have stainless steel machinery and equipment, and 70% have boiler systems for the production of saturated steam. Another important characteristic is that milk production and members of a single family usually carry out cheese making. In terms of intellectual resources, 90% of the group has more than 15 years of experience in the sector.

Their main marketing activities are based on the development of new products and marketing campaigns to promote them. The use of social networks and websites is a common practice in this type of companies. As stated by Estrella-Ramón *et al*. (2019) the use of social networks, have economically significant effects, which go beyond the online environment; that is, on the value of the brand as a general business. These key activities are consistent with those used by large food industries, such as Lala and Alpura, which generate diversification strategies in their business and product portfolio and innovation trends (Maldonado-Hernández *et al.*, 2020).

In terms of key partnerships, and following the definition of Osterwalder & Pigneur (2010), a strategic alliance between cheese factory-customer is observed, specifically, with the pizza chain *"Chesee pizza"* in the state of Aguascalientes, and one with the restaurant group *"Tanque lleno"* in Monterrey city, Nuevo León. Key associations had a significant Pearson correlation with the following variables: sales volumes per week ($p<0.05$, $r=0.371$) and profits ($p<0.05$, $r=0.459$), both coefficients indicate a moderate positive association, since the range for this degree of association is from $r=0.30$ to $r=0.49$ (Santoyo *et al.*, 2002). This means that the key partnerships they have, the more they will sell and the higher their profits will be. In addition to strategic alliances with other companies, dairies also collaborate or link up with government agencies and universities.

As in the traditional model, the cost structure does not have a value approach, which means that they do not seek to reduce costs, but rather to offer the greatest possible value to customers, using quality raw materials.

Multilateral model

It serves two different market segments. The mass market, where mixed and similar cheeses are offered, besides participate in the specific market niche, intended for the sale of cheeses made with 100% milk. The market segment index shows positive and statistically significant correlation with a moderate degree of association with the variables number of employees ($p<0.05$, $r=0.367$) and the value proposition index ($p<0.05$, $r=0.418$). Likewise, the latter presents a negative correlation with the variables: i) seniority in the activity ($p<0.10$, $r=-0.361$), ii) cheese yield ($p<0.05$, $r=-0.391$) and with iii) average price ($p<0.05$, -0.376), all coefficients indicating moderate association. This means that dairies with greater breadth in their value proposition, i.e. that offer analogous or extended products, have fewer years of experience in the cheese activity, obtain higher yields and sales prices are lower.

The value proposition of this model is divided, as it serves two different customer segments (Osterwalder & Pigneur, 2010). In the first case, it aims to satisfy the mass-market demand for cheese, for which it proposes to offer functional products at the lowest price. Some of the respondents highlight their proposal with the phrase "our cheeses have a high cost-benefit ratio". The other option aims to supply the niche market for the sale of genuine cheeses, and in general does not vary from that used by the other models. Their offer stands out for offering genuine products made with 100% milk, in addition to promising a more specialized service. The products and services they provide present more benefits for consumers, as they are better adapted to their needs and desires compared to other companies; in general, consumers perceive their offer as more innovative (Keiningham *et al*., 2019). The main marketing ways they use are central supply centers and restaurants, at 100 and 87%, respectively. The former are synonymous with the mass market, since it is through this channel that cheese dairies distribute most of their products. Main entities where they market similar cheeses are Mexico City (CDMX) and Guanajuato, San Luis Potosí and Aguascalientes states.

Customer relations are both direct and indirect. The relationship indicator is lower than in the other models; however, there are no statistically significant differences. The marketing channels used explain the low values; when selling to wholesalers in central supply centers, there is no direct relationship with end consumers; this effect is attenuated by the direct relationships established with restaurants. As in the previous models, the cheese factory represents the only source of income for its owners. Seventy-five percent of the companies in the multilateral model offer more than four

products, including analog "Asadero", "mixed Asadero", analog Mozzarella, analog Manchego, aged and fresh cheeses.

As described by Maldonado-Hernández *et al*. (2020), the key resources desirable in agri-food business models are the product of different factors, including aspects such as: i) creation of well-positioned brands, ii) research and development of patents, iii) new technologies and production processes, iv) availability of employees and partners, as well as v) having a wide distribution network, and vi) multiple production lines. However, these resources cannot be applied in all the production models described, due to the lack of capital and interest in growth on the part of the cheesemakers.

Some key activities that explain the success of the Lala and Alpura groups are the development of brands oriented to broad markets. In addition to offering products made from 100% milk, they decided to broaden their offer with accessible prices to reach low-income households, thus reaching all socioeconomic strata and all age levels, a strategy that this model has used in the development of its commercial activities. Previous dairy companies did homologating what, these dairies develop new products aimed at different socioeconomic levels, carry out marketing campaigns and offer promotions throughout the year. This model, like the business model, has the characteristic of having higher levels of key associations, due to the linking of the dairies with strategic clients such as canteens, butcher shops and restaurants located in the city of Aguascalientes and in other states of the republic, which are classified in this way due to the volumes and frequency of purchase.

DISCUSSION

Not only in Mexico, but also in general at the international level, for large cheese producers, whose business model has traditionally focused on selling their products to the middle and high income sectors, the competitive scenario is becoming increasingly complicated, difficult and costly. This situation has given rise to a new strategy based on reorienting its offer towards consumer segments located in what has been called the majority market or the base of the pyramid, as proposed by Prahalad (2005). It is in his theory called "Fortune at the base of the pyramid", in which he argues that companies should reorient their supply towards low-income consumers, avoiding continuing to fall into markets full of excessive competition and strategies aimed at overexploiting existing demand, also known as "red oceans" (Chan Kim & Mauborgne, 2005). It is increasingly problematic for them to develop effective differentiation strategies. Guiné *et al.* (2021) assert that traditional foods, including cheeses, must focus on highlighting their authenticity, adopting innovations and creating mechanisms that help them adapt to the ever-changing environment in order to ensure future success.

In this sense, several authors such as Gomes da Cruz *et al.* (2009), Castañeda *et al*. (2009), Domínguez *et al.* (2011), Cesín-Vargas *et al.* (2012), Cervantes-Escoto *et al.* (2019), have analyzed the phenomenon of cheese-making in consumption. Not only in the popular sectors, but also in those with sufficient resources to expand the taste for genuine cheeses or specialty, matured or fresh cheeses. Companies integrated in the traditional, business and multilateral models analyzed in this paper show an inverse condition to that indicated above by the large cheese factories, since, since their origin as a business, they have focused their attention on the generation of an offer of genuine cheeses, and only the multilateral model has considered the option of analogues. In its beginnings, this condition was accompanied by the almost exclusive search for social survival strategies and the generation of activities, that would provide employment for the family labor force, in addition to guaranteeing the use of its varied dairy surpluses in the face of fluctuations in the price of milk. This corresponded to the management of a limited scale of milk production, as well as the need not to increase costs too much in order to continue cheese production. Likewise, and according to Patiño-Delgado *et al*. (2021) the diversification of products, productive activities and fixed scales of production is related to a survival strategy.

One of the problems they face in overcoming their status as local cheese producers is the relative spatial isolation of their businesses, some of which are located in areas with difficult road access. The other one is the wide variety of products and services offered in the national market (including the communities where the original cheeses are produced) by the large companies producing highly industrialized cheese or similar products, which forces the small and medium-sized companies to adopt business models that improve their levels of competitiveness. The great challenge they face is to expand their sales among intermediate consumer segments that have sufficient income to be able to purchase a genuine or artisanal cheese, which usually enters the market at a premium price due to its cultural or territorial value. There is an analytical theoretical approach called "Localized Agri-Food Systems" (SIAL) which aims to identify in the territories all those agri-food resources that are likely to be activated, through differentiation strategies and a set of positive externalities that affect the multisectoral and multifunctional activities that are part of the Agri-Food System (Grass-Ramirez *et al.*, 2012). Some of the strategies suggested by this approach include the use and consolidation of short supply chains and agrotourism (Blanco, 2012).

On the other hand, cheese dairies with a multilateral model have generated an example of a pragmatic business that responds to the needs of both market segments. They do so by expanding their offer with standard or similar cheeses and innovating the way in which they establish their sales strategies, with which they seek to increase value

creation. According to Osterwalder & Pigneur (2010), the business model is a picture of interrelated blocks, through which companies enhance the attributes that allow them to create value through their offer. In this regard, the construction of value becomes the raison d'être of these companies, so that the attributes of the product offered represent the value proposition they offer to their customers. However, the scarce development of alliances with their suppliers, in order to generate a more robust value chain, shows that this is still an incipient process for them. However, they have made good progress in the part dedicated to reinforcing and promoting their value proposition and in key activities that make it possible to sustain product quality without overly punishing costs, but they have yet to strengthen the linkage of key activities and partnerships.

The key activities identified in the cheese dairies of Aguascalientes municipality have been documented in other parts of Mexico and the world. According to Patiño-Delgado *et al*. (2021) these are classified according to the objective of their implementation. I) collaborative strategies such as formalization of sales channels, management of support with government and research entities; ii) technological and commercial innovation such as process and product innovation, specialized consultancy, capacity building, application of Good Manufacturing Practices (GMP) and increase in the number of suppliers (kamimura *et al.*, 2019; De Herde *et al.*, 2019); iii) of channel choice, implementing actions such as market segmentation (Rendón-Rendón *et al*., 2019); iv) of survival, such as diversification of supply and fixed scales of production; v) of differentiation, such as improvements in product presentation, innovative labeling and practices that help consumers distinguish the sensory attributes of the product (Peralta-Miranda *et al*., 2017; Santos-Lavalle *et al*., 2018), and vi) consumer relations, such as customer care and prospecting and awareness campaigns.

Currently, to the growth of genuine cheese market, there is an important factor; we refer to the modification of NOM-051-SCFI/SSA1-2010 on the labeling of pre-packaged food moreover, non-alcoholic beverages, approved in January 2020. This reform consists of a series of black octagonal "seals" that warn when a product exceeds the recommended amount of sugars, fats, sodium and calories. In addition, another of the main changes introduced is that it obliges companies that sell non-original food or alcoholic beverages to include the legend "imitation" on their packaging, a practice that would bring with it an encouraging scenario for cheese factories that offer genuine products, as it would expose companies that produce similar cheeses. However, dairies with a multilateral model have the advantage of being able to reformulate their products and take advantage of their strategic positioning in the market, which would theoretically lead to an increase in the supply of genuine products and/or a decrease in the use of raw materials such as vegetable fats and melting salts (with high sodium content). The above is consistent with Tolentino-Mayo *et al*. (2018), who state that the modification of

nutritional criteria and the form of labeling itself can contribute to improving the nutritional intake of the Mexican population. Therefore, their health and nutritional status, since in Mexico, the consumption of industrialized products is increasing and it has been estimated that more than 58% of the total calories consumed by Mexicans come from processed foods (Popkin, 2014).

CONCLUSIONS

It was able to identify and differentiate three business models used by the cheese industry in Aguascalientes municipality, which differ in structure.

The traditional model is by the lowest income levels, because of the absence of key activities and associations that guarantee increases in product demand. The business model, like the previous one, focuses on the commercialization of cheeses made from 100% fluid milk; however, this one has higher income, processes larger volumes of milk per day. Its business model emphasizes customer service, development of key activities such as the development of new products, seasons of supply, in addition to generating key commercial partnerships, which increase the exposure of the brand. Although the high levels of production take it away from the artisanal, its strength lies in always using natural raw materials, which helps to differentiate the product from analogous and/or extended cheeses. For these two models, it is necessary to emphasize that future success will depend on their ability to carry out effective marketing strategies, aimed at differentiating their offer in terms of flavor, healthy properties and cultural and ethical values, leaving aside the tedious battle against analogous cheeses.

The multilateral model is mainly by a wide variety of offerings, serving two market segments: genuine and analog cheeses, with high levels of innovation and revenues similar to the business model, and is differentiated by the key partnerships it develops with strategic customers.

The segmentation strategy used by this model is increasingly losing ground, because we are currently undergoing a process of change towards a more natural and nutritious diet, supported by the modification of NOM-051-SCFI/SSA1-2010 on the general specifications for the labeling of processed products. It is expected to increase the demand for and production of genuine cheeses, which provide essential nutrients for a better quality of life.

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Errata Erratum

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