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Balance of Payments Constrained Growth in China: An Application of the Autoregressive Distributed-Lag Modelling Approach

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Abstract

This paper applies the balance of payments constrained growth (BPCG) model to the Chines economy using data from the Organization for Economic Co-operation and Development (OECD) over the period 1982-2011. The long-run income elasticity of demand for imports, the relative price elasticity of demand for imports and the adjustment speed parameter from the import demand equation are estimated. The computation of the parameters is conducted through the autoregressive distributed-lag econometric modelling technique (ARDL). The short-run adjustments are obtained by using a vector error correction model. We found that estimated average growth rate forecasted by the BPCG model approaches the average real growth rate over the analyzed period.

Balance of payments constrained growth, Chinese economy, economic growth, income elasticity of demand for imports.

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Introduction

Thirlwall (1979) proposed the BPCG model, which is aimed at analyzing the relationship between the balance of payments and economic growth. The model shows that the balance of payments might constraint the production rate of growth, as it can set a boundary on economic growth in a certain level of demand to which supply can be adapted. A rise in national production, requiring an increase in imports, can lead to a deficit in the balance of payments. The solution could be a depreciation of the real exchange rate or a demand reduction, in order to guarantee the sustainability of the external deficit. Consequently, an unsustainable external deficit eventually must be corrected, which can reduce the production growth.

Assuming that the real exchange rate is maintained relatively constant, the concept of the balance of payments constrained growth is defined as the ratio of the growth rate of exports to the income elasticity of demand for imports. Only when the rate of growth of the real gross domestic product (GDP) turns out to be lower than balance of payments constrained growth rate, it will be possible for a country to reach sustainable growth, and therefore, simultaneously, the balance of payments will remain in equilibrium. This condition, also known as the Thirlwall's law, is equivalent to the dynamic Harrod foreign trade multiplier, introduced by Harrod (1933). It implies that if the rate of growth of a country is higher than the balance of payment constrained growth rate, it will cause an external deficit and will reduce the expected rate of growth, and vice versa, if the rate of growth of a country is lower, it will obtain an external surplus. These concepts are analogues to the results presented by Krugman (1989), who found that the countries growing to higher rates have a larger income elasticity of demands for exports than for imports.

The Thirlwall's model has been widely tested and proved since it was proposed.

The model provides a useful approximation to the economic rate of growth in both developed countries and emerging economies. In recent years the BPCG model has been applied in its different forms, in wide range of studies, across countries. In this respect, Beko (2003) studied the Slovenian case; India is analyzed by Razmi (2005); The Brazilian economy is analyzed by Bértola et al. (2002), Ferreira y Canuto (2003), Jayme (2003), Carvalho et al. (2008), Carvalho y Lima (2009), Britto y McCombie (2009), and by Alcantara y Strachman (2014), while Irland is examined by Garcimartín et al. (2008). The Argentinian case is studied by Fugarolas and Matesanz (2008) and Chena (2014); Felipe et al. (2010) explored the Pakistani case; Soukiazis y Antunes search the Portuguese economy (2011); and the Mexican economy was examined by Moreno-Brid (2002, 2003), Guerrero de Lizardi (2003, 2006), Pacheco-López y Thirlwall (2004), Pacheco-López (2005), Cardero y Galindo (2005), among others. The majority of these papers support the balance of payments constrained growth hypothesis.

Among the studies exploring group of countries we could highlight Holland et al. (2004) who analyzed a group of ten Latin American economies; Kvedaras (2005) explored a group of ten Eastern European economies; Pacheco-López and Thirlwall (2006) examined 16 countries from Latin America; Gouvea and Lima (2016) also explored the Latin American region through a group of four countries and contrasted the results with a group of four Asian economies; Bagnai (2010) analysed a sample of OECD countries; Garcimartín et al. (2010) studied Portugal and Spain; and Gouvea and Lima (2013) analyzed a panel for 90 countries.

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In particular, in this paper, we test the BPCG model in the Chinese economy, applying recent cointegration techniques to study the long-run restriction, imposed by the foreign exchange requirements needed for economic growth. The analyzed period is from 1982-2011.

The methodology applied is an autoregressive distributed lag technique (ARDL) in which we explore the cointegration among the variables.

The structure of the paper is organized as follows: Section two presents the theoretical basic model derived from the Thirlwall's growth law. Section three shows the econometric model applied in the study. Section four presents the results. Finally section five provides conclusions and policy implications.

The growth law by Thirlwall

Thirlwall states that demand restrictions are valid for most of the countries and they occur before supply restrictions. Consequently, for an open economy demand represents the main restriction to growth and therefore, the economic performance is subject to the balance of payments behaviour. The main idea behind the BPCG model is that a country cannot grow at a rate higher than that consistent with the current account equilibrium, because is not possible to sustain deficit in the balance of payments during a long period of time, as it has to be financed with short-run capital inflows, which leads to an increase in the ratio of net external debt to GDP. If a country attempts to finance its deficit over the long-run through inflows of foreign capital, the international financial markets will press the national currency, and hence, conditions are created to collapse the exchange rate; in other words, there would be a scenario of depreciation and inflation.

As a result, the economic growth rate for any economy, in the long-run, must be consistent with the balance of payments equilibrium (McCombie, 2003; Panico, 2003; Thirlwall, 2003).

The BPCG model by Thirlwall, analyses the effect of exports demand on economic growth and introduces the concept of balance of payments constraint.

The fundamental idea is that for every open economy, demand for exports constitutes the main component of autonomous demand; in this sense, economic growth over the long-run will be supported on exports growth. It should be noticed that exports affect demand not only directly, but also indirectly since consumption and investment grow faster. Hence, if we consider both effects, we can realise that exports increase (x) determines production growth (y).

The exports rate of growth can be represented as follows: $x = \eta\left(p_d - p_f\right) + \varepsilon(z)$, where p_d and p_f are domestic and foreign prices respectively, z is foreign income, ε (>0) is the income elasticity of demand for imports and η (<0) is the price elasticity of demand for exports. The domestic prices are considered as an endogenous factor, while income and foreign prices are exogenous factors.

Thirlwall (2003) introduced the analysis of economic growth and the balance of payments constraint. He made it by taking the equation that represents the exports rate of growth, added the import demand equation and the balance of payments equilibrium condition.

The export demand and import demand equations are defined respectively as follows:

$$x = \eta\left(p_d - p_f - er\right) + \varepsilon(z \qquad (1)$$

$$m = \psi\left(p_f + er - p_d\right) + \pi(y) \qquad (2)$$

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Where π (>0) is the income elasticity of demand for imports, ψ (<0) represents the price elasticity of demand for imports, er is the exchange rate and y is the GDP rate of growth.

The equilibrium condition in the current account, written in rate of change is defined as follows:

$$p_d + x = p_f + m + er \quad (3)$$

By substituting the exports and imports demand equations in the equation of the current account equilibrium condition, we obtain the national income rate of growth, which is consistent with the balance of payments equilibrium:

$$p_d + \eta(p_d - p_f - er) + \varepsilon(z) = p_f + \psi(p_f + er - p_d) + \pi(y) + er \quad (4)$$

After conducting algebraic transformations in Equation (4), it is possible to obtain an expression that represents GDP growth, which is consistent with current account equilibrium:

$$y = ((1 + \eta + \psi)(p_d - p_f - er) + \varepsilon(z))/\pi \quad (5)$$

According to Thirlwall (2003), Equation (5) represents the following:

- An improvement in the terms of trade $(p_d - p_f - er) > 0$ has the potential to restore the rate of growth consistent with the balance of payments equilibrium;
- If domestic prices increase more than foreign prices, there will be a reduction in the rate of growth, consistent with the balance of payments equilibrium, that is, if the sum of the negative price elasticities is greater than one: $1 + \eta + \psi) < 0$;
- A depreciation of the local currency $(er > 0)$, will cause an increase in the rate of growth, consistent with the balance of payments equilibrium, if the sum of the price elasticities is greater than one;
- The rate of growth of a country (y) is associated to the rate of growth of another country (z), because the rate of growth that a country can reach, keeping the balance of payments equilibrium, will depend on the income elasticity of demand for exports (ε);
- The rate of growth of a country, consistent with the balance of payments equilibrium, is inversely related to the demand for imports;

Assuming that the relative prices[1] remain constant[2], the rate of growth consistent with the balance of the payments equilibrium becomes:

1 The relationship between the prices of two goods or two services is called relative price. The relative price of the good X in relation to the good Y, implies the relationship of the price of good X with respect to the price of good Y, in other words: Px,y = Px/Py. This ratio shows the amount of units of good Y that is forgone in order to obtain one more unit of good X. A relative price is an opportunity cost.

2 If the relative prices remain constant, the trade balance does not change in the short-run; however, in a trade balance deficit scenario, a depreciation of the local currency can lead to the equilibrium or even surplus as follows: With the depreciation, the country obtains more local currency by foreign currency, consequently the nominal exchange rate increases and so do the relative prices. The price of imports in local currency increases and therefore, demand for imports falls; on the other hand, the price of exports in foreign currency decreases and its demand rises. In this scenario, if the Marshall-Learner condition is satisfied, the net exports increase and the trade balance improves. An appreciation of the national currency causes a decrease in the relative prices and this leads to an increase in imports demand and to a decrease in exports demand, which deteriorates the trade balance. To sum up, depreciation causes less competitive imports, as the relative prices move against imports and in favour of national products; in contrast, an appreciation leads to a change in relative prices in favour of imports and against local production.

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If we take as the proxy of z the exports rate of growth x Equation (6) is transformed to:

$$Y_t^* = \varepsilon(z_t) / \pi \quad (6)$$

$$Y_t^* = x_t / \pi \quad (7)$$

Equation (7) is known as the Thirlwall's growth law, and shows that the rate of growth of any country, in the long-run, it is constrained by the equilibrium in the current account of the balance of payments.

Econometric model

In general, the Thirlwall´s law is tested by comparing the real GDF effective rate of growth with the rate of growth forecasted through Equation (7), where the income elasticity of demand for imports, determines, to a greater extent, the result. Expressing in logs the long-run relationship variables of the import demand function, we have:

$$LM_t = \alpha + \pi LY_t + \beta LRP_t + \omega_t \quad (8)$$

Where LM_t is the real imports log, LY_t is the real income log, LRP_t is the real prices log (it is defined as the ratio of national prices to foreign prices), and ω_t is the error term.

Recent advances in econometrics suggest that the short-run dynamic adjustment process should be added to the long-run relationship in Equation (8). In this context, Equation (8) is expressed as a Vector Error Correction model, as suggested by Pesaran et al. (2001):

$$\Delta LM_t = b_0 + \sum_{i=0}^{m1} b_{1i}\,\Delta LM_{t-i} + \sum_{i=0}^{m2} b_{2i}\,\Delta LY_{t-i} + \sum_{i=0}^{m3} b_{3i}\,\Delta LRP_{t-i}$$

$$+ b_4 LM_{t-1} + b_5 LY_{t-1} + b_6 LRP_{t-1} + v_t \quad (9)$$

This approach is known as an ARDL model.

One characteristic of these models is that they produce unbiased long-run coefficients estimations; regardless some of the explanatory variables are endogenous (Pesaran y Shin, 1999). Another advantage is that in the estimation through the bounds testing approach it is possible to use integrated variables of order one I (1) and order cero I(0) in the same equation.

What is not possible to apply is the Johansen approach, because when the model is specified it is important the all the variables have the same integration order.

The ARDL models presented, as error correction models, provide short and long-run coefficients simultaneously. The short-run effects are obtained from the estimation of parameters that belong to the variables in first differences. The long-run effects are obtained from the estimations of b_5 and b_6, which are normalised using b_4. The model also incorporates the adjustment coefficient. In an error correction model it is the long-run lagged error term. In order to explore whether the variables adjustment tends to a long-run equilibrium, the estimations from b_4, b_5 and b_6 are used to obtain an error correction term (ECT), this term substitutes the lagged variables in levels from Equation (9) and therefore we have:

$$\Delta LM_t = c_0 + \sum_{i=0}^{m1} c_{1i}\,\Delta LM_{t-i} + \sum_{i=0}^{m2} c_{2i}\,\Delta LY_{t-i} + \sum_{i=0}^{m3} c_{3i}\,\Delta LRP_{t-i}$$

$$+\lambda ECT_{t-1} + \mu_t \quad (10)$$

In Equation (10), λ represents the adjustment coefficient parameter. The equation is estimated taking into account the same lags as before.

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If the coefficient from the $ECT_{t-1}$is negative and statistically significant, it indicates the existence of cointegration among the variables but, the main finding is a long-run trend towards the equilibrium.[3]

Results

In this paper, we use time series data over the period 1982-2011[4]. The variables from Equation (8) fulfil the requirement to be I (1) the most. It is worth noting that if any of the variables would be I (2), the results obtained from the cointegration procedure by Pesaran et al. (2001) were not be consistent and efficient. The following unit root tests were applied to the series: augmented Dickey-Fuller (ADF) (1979, 1981), Phillips-Perron (PP) (1988), and Elliott-Rothenberg-Stock (ERS) (1996). The results from the tests confirmed that the series are stationary either in levels or first differences. It can be seen in Table 1 that the variables are integrated of order 1, but not superior, which validates the application of the bounds test suggested by Pesaran et al. (2001).

Variables	ADF	PP	ERS
LM_t	0.1580	0.2794	14.83149
LY_t	0.0762	0.5422	18.81679
LRP_t	0.4427	0.5123	29.77162
ΔLM_t	0.0034**	0.0032**	1.728792**
ΔLY_t	0.0021**	0.0077**	1.037210**
ΔLRP_t	0.0006**	0.0006**	1.640388**

Table 1 Unit root test

Notes: The unit root test specification, for the variables in levels, includes constant and deterministic trend. The specification for the variables in first differences includes constant but no trend.
** Indicates rejection of the Null Hypothesis and evidence that the time series is stationary at 90 per cent of statistical significance.
Δ Represents first differences.

3 The fact that λ is negative and statistically significant means that the dependent variable moves over time towards is long-run equilibrium value.

4 The definition and data source is provided in the Appendix.

In order to verify if the there is a cointegrated and long-run relationship among the variables in Equation 8 two stages estimation was performed. Firstly the statistical sufficiency of the model was satisfied and hence, we proceed to estimate the optimal number of lags in the first differences variables by using the information criteria from Hannan-Quinn, Schwarz and Akaike; in addition, we applied the conventional diagnostic tests. In the second stage we verify the presence of cointegration.

Pesaran et al. (2001) propose two cointegration tests. First, they provide critical value bounds for the corresponding t test, with upper and lower bounds, which are based on whether the variables in the equation are all cointegrated of order 0 (lower bound) or 1 (upper bound). There is cointegration when the absolute value of the test statistic exceeds the upper limit. Second, they suggest an F test for the significance of the variables in levels, under the null hypothesis that the speed of adjustment and the coefficients of Equation 9 jointly equal cero. Moreover, they provide the lower and upper critical values for the tests. Cointegration is accepted when the absolute values from the F and t statistics are larger than the upper bound (see Table 2).

Long-run relationship: F/t (LM l LY, LRP)

	95% LB	95% UB	97.5% LB	97.5% UB
F statistic 5.82	3.79	4.85	4.41	5.52
t statistic -4.02	-2.86	-3.53	-3.13	-3.80

Table 2 Bounds tests

Notes: Both the statistics from the t and F test are larger than the upper bound at 5% and 2.5% levels of statistical significance (values taken form Pesaran et al. 2001, Tables CI (iii) y CII (iii)). The Null Hypothesis is there is no cointegration among the variables imports, GDP and relative prices. The bounds testing procedure indicates that the Null can be rejected, which implies that there is cointegration among the variables.

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The ARDL model for the period 1982-2011was estimated through the Ordinary Least Squared method. The short and long-run coefficients are presented in Tables 3 and 5 respectively. The statistically significant coefficients have the expected sign. The corresponding statistical test are illustrated in Tables 4 and 6, they show that there are no normality problems, autocorrelation, heteroskedasticity and misspecification.

Regressors	Coefficient	Probability
Constant	-9.07	0.00
LY_t	1.49	0.00
LPR_t	-0.59	0.00

Table 3 Cointegration results through the ARDL for the long-run import demand equation

Note: LM is the dependent variable

$\bar{R}^2$	0.99	
RSS	0.12	
Statistic F	958.28	(0.00)
Statistic DW	1.89	
Breusch-Godfrey LM (2)	0.77	(0.47)
Jarque-Bera	1.09	(0.57)
Breusch-Pagan-Godfrey	0.98	(0.43)
Harvey	2.23	(0.09)
Glejser	2.00	(0.12)
Arch (1)	0.95	(0.33)
White	2.04	(0.10)
RESET (1)	0.10	(0.91)

Table 4 Tests statistics for the long-run import demand equation

Notes: RSS indicates residual sum of squares. ρ-value in parenthesis.

From Table 3, it is possible to see that the long-run income elasticity of demand for imports is 1.49, that is to say, an increase of 1 percent in the real GDP will lead to an increase of 1.49 percent of the imports. The long-run price elasticity of demand for imports is -0.59, in other words, a 1 percent upturn in the relative prices causes a reduction of 0.59 percent in real imports.

The speed of adjustment is -0.40, it means that the import demand equation will adjust 40 percent in one year when is not in equilibria, it implies that the convergence towards the equilibrium will take 2.5 years.

Regressors	Coefficient	Probability
Constant	-0.16	0.08
ΔLY_t	2.77	0.00
ΔLY_{t-1}	0.14	0.86
ΔLPR_t	-0.55	0.00
ΔLPR_{t-1}	0.11	0.43
TCE_{t-1}	-0.40	0.03

Table 5 Cointegration results through ARDL for the short-run import demand

Note: The dependent variable is ΔLMt

$\bar{R}^2$	0.74	
RSS	0.07	
Statistic F	8.44	(0.00)
Stadistic DW	2.00	
Breusch-Godfrey LM (2)	0.18	(0.83)
Jarque-Bera	0.04	(0.97)
Breusch-Pagan-Godfrey	0.61	(0.76)
Harvey	1.89	(0.12)
Glejser	1.03	(0.45)
Arch (1)	1.43	(0.24)
White	1.45	(0.24)
RESET (1)	0.83	(0.41)

Table 6 Tests statistics for the short-run import demand equation

Notes: RSS indicates residual sum of squares. ρ-value in parenthesis

We use overlapping periods of 15 years, following Atesoglu (1993a, 1993b, 1994) in order to verify the validity of the Thirlwall´s law for the Chinese economy over the period 1982-2011. This long time periods are taken due to the long-run relationship between the balance of payments and the GDP rate of growth, stablished in the BPCG model. The average rate of growth of effective export demand and the real effective GDP are taken in periods of 15 years, commencing in 1983-1997 and finishing in 1997-2011.

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The estimation of the balance of payments constrained real growth (Y_t^*) was obtained from Equation 7 with a long-run estimation of the income elasticity of demand for imports ARDL equal to 1.49. The results are presented in Table 7, in which it is possible to observe that the average real effective rate of growth is close to the estimated average rate of growth.

However, there are periods where difference between the two rates of growth expands. For instance, the periods located at the beginning of Table 7, commencing with the period 1983-1997 and up to the period 1990-2004, indicate an increasing divergence between the real effective rate of growth and the forecasted rate of growth. Nevertheless, after these periods, the two rates of growth tend to converge.

This trend does not occur over the periods 1995-2009, 1996-2010, 1997-2011, in which there is divergence. Only in these last three periods the real effective rate of growth is larger than the forecasted rate of growth, this fact is directly associated to a substantial reduction of the real exports rate of growth in these periods, compared to the high rates of growth recorded in the previous periods.

Periods	Effective rate of growth of *X*	Effective rate of growth of *Y*	Forecasted rate of growth of *Y**	Difference *Y*-Y*
1983-1997	19.11	10.61	12.83	2.22
1984-1998	19.07	10.41	12.80	2.39
1985-1999	17.65	9.90	11.85	1.95
1986-2000	17.87	9.57	12.00	2.43
1987-2001	16.98	9.53	11.39	1.87
1988-2002	16.08	9.36	10.79	1.43
1989-2003	17.73	9.28	11.90	2.62
1990-2004	19.73	9.68	13.24	3.56
1991-2005	18.19	10.18	12.21	2.03
1992-2006	18.20	10.46	12.21	1.75
1993-2007	18.03	10.45	12.10	1.65
1994-2008	18.05	10.16	12.11	1.95
1995-2009	12.25	9.91	8.22	-1.68
1996-2010	13.32	9.88	8.94	-0.94
1997-2011	13.11	9.83	8.80	-1.03

Table 7 Annual average rate of growth, effective and constrained by the balance of payments, 1983-2011

Associated to the structural reforms that fostered trade and financial openness of the Chinese economy since 1979, (Chen et al. 1995; Kanbur y Zhang, 2005), in the periods that finalise in 1997 up to 2008, the average real rate of growth was kept below the potential of the balance of payments.

Nevertheless, over the last three periods 1995-2009, 1996-2010 and 1997-2011, the Chinese average rale rate of growth is located slightly higher than the forecasted value. During these periods the Chinese economy grew above the balance of payments potential, which is in keeping with the large capital inflows captured after 2000. These facts would confirm the Thirlwall and Hussein statements (1982), in the sense that over a long time period, the rate of growth of a country could be higher than its equilibrium rate of growth as a result of substantial capital inflows.

For the whole time period studied in the paper 1982-2011, the GDP rate of growth, in average, is 11.42 percent a year; this figure closely approximates the average real rate of growth of the GDP, which is 10.24 percent a year. This finding is consistent with Razmi (2005), who analysed the case of India, and with Gouvea and Lima (2010) and Blecker and Ibarra (2013) who studied the case of the Mexican economy. They found that the balance of payments constrained growth model accurately replicates the average real rate of growth when long time periods are considered.

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In summary, the results from Table 7, confirm that the Thirlwall´s law holds for the Chinese economy.

Conclusions

The aim of this paper was to test the validity of the BPCG hypothesis for the Chinese economy, over the period 1982-2011.

After exploring the time series econometric properties and using the econometric technique known as ARDL approach we find support to assert that there is a stable long-run relationship between real imports, real GDP and relative prices. The cointegration vector was also used in a vector error correction specification to study the short-run relationship dynamic. The estimate of the long-run income elasticity of demand for imports is 1.49 and the price elasticity of demand for imports is -0.59.

We found that the average rate of growth obtained from the BPCG model (11.42 percent) is closed to the average real rate of growth (10.24 percent) over the period 1982-2011. However, substantial differences emerged when individual 15 years periods were considered. Hence, the analysis found more support for the BPCG model in a long-run perspective. However, the short-run elasticities were also statistically significant.

The Thirlwall (1979) BPCG model estimates the rate of economic growth consistent with the balance of payment equilibrium. This paper provides evidence showing that the Chinese economy, over the most of the analyzed period, grew at a rate that did not exceed the rate of growth consistent with external equilibrium but, along the last three periods 1995-2009, 1996-2010 and 1997-201, kept a rate of growth higher than that in keeping with the external equilibrium.

This finding suggests that the country will not be able to sustain its current rate of growth without facing balance of payment problems in the short-run. As a result, the monetary authority has to conduct a gradual exchange rate depreciation of the currency.

At the same time, it is possible that China improves its balance of payments situation, through the implementation of innovative policies that foster quality and by diversifying the exportable goods and services.

These policies will allow not only the increase of the exports rate of growth, but also will reduce the country´s propensity to import.

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Technology-enhanced assessment process: issues affecting e-assessment uptake

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Abstract

Educational technology plays a crucial role in automating each task and stage of the assessment process and although its use and effectiveness has already been proven, educational literature shows that there is still a huge need to develop these innovative approaches. In this study we have reviewed the literature on the current state of knowledge and practice regarding electronic assessment technologies. Knowing the factors -positive or negative- involved in the adoption of ICT in the assessment process in the Higher Education context serves as a guide for building valuable strategies to design a plan of adoption of e-assessment technologies which enables us to determine when the staff are well prepared to implement it, as well as the grade of willingness of the main stakeholders. The willingness to adopt innovative educational assessment methods will indeed make a positive difference to students' learning. There are still many opportunities that are not being taking advantage of, and the emerging research should be constructed with the aim of proposing specific strategies for developing new approaches to e-assessment.

E-learning, e-assessment, educational assessment, distance learning, education and technology.

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Introduction

ICT has touched and transformed all fields of human activities. If we add the fact that technological capability is increasing exponentially, we can expect an even bigger impact on all human activities in the future. In the educational context, ICT has played an important role, transforming the way instructors teach and students learn. ICT has helped to enhance educational methods and approaches, making them more efficient. Recently, we have seen an increasing emphasis embedding them on all educational levels.

However, some might argue that educational technologies have not changed the way the teachers instruct or the extent to which the students learn. Nevertheless, the educational tools that students use to learn are changing. These have modified the process of teaching and learning per se. The influence of ICT on the processes of teaching and learning has been significant. Researchers have turned to ICT as a way to fulfilling the requirements for learning in a modern society, and this has created great demand from a diverse range of actors ranging from businesses to institutes of higher education (Sun, Tsai, Finger, Chen, & Yeh, 2008). There are many studies regarding the benefits of ICT on the teaching and learning process. For instance, Wang & Wang (2009) point out that ICT enables communication between instructors and students by serving as a platform to facilitate teaching and learning. Also, Gunasekaran, McNeil & Shaul (2002) state that ICT encourages interaction and communication between students and instructors. The fact is that technological tools are also becoming part of the equipment required for 21st century education.

E-learning becomes an attractive learning strategy particularly when individuals cannot obtain the education they want from local sources such as when students require a specialized course that is not part of the curricula of the university, or when people have to deal with daily responsibilities either at home or at work that do not allow them to attend a course physically.

In the last few decades ICT has played a key role in the real world. Currently, organizations require a workforce consisting of people who have the abilities and skills to be able to make their own decisions, high performance in teamwork, and the ability to manage effectively complex situations, which suggests "that the ability to use technology will become a standard job-entry requirement" (Bennett, 2002). Moreover, ICT is supporting global businesses in the process of employee learning and development.

The impact of ICT has widely expanded in all fields; including applications for teaching mathematics and allied subjects. The work of Gunasekaran et al. (2002) gives evidence of the effectiveness of using ICT to do this. Their study explains how researchers (Larson & Bruning, 1996) examine perceptions in an interactive collaborative mathematics course. Their conclusions show that "the distance learning format gives teachers access to more resources, is useful for under-achieving students, and is an effective way to implement national curriculum and instruction standards". Likewise, the study of McCollum (1997) describes a professor at California State University who divided a statistics course, teaching one group in a traditional way and another in an on-line version of the course using web-based tools (website, e-mail, and an electronic chat room). The students who took the on-line course did better than the others.

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Even though some technologies, environments and tools have been developed to support the learning and teaching processes, the assessment process is still in its early stages. Some policy-makers and senior management have redesigned the assessment practices in the universities using ICT and have achieved favourable results. For instance, the work of Heinrich, Milne & Moore (2009) shows some benefits in employing technology such as improved marking quality and feedback, support for human markers, insight into student understanding through quizzes and tests, ease of electronic submission and handling of assignments. Dreher et al. (2011) argue that automated assessments are technological tools that carry the potential to improve the assessment process for all stakeholders. Students can receive immediate and objective feedback, educators can focus on teaching and giving formative feedback, and administration/management can be performed at lower costs.

Whitelock & Watt (2008) point out that ICT has also contributed significantly to the educational assessment process. They mention that "the benefits gained include student retention, enhanced quality of feedback, flexibility for distance learning, strategies to cope with large student numbers, objectivity in marking and more effective use of virtual learning environments". In fact, ICT can make a huge difference in the educational process by introducing new ways of learning, teaching and assessment by using novel technological tools.

Taking into account that students as a "digital natives" engage in an educational system that was designed in a pre-digital era, they nevertheless need to teach themselves modern life-skills through participation in the networked society and must learn industry-relevant skills and knowledge on the job.

Social-technological innovations are the gateway to the future for universities. It is therefore important to examine the adoption of and resistance to educational innovations in universities (Dreher, Reiners, & Dreher, 2011).

However, the gap between understanding the benefits of on-line assessment, and having staff engaging with it in day-to-day assessment activities is significant. Thus, it is crucial to understand which are the most common factors that affect the uptake of electronic assessment technologies. The key studies were chosen we then selected the most common factors included. We classified the crucial factors which might help to build a successful implementation of electronic assessment technologies. It is also important to consider that a teacher's engagement is determined by individual educational beliefs or disciplinary differences, attitudes working with technologies and self-efficacy (Chew, Jones, & Blackey, 2010).

E-assessment

The specific process of assessment using ICT has come to be known as electronic assessment or e-assessment. It includes the entire assessment process from designing assignments to storing the results. It involves the assessment process such as coursework submission, peer-assessment, grading and feedback, traditional examination and quizzes from the perspective of students, tutors, learning establishments, awarding bodies and regulators, and the general public (JISC, 2007).

The crucial role that technology plays is building a useful link between the processes of teaching and learning and assessment creating new approaches and opportunities for enhancing learning goals.

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As Bennett points out in his paper written as early as in 1998, computer-based assessment opens up new opportunities for innovation in testing and assessment (Bennett, 1998).

However, e-assessment practices must not only be seen as an electronic tool embedded in the same traditional teaching methods; it has to reach further objectives and has to be a carefully planned process. It has to mainly be designed following pedagogical principles rather than just embedded innovative technology (Whitelock & Brasher, 2006) and/or to deliver only an automated version of item-based paper-and-pencil tests.

ICT opens new possibilities for innovative assessment practices. Universities might capitalize on the full power of ICT to innovate by providing a richer experience of student learning. Universities are becoming more aware of this and are transforming and enriching their practices by using digital assessment technologies. E-assessment also represents an attractive option for institutions looking to address the logistical problems associated with the increase in student numbers entering higher education (Walker, Topping, & Rodrigues, 2008). Furthermore, e-assessment also helps to speed up educational processes by eliminating paper-based processes such as printing and shipping, which represent a cost to both universities and students. It thus becomes an attractive strategy for administrative authorities in universities.

Dreher et al. (2011) remark on the pedagogical benefits obtained, particularly in feedback practices, by using e-assessment technologies. The technological tools allow educators to be freed of certain tasks, such as marking hundreds of assessment items, and therefore they have more time and energy to spend on giving more meaningful formative feedback to students.

Educators can thus increase the frequency of self-assessment with higher-order learning outcomes to enhance the experience and quality of the learning. Students can in turn be freed to determine their own learning path along defined milestones and assess their learning for successful performance. They mention that the real benefit for students is getting immediate feedback, which enhances their learning performance and also activates their intrinsic motivation within the learning setting. In short, it reduces staff workloads whilst improving the quality of assessment for students.

By taking advantage of the use of e-assessment, (Dreher et al., 2011) also discuss how universities report commercial benefits. In this respect, the reputation that universities want to obtain or maintain is an important issue. Since the quality of education is valued by society in successful graduations and post-graduate job performance, high quality education is a key driver for new student enrolments and a seed of research and business projects, including endowments and sponsorship. Thus the pedagogical benefits of improved assessment methods and outcomes can affect the overall university performance. Moreover, automated assessment can trigger an improvement of the administration and curriculum planning, as researchers (Dreher et al., 2011) point out precise calculations of financial costs based on the number of students and shorter time spans between exams and results.

Technological assessment is gaining more popularity in enterprises; these are now using it as a way to assess new job candidates. It is also used to evaluate their workers in order to certify job proficiency.

The two main classes of technological tools for educational assessment are broadly classified as e-testing and e-portfolios.

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Next, we shall mention some cases of e-testing which show how technology has contributed to provide innovative ways of teaching, learning and assessment. Later, we briefly mention e-portfolios.

Relating to e-testing technologies Hodgson & Pang (2012) discuss how to engage students in formative assessment practices by doing on-line multiple choice questions (MQCs). They report a strategy that help students to reinforce new concepts by encouraging students in activities that allow them to make multiple attempts in the context of a statistics course. The researchers use technology to promote students' participation in on-line tasks on a regular basis. The tasks are useful for students since they can check the correct answers and thus evaluate their own performance. Therefore, they are able to reflect on what is taught in class and think critically, in a process of continuous reflection on their performance. They show how educational technology has supported students in reflection and led them to take greater ownership of their learning.

These researchers state that tests with MCQs (one answer and a few distractors) in on-line learning environments have been widely used as a method of both formative and summative assessment. They stress that these on-line quizzes bring benefits to students by providing timely feedback and that their use motivates students to keep practising during a semester. Also, MCQs can be set to examine a broad spectrum of declarative knowledge of a subject.

A special advantage of the use of on-line MCQs for formative assessment practices is that it allows multiple attempts to answer a question, which means that these questions can be used in pre- and post-course tests.

Commonly a chosen score (highest or average) after a number of attempts can be considered as the final mark for a formative assessment. This means that students learn from feedback following their attempts.

Hodgson & Pang (2012) conclude that on-line formative assessment activities help students to realise of "the gaps in their performance through continuous feedback" from the on-line environment. A web-based environment is a good way of providing learning challenges, particularly for large classes where it is possible to apply a randomised quiz to motivate students to make multiple trials. The researchers conclude that the learning opportunities for students were enhanced. There is "more time for self-regulated learning and reflection on what was learned; students can clarify misconceptions in face-to-face discussion with peers; and peers feel more confident to ask for help in a supportive learning community". However, the point is that the usage of MCQs supports recall of memorized knowledge without checking deeper understanding as can be included in a taxonomy of educational objectives (Bloom, 1956).

The study by Gill & Greenhow (2008) reports evidence of the benefits of the interaction between students and feedback received on-line while they interact with the computer-aided assessments (CAAs). These researchers focus on providing rich feedback to the students when they answer multiple-choice and responsive numerical input-type questions that compare a student's input, an answer, against that resulting from a coded malrule (an incorrect rule for syntactic transformation of a mathematical expression).

The technological tool reports exactly where the error was made and provides a complete solution that allows students to be able to determine their errors.

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By making students engage with the feedback, they are then able to relate the aspects of the feedback to their written work, such as use of diagrams, presentation of solutions and correct notation of vectors, demonstrating that they have developed organisation and presentation skills. According to the researchers, the study shows that students are able to improve their performance in formative and summative assessments while they are engaged with the CAA assignments, especially by spending time studying the feedback.

These authors remark that students do engage with formative assessment activities, even when no marks are allocated, due to both the quality of the CAA and a structured and supportive environment (lab sessions are scheduled in students' timetables) which shows that when students engage with high-quality feedback, the benefits appear to go further than simply short-term recall.

Other researchers have also explained how a web-based learning tool can help students to improve problem-solving skills and performance. For instance, Crippen & Earl (2007) explain how a web-based testing environment providing worked examples and self-explanation prompts has the potential to improve problem-solving skills and conceptual understanding. They mention the use of worked examples, (detailed problem solutions that contain identifiable qualities and characteristics) are designed to provide students with some structure for understanding what is the solution of a example without giving them a script or algorithm.

Researchers worked through these examples with their students; their results suggest the combination of a worked example with a self-explanation promptly produces improvement in performance, problem solving skills, and self-efficacy.

Reiners et al. (2011) have pointed out that automated assessment systems only support memorized knowledge. Nevertheless, the recent technological advances in automated assessment are a convenient option. Emerging technologies on assessment intend to support interpretations of short answer and essay type questions. These educational tools would support interpretation and problem-solving levels (Reiners et al., 2011). For instance, automated essay grading tools (AEG) are computer-based tools to assign grades to essays written in an educational context. These tools are based on natural language processing and normalization techniques which compare students' written words of an essay with a model solution (normalized word vectors and their frequency from the essay are mapped to their corresponding root word in a thesaurus). The research of Nicol & Macfarlane-Dick (2006) shows that essays can assess higher-order learning.

However, Reiners et al. (2011) argue how the success of these innovative tools is being blurred by the idea that these cannot assess higher order tasks as accurately as human beings would do. In the case of assessing student's goals through electronic essays tools, there is a current belief that human markers are superior to computers at the tasks of understanding content and making comparisons between student essays and a model solution. The researchers argue that the use of automated essay grading tools (AEGs) refute the idea that computers cannot do human activities that require higher order thinking.

They mention that "while this may be true for many endeavours, it is no longer true for grading essays". As a result they advise that electronic assessment, particularly automated essay grading is an option that works for universities, emphasizing the idea that technology works as accurately as human markers enhancing formative feedback, saving time and money.

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Other useful e-testing technologies that have gained broad popularity are plagiarism assessment tools. These are tools that compare a document to a set of 'genuine' reference documents in order to retrieve similar patterns of text. Although these tools "do not assess learning or application of concepts/knowledge" (Reiners et al., 2011), these have been successfully applied in universities as practical and efficient tools to assess the originality of written essays.

An e-portfolio is defined as "the product, created by the learner, a collection of digital artefacts articulating experiences, achievements and learning. Behind any product, or presentation, lie rich and complex processes of planning, synthesising, sharing, discussing, reflecting, giving, receiving and responding to feedback. These processes are the focus of increasing attention, since the process of learning can be as important as the end product" (Gray, 2008). These technologies have proved to be important educational tools, that promote and support learning (Alexiou & Paraskeva, 2010) and teaching leading to more profound forms of learning, adding value to personalised learning that serves as scaffolding approach of understanding and engagement. E-portfolios also facilitate the transition between institutions and stages of education, supporting education and employment, staff appraisal and applications for professional accreditation, and supporting learners based in the workplace (Joyes, Gray, & Hartnell-Young, 2010).

The JISC in the UK is a very useful source for advice on how to implement effective practice in the use of e-portfolio systems and tools, as well as to determine their implications for teaching, learning and assessment. JISC has worked in partnership with other sectors and bodies to develop and provide guidance to institutions on effective e-portfolio practice to support lifelong learning. They have proposed the development of standards and piloted e-portfolio technologies.

The main driver for institutional e-portfolio initiatives in the UK is the Personal Developing Planning Policy (QAA, 2001). Although it has not just been the unique driver, according to Joyes et al. (2010) these have also been "the importance of retaining students, widening participation, and increasingly, reflective learning have also contributed to widening interest in e-portfolio tools and technologies".

E-portfolios systems have proved to be an important tool to enhance quality learning, according to Gray (2008) in the JISC report effective practice with e-portfolios, these electronic tools can serve to develop higher-order functions, leading to students becoming independent enquirers; creative thinkers; reflective learners; team workers; self-managers and effective participators, skills that employers and higher education want to see developed in current generations of learners. Moreover, the creation of an e-portfolio involves a critical process: reflection. This process is a key aspect in the development of deeper learning through self-reflection and self-assessment which includes developing activities such as planning, goal-setting and future reflection. The process also helps to build up a range of skills including critical thinking.

Joyes et al. (2010) report on the tangible benefits of the use of e-portfolios.

They classify the benefits as efficiency (time-savings for students, academics and, administrators), enhancement (improving quality of evidence and feedback, skill development, satisfaction and increases in recruitment and retention) and transformation (innovation and changes to institutional policy). However, they also point out the drawbacks, since e-portfolio implementation is particularly complex, in part due to the number of stakeholders involved since portfolios can be used in several contexts and purposes.

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They suggest that there are threshold concepts related to e-portfolio implementation and that developing an understanding of effective practices is not straightforward.

Regardless of the educational technology used in assessment to implement, e-portfolio or e-testing, there are some generic skills and knowledge required according to the e-assessment: guide to effective practice (2007). The guide suggests that all staff involved, irrespective of their role, should have (or be trained to have) the following skills and knowledge:

- A broad understanding of assessment principles.
- An understanding of security importance for conduct assessment and a security measures knowledge required for e-assessment (particularly to their centre).
- An overall familiarity with the e-assessment environment and delivery platform(s) especially to their centre.
- A recognition of possible malpractice in e-assessment and the precautions needed for its prevention.
- A legislation awareness relevant to the centre operation. The general regulations of relevant awarding bodies, and regulatory authority guidelines and codes of practice.

The UK government has proposed several initiatives to recognise the skills and knowledge of people involved in the delivery of e-testing such as the Level 3 Award for delivering e-testing. This initiative recognises the importance of key aspects such as security, legislation and regulations of adequate e-assessment practices.

The units that make up this Award form part of the Teacher Qualifications Framework developed by (Lifelong Learning UK, 2010).

In order to gain a wider perspective of emerging technologies that will impact the future of educational systems, the Horizons Reports (HRs) are a good starting point. These reports are produced by The New Media Consortium, NMC (2014) and the EDUCAUSE Learning Initiative, ELI (2014). NMC is an international community of experts in educational technology whose role is to help universities, colleges, museums, and organizations drive innovation across their campuses. ELI is a community of higher education institutions and organizations committed to the advancement of learning through the innovative application of technology. Since 2004 both have made yearly predictions of the impact of ICT by using three temporal horizons: the year of the report (short-term predictions), the next two years (mid-term predictions), and the four years following the report (long-term predictions).

Regarding assessment practices, the Horizon Report 2014 (NMC Horizon Report, 2014) discusses the actual trend of learning analytics provides statistical and data mining tools that can improve student services, retention and aims through adaptive learning strategies.

On-line learning platforms are generating a large amount of data about student activity and dashboards provide both students and teachers with an overview of this data. This can help students realize how they are doing and help teachers identify students who might need more help and support, making improvements to students' performance and personalizing in the learning experience.

The increasing importance of assessment practices in educational systems is a global phenomenon.

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Countries such as the UK have seen the e-learning movement and e-assessment as important strategic initiatives whose growth potential is enormous. The UK has set government strategies to include innovative assessment practices. These assessment practices include; assessment feedback, plagiarism/academic integrity, assessing and recording student achievement, and methods of assessment such as essay-type, MCQ, portfolio, etc., and formative versus summative assessments. These practices should have been included in all UK universities by 2010, (Higher Education Academy, 2010). However, others countries such as Mexico have made insufficient investments in science, technology and innovation. As a result, the potential increase in their economy is inferior to that necessary to reach the level of other countries and achieve a comparable competitiveness to that of other emerging economies.

In accordance with all other available indicators the general level of innovation in Mexico is really low, not only in comparison with other Organisation for Economic Co-operation and Development (OECD) countries but also with the most dynamic emerging economies (perspectivas OCDE: Mexico reformas para el cambio OCDE, 2012).

Issues inhibiting e-assessment uptake

We will focus on the factors that limit the adoption of ICT at universities in order to possibly avoid repeating the same mistakes. It is believed that not only is it useful to figure out the main barriers, it is also important to know what facilitates adoption; it is also very valuable to focus on what strategies have been successful for universities in order to implement e-assessment.

We will identify facilitators and barriers to the adoption of educational technology for the assessment process.

This demonstrates how well a university is prepared for it, whether the university's staff have the skills to carry out the plan and to what the extent all stakeholders are involved in the plan. This will help us to design and implement electronic assessment plans successfully. On the other hand, it also helps in designing future policies for the adoption of e-assessment as well as help to establish a context for commercial agreements related to the assessment by computers.

In order to obtain a clear view, we take into account the model of Ocak (2011), who identifies categories and themes to classify and examine the impediments that face faculty members in the adoption of blended learning environments. The study identifies three categories and eight themes as results of faculty members' problems with blended courses. The categories were classified as instructional processes, community concerns, and technical issues.

The themes derived from these categories were identified as 1. complexity of the instruction, 2. lack of planning and organization, 3. lack of effective communication, 4. need for more time, 5. lack of institutional support, 6. changing roles, 7. difficulty for adoption of new technologies and 8. lack of electronic means. Considering this model as a reference, we identify the categories and themes that affect the adoption of electronic assessment technologies which we have classified as “administrative structures”, “faculty concerns” and “technological infrastructure and systems” categories and their related themes that we have represented in Table 1.

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Administrative structures	
Institutional policies	-Lack of incentives (tenure, promotion) -Lack of resources, equipment, infrastructure -Ineffective dissemination of e-assessment
Administrative structures	-Changing of roles -Lack of support on legal matters, such as plagiarism, data protection, intellectual property rights -Lack of skill and understanding -Health and safety issues -Lack of key roles for administration, support services and departments -Resources withheld by senior management
Communication	-Lack of interdepartmental communication -Lack of communication with academic staff
Funding	-Not enough investment for technological infrastructure -Lack of new projects -High cost of licences
Faculty concerns	
Pedagogical research	-Inability to evaluate higher levels skills -Is viewed as a secondary to authoring, marking, reporting -Not appropriate for particular subject -Lack of development of examination procedures -Making ICT the focus instead of pedagogical matters
Attitudinal issues	-Lack of willingness -Lack of confidence and reliability -Fear of failure -Feelings of isolation -Wrong expectations -Fear of anonymous submission of assignments -Threat of reductions of faculty members -Feelings of discrimination by "non-digital natives"
Training	-Lack of computer literacy -Lack of expertise in the design -Complexity of instruction
Time	-Lack of time
Technological infrastructure and systems	
Systems, applications and environments	-Limited functionality -Incompatibility -Limited availability -Lack of reliability -High risk of technological failure -Limited availability of internet-connection
Pilot projects	-Difficulty of adoption -Insufficient funding
Technical support plans	-No backup plans -Lack of follow up -Lack of technical support
Security issues	-Passwords, cheating, impersonation
Upgrade technology	-Lack of plans for renewing systems

Table 1 The main factors affecting the adoption of e-assessment technologies

Table 1 gives a wide view of the current landscape of electronic assessment. It identifies the main barriers to the adoption that affects all stakeholders involved in the electronic assessment process recognizing the key points which allow us to clearly identify strategies and tactics that may help to minimize the cited barriers.

The table is divided into three categories. We call the top level "administrative structures" which represents policy-makers, senior management and university staff who propose, design and implement the policies and educational plans related to the adoption of technologies, including technologies of e-assessment.

We call the second level "faculty concerns" which represents the faculty members' needs and problems to embrace ICT in their teaching and assessing practices. This includes important matters such as pedagogical and attitudinal issues, training concerns as well as spending time learning educational technologies.

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The bottom level called "technological infrastructure and systems" includes matters related to availability and efficiency of the use of ICT resources. These factors are crucial in adopting ICT, particularly for teachers (Bhuasiri, Xaymoungkhoun, Zo, Rho, & Ciganek, 2012). Teachers who perceive that these requirements are attended and also satisfied should be more willing to use assessment technologies.

As seen in Table 1, for teachers a common and continuous barrier is the lack of time to learn and use an e-testing environment (Whitelock, Mackenzie, Whitehouse, Ruedel, & Rae, 2006), (Sim, Holifield, & Brown, 2004).

However, educational research shows also that the use of ICT can compensate for time spent in grading/scoring practices which are commonly considered as tedious and time consuming practices.

The time invested in creating high-quality materials for e-assessment is another important barrier. This also includes training and experience to develop creative questions (Brasher & Whitelock, 2006). Bull (2000) proposes some strategies to overcome these barriers such as building up banks of questions and to share common questions. Although there is plenty of material available on the web, Bull advises that their quality is often low. In the same way, she points out that security issues, copyright and organization are serious obstacles for the effective use of question banks.

Importantly, the activities must be recognised as valid academic products that must be developed by teachers, and should be included in a regular timetable. However, Bull also mentions that until it becomes a mainstream activity the efforts to release time for these activities will be lacking.

Likewise, "difficulty with using systems" (Warburton, 2009) and "lack of adequate computer training policies" (Whitelock et al., 2006) are two common barriers mentioned in literature. Not including plans for renewing systems or inadequate technology upgrade plans is an important barrier. In the day to day of academic activities it is common to hear complaints about "the system has failed" which can cause both teachers and students to feel discouraged in using the systems. The key point here is to implement appropriate policies and plans that keep systems running. This clearly depends on organisational structures, for their implementation and follow-up.

On the other hand, we want to highlight an important finding which must be carefully taken into consideration. It is related to teacher's perception that use of ICT has been imposed by institutions regardless their needs. It makes teachers feel unwilling to use ICT, as they think it can affect their autonomy. To avoid this McCann (2010) advocates guidelines to manage cultural change that includes choosing a leader, defining a vision, starting with pilot projects, motivating teachers with hands-on training and informing them about the system with particular emphasis on results and impact. The above points show that many of the obstacles are related to academic staff (Whitelock et al., 2006).

Other important drawbacks are that the selection of ICT for teaching, learning and assessment is an approach that does not include enough detail of a pedagogical plan, which deters the adequate use of technology (Heinrich et al., 2009). The combination of deep skills and technology and pedagogy knowledge for e-assessment are not common questions. To develop pedagogical and technological strategies and make them accessible to all those involved, is an effective way to cope with it.

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The provision of training sessions for teachers, resources, advice and guidance is also a way to overcome this barrier.

To obtain tangible results in universities will require a clear support by policy-makers at the institutional and national level.

From the students' point of view, although they are very familiar with the use of technology, they are still worried about the security of testing (Cassady & Gridley, 2005), possibilities of cheating (King, Guyette, & Piotrowski, 2009) and the fairness of question banks (Dermo, 2009). If students do not have enough confidence in a test, that can affect their levels of engagement and cooperation (Domino & Domino, 2006).

Other important barriers are highlighted by Bull (2000) in their annual report on Computer-Assisted Assessment (CAA) in the UK. The report points out that a "lack of understanding of the limitations and potential of the method of assessment and the assumption that it is not possible to test higher order skills using CAA" are two important obstacles for the implementation of CAA. The report advocates "to include staff development at a generic and departmental level; to provide good examples of materials in a particular discipline". This is a powerful way to show that CAA can test higher order skills. However, the report advises that because of the high level of skill needed to create such materials, these are difficult to make.

This is also shown in the research of Warburton (2009), where it is stated that factors such as "fear of CAA failure, ineffective dissemination of good CAA practice, difficulty using the systems and resources withheld by senior management" are other obstacles.

Concern over security issues is another factor restricting the adoption of electronic assessment technologies. Bull (2000) points out that this results in "techno panic, a phenomenon which manifests itself as a demand for much more stringent security measures than would be adopted for paper-based assessments".

The causes are: "an inherent unwillingness to participate, resulting in identifying difficulties and reasons for failure; unrealistic expectations of technology; and a misguided belief that students will only consider cheating if they are using technology". The strategies to overcome this issue include encouraging a more sensible approach to security measures and awareness of developments in technology which help the security of examinations. These are also important within the context of assessment strategies and strategies in general.

Aspects of reliability and validity are important in designing electronic exams/test. For educators the main concern is keeping marking reliable, particularly for larger classes (Heinrich et al., 2009). Students are more interested in efficiency, transparency and fairness of their assessment activities, which influences the degree of engagement shown in their studies (Iannone & Simpson, 2013).

Factors driving e-assessment uptake

To recognize the factors that facilitate the adoption of technology, we will now consider the strategies and tactics that enable its use.

To successfully adopt technology one has to be convinced of its usefulness; to identify which factors are driving each stakeholder to get involved in the assessment process. We have included below the most common factors that encourage their use.

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A major factor often mentioned in literature is active institutional and administrative senior management support (Buzzetto-More & Alade, 2006), that strongly supports the proposal of strategies for academic staff development and training (Whitelock et al., 2006), (Warburton 2009), (Heinrich et al., 2009).

This is not surprising, as policy-makers and administrators should be the first to be convinced that educational technology can greatly enrich the assessment practices.

The role that policy-makers and senior management play is crucial for educational technology adoption for the e-assessment process.

Their support serves as motivation for teachers and students to adopt ICT, as is highlighted in Whitelock et al. (2006), who point out that the main facilitator of effective implementation of e-assessment is the support of the school manager, combined with staff development and pedagogical and technical support. Likewise, Heinrich et al. (2009) notes that teachers need more support from the university management when using automated assessments.

This is also stated in the work of Bhuasiri et al. (2012), whose research tries to identify factors that influence the acceptance of e-learning systems in developing countries. The results of this study are particularly applicable in our research, since e-assessments are an important part of the e-learning technologies. They identify 6 dimensions and 20 critical success factors (CSF) that affect the adoption of e-learning. They define the dimensions; learner's characteristics, instructor's characteristics, e-learning environment, institution and service quality, infrastructure and system quality, course and information quality and motivation.

As the principal factors involved in e-learning adoption. Their conclusions show that the "infrastructure and system quality dimension" is the most important from the teachers' perspective. Therefore, it seems that active institutional support is crucial, as we have already pointed out above.

Likewise, Heinrich et al. (2009) points out that successful e-assessment adoption depends on the flexibility (willingness) of the academic staff.

Another important factor, is the willingness of staff to develop material, which clearly requires specific training to develop teachers' abilities and skills.

The opinions and experiences of educators can influence colleagues' willingness to use a specific educational environment (Heinrich et al., 2009), (Warburton 2008). This suggests that a teacher can agree to use a certain system and disagree to use another one. In this way, his/her opinions can affect colleagues' perceptions and opinions and therefore modify their willingness to use a system. The ideas cited by researchers (Heinrich et al., 2009), (Whitelock et al. 2006) show the importance that pedagogy plays in a technology adoption plan. As Heinrich says "the selection of the technology should be guided by pedagogical design of the assessment" and not as often, the other way around.

They also point out that other important factors that facilitate the adoption of electronic assessment are "the removal of geographic limitations, reduction of losing work risk, saving time and resources if printing is not required, the availability of a long-term archive of student work based on the ease of storage of electronic material, and fast return of marked student work" which can also serve as strategies for educators who want to enhance their teaching.

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It is noteworthy that the practical benefits for educators are the reduced effort and time spent on assessment practices. When teachers adopt technology in their class, they acquire new skills that improves their performance.

Once they have used the technology, they do not want to go back to using traditional practices (Heinrich et al., 2009). Electronic assessment practices facilitate the opportunities for anonymous participation and marking which support group activities, and improve the quality of marking and feedback. Whitelock et al. (2006) mentions that technical support for teachers is an essential facilitator (including technical services and the design of electronic assessment tasks).

We will also analyse the impact of this factor on teachers' willingness to adopt e-testing technologies.

More recent research, e.g. Reiners et al. (2011), point out other factors that help the dissemination of strategies of automated assessment technology such as demonstrations, case studies, and hands-on experiences (e.g. 3D Virtual Worlds). Technologies such as advanced plagiarism detection have also been successful promoting advanced automated assessment technologies.

Conclusions

In this study we have reviewed the literature on the current state of knowledge and practice regarding electronic assessment, and wish to conclude with some useful insights that summarize the adoption of ICT in the assessment process. Knowing these factors - positive or negative- enables us to determine when the staff are well prepared to implement a plan to adopt technology, as well as the grade of willingness of the main stakeholders.

For teachers the lack of time to develop questions or even to learn the software (Dermo, 2007); (McCann, 2010); (Whitelock & Brasher, 2006); (Warburton, 2009) are important barriers for the adoption of e-assessment.

Nevertheless, the literature shows that adopting electronic assessment practices can help teachers save time (Whitelock et al., 2006), which compensates for the time spent in learning and developing e-assessment strategies.

Teachers' training in computer literacy and test construction is another important lesson. (Sim et al., 2004), (Warburton, 2009), (Purvis, Aspden, Bannister, & Helm, 2011), (Dermo, 2007), (Ashton, Beevers, & Thomas, 2008).

Another important factor is the design and development of a technology plan that considers sufficient details of pedagogical strategies.

It is fundamental to include aspects of validity and reliability in designing a useful plan for adopting technology to educational assessment, because it depends to a large extent on the level of trust and confidence that students embrace in the assessment practices. This will also be reflected in students' efforts in their learning (Iannone & Simpson, 2013).

In the research of Bhuasiri et al. (2012), the infrastructure and system quality are the most significant categories from a faculty perspective at the universities and found to be also at the educational organizations. Hence, it might be interesting for policy-makers and senior management to initiate strategies regarding funding the development of new educational projects that enhance the assessment practices by the use of ICT. As Whitelock et al. (2006) remark, a successful implementation of electronic assessment depends on active institutional and administrative support.

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It must not be forgotten that the adequate design of electronic assessment methods must include technology for the right pedagogical reasons as educational research advocates, the use of technology for its own sake does not improve educational assessment (Heinrich et al., 2009).

As is shown in the experience of other countries such as UK, where e-learning has been recognized as a movement with a huge growth. The UK government has focused on developing new initiatives to recognize the electronic assessment process as an important strategic initiative. Policy-makers and senior management have the power to foment and create these changes. Also, teachers must be involved in a steady and continuous change.

Their strategies must be extended to include all stakeholders involved in the educational processes.

Not surprisingly, teachers also need to take into account that there are wide political and business issues in the background that affect the appropriate development of electronic assessment at universities. To deal with this situation, policy-makers and senior management must learn the best strategies to obtain real progress to all related stakeholders.

ICT has revolutionized the education system by making it more accessible to modern society.

This should be an advantage to students, teachers and universities. Technology enables education to be available to more students, including those from the social stratum of the needy. This not only can meet actual demands for higher education, but also offers innovative teaching, learning and assessment methods that undoubtedly will be attractive to new generations of students.

Educational technology also plays a crucial role in automating each task and stage of the assessment process and although its use and effectiveness has already been proven, educational literature shows that there is still a huge need to develop these innovative approaches. Research in e-assessment includes a huge variety of perspectives that leads to continuous change. There is no single solution to the challenge of effective education.

However, the willingness to adopt innovative educational assessment methods will indeed make a positive difference to students' learning. We conclude by citing the idea of Stödberg (2012), who points out that knowledge in this area is quickly expanding and there is a need for more studies related to e-assessment.

There are still many opportunities that are not being taking advantage of, and the emerging research should be constructed with the aim of proposing specific strategies for developing new approaches to e-assessment.

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Modular technological capabilities in the furniture industry

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Abstract

This paper presents an analysis of modular technological capabilities in furniture industry, in particular case of two companies producing wood residential furniture, BV and SGS. These companies operate in two different areas of furniture industry, the first is characterized by producing classical European style furniture. The second detonated SGS at time known Mexican rustic furniture design. Both companies have offered their products nationally and internationally, which led them not only to establish the quality within its objectives, but also needed management strategies productive and technological capabilities and design to stay competitive in their market. This document focuses on the technological effort of firms and analyzes the modular capabilities have developed in different areas such as production, product and marketing.

Marketing, furniture industry, technology, production, market.

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Introduction

Introduction the work of Baldwin & Clark (2000), focus on design as a key activity in the innovation process, being the design establishes the architecture of artifacts and their interactions. They analyze the modularity as a mechanism that enhances innovation given the standardization of interfaces with other appliances.

Modularity is the process of dividing a large design in consistent units "modules" that can work together as an integrated whole. By definition, the modules are indivisible units of the activity of design within a larger, divisible and hierarchical system. A module is defined as a set of parts that are interrelated structurally interlinked to form a unit which is integrated into a larger system, in which interacts with other modules through functional links (Baldwin and Clark 2002, 6).

A modular system is composed of modules that are designed independently, designers get modularity partitioning information in visible rules of design and hidden design parameters, enabling the functioning together as a whole. The modularity is beneficial only if the partition is accurate, complete, and non-ambiguous.

Modularity, is the response that has been built to address the complexity, presents a breakdown of complex products in simple and independent modules through a standardization of interfaces.

This production strategy has been adopted by various industries that handle a high level of technological complexity, and seek to reduce the diversity of components reaching a productive synchrony and high levels of standardization of components inside and outside your company or industry.

This document presents in the first place the tool used to perform this analysis, then presents the main elements that determine the modular capabilities, as the third point arises the economics of the furniture industry context, followed by the definition of the two analyzed cases and its analysis, in a fifth section presents the results and finally the conclusions of the analysis are presented.

Methodology

First of all put this research into the methodology of case study, for which followed the methodology proposed by (Yin, 1994), we define this study as multiple holistic, in which there are two cases and an object of study.

For the analysis of the modular capabilities, Gonzalez (2014), proposes an array of modular capabilities that allows you to locate the State of the modular capabilities of enterprises or industries, this matrix is that we use to perform this analysis to furniture companies. This matrix identifies the types of modular capacity that can be found in the Organization, to then assess the level of these first, i.e., allows us to recognize the modularity and the level in which the analyzed organization is located, but also allows us to establish a management strategy of these capabilities according to the production environment of the company It will advance the capabilities to improve its competitive position.

Firstly the technological capabilities of both companies were analyzed, then focused the modular capabilities study, determining the type and the level in which are, describes these capabilities in terms of their productive activity. Table 1 presents this tool used to assess the status of these capabilities in both companies.

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Types / Levels	Modularity in the configuration	Modularity in production	Modularity in the use	Modularity in transportation
1. Null Capabilities				
2. Basic capabilities				
3. Intermediate capabilities				
4. Advanced capabilities				

Table 1 Matrix of modular capabilities (outline)

This matrix is divided into four types of modularity and in three levels of the same, also offers a reference point of zero state of modularity, a reference in a premodular state, which serves as reference to determine, case of a company or organization that may be at a point prior to a state of modular capability. The matrix here proposed, allows an internal and external analysis of the productive organization, as well as it allows in the same way, analyzing an object in relation to its architecture and design rules, as well as its interconnectivity with other systems or subsystems.

The principles and foundations of the modularity

Design Rules

Modular design rules established strict partitions of knowledge and effort in the realization of a design that supported the structure of efficient and flexible processes, whose parts are worked independently and in parallel with each other. The application of those rules extends the possibilities of design and thus opportunities for more innovations in the modular design. In a modular configuration options in the design are multiplied because changes in one module become independent from changes in other modules.

They are also decentralized because as designers adhere to the design rules, you have the freedom to configure (apply modular operators) without reference to the original architecture or any central Configurator of design (Baldwin & Clark, 2000).

According to Taboada (2005), these rules of visible design fall into three categories, architecture, interfaces and standards.

- An architecture that specifies which modules will be part of the system and what are their functions.
- A series of interfaces that describe in detail how the modules will interact, including how it is that they will work, will be connected and communicate together.
- Standards to prove that a module compliance in accordance with the design rules.

That is, architecture is the plan of basic design of the product, which is to divide it into different parts by assigning them different roles and deciding how they are connected. It may be, Integral: one whose components have a high degree of interdependence. Or Modular: design that is based on the use of components and interfaces, allowing customization (customization) of the product by mixing and setting (mix and match) them (Taboada, 2005).

The formalization of a modular architecture enables the independence of structure and function integration[1].

1 Modular architecture began to be developed in the computer industry from the e. U. A. between 1960 and 1970 and resulted in the emergence of clusters of firms and markets around successful computer systems modular (Taboada, 2005).

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The interface as well as the bond of communion of the components must denote the language indicative, to establish formal features of the component, that denote the operation, assembly, clamping and any other indication to the user for optimal operation (González, 2014).

Principles

Following Ethiraj & Levinthal (2004), when the strategy is not modular, a small change/problem can affect the entire system. Modular systems are more stable and predictable, and it establishes seven positions on the modularity.

- Modularity relates positively with speed of imitation of the design product, and therefore negatively the durability of the advantages of product performance.

- The heterogeneity of the product negatively moderates the relationship between modularity and imitation.

- Modularity will be positively related with the speed of the increase of improvement and performance of the product.
- The modularity is positively related to the reliability of incremental improvements to the performance of the product.

- The modularity is positively related to the likelihood of radical innovation in the component and subsystem level.

- The advantages of radical innovation, gained through modular design are positively related to durability of modular performance of the advantages of the organization.

- The experience in the use of the modular design principle, positively moderates the relationship between innovation and modularity.

Lara, A (2000), points out that the modular architecture has at least three objectives i) standardization and decrease of variability; (ii) increase in the variety; and (iii) flexible manufacturing processes.

Standardization and decrease of variability

The modular product is built with a series of units or modules, where all the product variants can be created from those modules. The modules are linked together through interfaces. In this way, is built the product with a minimum of parts reducing its variability and expanding the flexibility of designs and creating a structure open to change.

Increase in the variability

The modular architecture allows the interior of each module to improve the designs and produce variations that explore new forms.

The variety in the product is created with different versions of each component in the final product. So any combination of components can be assembled in different versions of the same product, or even in different products, with slight modifications.

Flexible manufacturing processes

The units or modules are common components of all variants. The variants are defined by design rules that respect the assembly and interconnection interfaces.

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Modularity levels

Modular system designers must design and specify visible design rules, needed to make the modules work as a system, the modularity in the development of new products may occur at four different levels (Hsuan, 2000):

- Components: parts standardized, well defined and accepted as industry standards. They are useful for many industries.

- Module. Combination of different parts of the component level.

- Subsystem: formed by the combination of modules, under specifications for each subsystem.

- System: Composed of subsystems with clear boundaries and defined interfaces.

These four levels can be or not present in products, this depending on the modular complexity of the object, to more complex higher level, less complexity less modular level.

The complexity is not given by the number of components, if not for the combinations in the modular arrangement (González, 2014). The degree of modularity in the development of new products is highly dependent of the number of standardized components, the composition of components, the interfaces between components, modules and subsystems, as well as the degree of substitution of components.

As more components are created at each level, modularization implies greater restriction on the system level, increase in the degree of customization (Hsuan, 2000).

Modularity typologies

It is possible to define the modular design from different perspectives: product and technology process, reconfiguration of the spatial distribution of components and subsystems; degree of connectivity and no-connectivity of the elements of the system, etc. (Lara A., 2000).

According to Gonzalez N., (2014), we find various kinds of modularity of agreement to different authors, she brings these proposals into four types: 1) modularity in the configuration, 2) modularity in the production, 3) modularity in use and finally, 4) modularity in transport.

- Modularity in the configuration: it is "hierarchy of the product", i.e., "architecture of the product" which defines the plan's basic design, which is to divide it into different parts, assigning different functions, like wise defines the interfaces between components.

Is designated when the components are closely interrelated within units, and there is among them a task interdependence and parameters, and these, in turn, are independent units (Baldwin and Clark, 2000;) Fujimoto and Akira, 2001).

- Modular production: consists of the "hierarchical structure of the product and its production process", i.e. the modularity provided by the variety of components of the product and the variability among them.

She completely specify all parts of the product and their interactions, are standardized under the strict parameters and can be manufactured or made at different times and each component or process in different place. (Baldwin and Clark, 2000 ;) Fujimoto and Akira, 2001).

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- Modularity in use: it is defined in terms of the interrelationship between the "function of the product" and the "hierarchical structure of the product", i.e., the function of the product is governed by the architecture of the product. I.e. the provision provided by the appliance the user to configure or reconfigure the product according to your needs. (Baldwin and Clark, 2000 ;) Fujimoto and Akira, 2001).

- Modularity in transport: is the modularity sued by channels, means and costs of the action of moving from one place to another component, module, sub-system or system, whether by the modularity intra-firm, inter-firm or for marketing.

I.e. it can be defined by components or modules that move within the firm or by modules that are delivered by suppliers external to the company, these modules are assembled in finished products in sub-systems on the main line of the contractor, in a process of outsourcing. Or it can be defined by the need to distribute the product to a lower volume and cost. (Baldwin and Clark, 2000 ;) Fujimoto and Akira, 2001; Gonzalez N, 2014).

The furniture industry

In sectors of economies of scale as the automobile industry, the volume factor - distance that determines the economic density of the product, has not been relevant element to trigger another kind of modularity. However in areas of low economic density products as they can be certain industries such as the furniture, since transportation costs are a crucial factor in the competitiveness of the product, required a fourth type of modularity the modularity in the transportation.

This modularity is determined by the capacity of modules or subsystems of recovering ones from others, reducing its volume in transportation given an outsourcing or in the marketing of the product to the end user (González, 2014).

The wooden furniture industry, is considered an industry that uses mature technology, with low technological income and high international broadcasting. It is classified as dominated by the supplier, however, even when this activity is classified in this way, there are companies that do not strictly conform to this classification, which is analyzed in this research (González Vega, 2005).

The furniture of wood, for many years industry has been a family business, formed by companies that initially were small workshops with little machinery and poor workmanship. The product of this industry is a good of consumer durables which are placed in the third phase of the life cycle of the product. The technological application of furniture products, grows in importance in the global production. Wood furniture manufacturing, linked resources from the primary sector, including providers of economic infrastructure; the secondary sector, suppliers of inputs and services and; of the tertiary sector, including infrastructure and transport.

The wooden furniture industry, internationally turned towards the use of new materials and increasing integration between companies. Traditional production processes are being overwhelmed by technology transfer, courses, trainings, technical manuals and experimental productions, manifesting itself as one of the great features of the international industry of furniture (Torres and Muñoz, 2002). Among the most relevant factors that characterizes the new type of industry (Domínguez, R., 2002: 105)

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- Consolidation of companies to obtain advantages of scale in the purchase of raw materials and distribution of products.

- Greater horizontal integration for the manufacture of new products.

- Specialization of small companies in the manufacture of components, such as suppliers of large enterprises.

- A growing integration of small businesses to form distributors to export markets.

- Technological innovations seeking simpler, less expensive and more automated processes.

- Less use of tropical timber and greater use of the temperate.

- Increase in the use of MDF (Medium Density Fiberboard) and fiberboard, instead of solid wood (furniture for kitchen 90%) and 80% in furniture for the home and office.

- A change in the industry towards manufacture ready-to-assemble (RTA) furniture.

- More training in norms, standards and quality control required in export markets.

According to Gonzalez, N. (2005)

- The use of new tools and design methods as CAD-CAM, Virtual and 3D furniture design, have transformed the technological profile and how to conceive and produce companies.

- The increasingly greater use of information technologies, as the Internet and intranet, as well as the use of communicator radios for the exchange of information.

- The creation of databases of the company, where the information is organized to be consulted by the different departments.

In general, this industry, moves along by technological advances and the development of substitutes for wood, as well as by the development of new finishes.

Globally, the industry is segmented by product type, where the home furnishings are the most significant.

Mexico has a moderately developed, the furniture industry where important stages of the production process are still made with traditional methods. So the national furniture industry can be classified as intensive in hand work and low volume. In Mexico are three types of companies: automated, fairly automated and handmade[2] (Bancomex).

The wooden furniture industry mainly produces furniture for the home, followed by office furniture and furniture for institutions, hotels, shops etc. Costs represent 60% in raw materials, 30% labor and 10% in other expenses such as transportation, marketing and other areas. In terms of sales, for the year 2000, the total sales of wooden furniture, the 58.1% corresponds to the micro and small enterprise, 31.4% to medium and 10.5% to the large (Torres and Muñoz, 2002).

2 The companies that are discussed in this research are defined one in fairly automated and other craft.

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This industry, controlled mainly by national companies, is an important foundation of manufacturing for domestic consumption.

The national furniture industry, is composed of about 44000 companies[3], as he already explained are mostly micro and small. 54% of the companies are located in Mexico City, Jalisco, Mexico State, Michoacán, Oaxaca, Puebla, and Veracruz.

General characteristics	
Size of the company	Many micro and small companies with an average of 6/7 company workers.
Style	Traditional and craft with little own design
Product line	Different lines of products, with great variety of models.
Machinery and equipment	It has little specialized machinery and Semi-industrial equipment.
Type of Industry	Semi-developed, with idle production capacity, low volumes of production

Table 2 Characteristics of the wood in Mexico furniture industry

The economic concentration of this industry is minimal, presents one less than 0.1 CR4, this means the four largest wooden furniture-producing companies have no more than 0.1% of the market.

The economic concentration in this industry does not exist, since more than 90% of the establishments are micro and small industries, and over time, this divergence is greater, in 1981 the number of microfinance institutions and small was only 79%, for 1999 the percentage rises to 99%, i.e. the concentration of the market disappeared, there is no power market in this sector (INEGI). As mentioned above, this is explained by the number of establishments engaged in the repair, and in addition the technological ease that represents access to a mature industry.

3 15th Industrial Census. 1999 INEGI

Of the total exports by customs of furniture, the 15.8 percent wooden furniture (Bancomex, 2001).

The world market of wood furniture is increasingly more open, it is estimated that world demand for this product is increased by 3% (Canacintra). Emerging new players such as India, Viet Nam and Romania, while China stands as a main player in the market.

Although Italy continues to be the main exporter of furniture in the world together with Canada, Germany, China and Poland.

The largest importers are the United States, United Kingdom, France and Japan. Mexico is not in any of these two groups but is expected in 2004 continued on an upward trajectory as producer and exporter, mainly to the United States.

One of the factors that make small the competitiveness of Mexican modern enterprises, are the high costs of operation, as it would be the case of the electrical energy that is 60% more expensive compared with foreign competitors, such as China (Canacintra).

The Mexican companies have indicated a growth from trade liberalization, especially since the implementation of the free trade agreement with the United States and Canada, this growth has been explosive and provided investment opportunities for the manufacturing and marketing of furniture, which have had as main target the domestic market followed by the United States market. After this, Europe represents one of the main markets of the Mexican furniture.

The Cases

This section is a summary of the history of companies, information on their origin and evolution.

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Describes a set of background, characteristics and information about production and the market, to place the object of study in one company.

VB Company

The VB furniture company, was founded in 1934, is located in the industrial zone of Naucalpan, Mexico State, manufactured in a home, English style furniture, which were exact copy these designs and some European classics of the 15th and 16th century. These furniture were made in 100% solid wood, i.e. industrialized wood (plywood or chipboard) was not used.

It focused on a classified as upper middle class market, which could acquire this type of furniture, which are characterized by a large size and high price. Currently the company is dedicated to the manufacture and distribution of wooden furniture for the home in the following lines; canteens, bedrooms, tables, bookshelves, especially using derivatives of wood.

Its main models which follows the line that characterizes them: Orleans, Sheraton and Chippendale.

Some of these models are maintained today, but also has emerged a classic line that is developed by this company.

Its main clients are; Liverpool, Dico furniture, Hermanos Vázquez, Sears. It is also present in the interior of Republic in the major cities, such as: Guadalajara, Monterrey, Tamaulipas, Morelia, Queretaro, and Hidalgo. The Interior of the Mexican Republic, furniture are distributed by large local retail chains. And in some of these States distributes its furniture through its main clients.

Its furniture is targeting a particular sector of the market, characterized as upper middle class; being large, ample spaces for furniture. In addition to having a higher price to similar styles that are available in the market, because of its prestige and quality.

The company has its furniture to South America mainly exported to Central America, its main customer was in the country of Guatemala.

Production process

The company is currently divided into two plants, the main plant, which manufactures dinners (except chairs), bedrooms, booksellers and Center tables. It is located in the industrial zone of Naucalpan, and the plant Lerma, which manufactures chairs for dinners, located in the industrial area of Lerma, both in Mexico City.

Both plants are divided in the same areas of production, but different dimensions. The main plant, has a ship to one or two areas, while the Lerma plant has only one ship divided into two, for all areas of chairs production:

- Storage area: is in charge of reception, selection and distribution of wood, sheets, chipboard and MDF to the different productive areas.

- Shred: in this area it was held the yarn, cut planks, molding parts, as well as the training and integration of (strips of glued timber) boards and cutting of sheets of plywood for the manufacture of covers or modules that will be calibrated to leave them to the exact measurement.

- Veneer: this area is responsible for enabling the sheets of veneer (root of Elm, cherry, mahogany, etc.) for the veneer of modules and covers.

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- Machining: this area is responsible for drilling, molding head, cut and shape the veneer pieces, strips and wood boards, for the dimensioning of parts, according to the models of the product.

- Polishing: this area deletes the roughness that arise in machined parts, to give them the required texture.

- Pre finished: this area will ink some parts by immersion, as well as the application of the catalyst to covers of tables, commodes, and bureaus.

- Finishing: this area has a single recent acquisition machine, it consists of a finishing process U.V, which is characterized by being more resistant to solvents and scratches. This finish is applied to flat pieces such as, the surfaces of tables, panels, shelves, drawer among other fronts.
- Assembly and final assembly: in this area is the assembly of each of the components that make up the furniture.

- Upholstery: the upholstery of the chairs that arrive from the Lerma plant is done in this area.

- Finished product (store): in this last area is saved the finished product carefully identified and accommodated in racks that are arranged according to the order of production, to be distributed.

Plant Lerma which only produces chairs has similar areas of storage area, shred, veneer, machining, polishing, pre finishing and final assembly. But unlike the main plant, at Lerma the product is assembled before entering to pre finishing. Table 6 shows the process of production of the furniture company, in its plant Naucalpan.

By reversing the order in the process of Assembly and finishing, plant in Lerma is in reverse.

SGS Company[4]

It is a company specialized in the manufacture of rustic furniture artisan characteristics in industrial volumes.

It is located in the town of Chipilo, Puebla 140 kilometers from the city of Mexico. The plant of the integrated company[5] - is installed in an area of approximately 60 000 m2, divided into several sections[6], associated workshops and integrated micro-enterprises[7] are also located in the same community, creating an important source of employment in the region.

It started operations in 1987 exporting that same year 50% of its products to the United States. That first year, the company had an area of 150 M2 and had 20 employees. In 1989 three workshops for the production of furniture in white were integrated. That same year they started exports to Europe and its markets showed very high growth, which led them to integrate new associated workshops.

External workshops, mostly started by internal workshops, i.e. integrated companies born of the own company.

4 The company as such disappeared at the beginning of this century, but continued with other social reason PN, which operates under a similar system although on a lesser scale. Retains the same designs and produces new, lighter, more standardized under the same concept of furniture rustic.

5 Companies of specialized services that individuals and companies, associated preferably small scale and medium (SECOFI, integrators).

6 Subcontracted workshops dedicated to machined furniture in white (unfinished)

7 Companies subcontracted by the company Integrator (SECOFI, integrators).

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The capital of finance for the creation of these new workshops, is issued by the same company, is encouraged them to lending them money so they start producing, coming at a time of self-financing.

Products

Each of the furniture comes from a piece of old furniture, from the 14th to the 19th century, whose reproduction have been studied and careful details

They are made with a combination of new pine wood and authentic ancient woods moth-eaten, whose whimsical beauty and appearance has been created by nature.

They handle white furniture to then give the finish the customer wants, such as pewter inlay, quarry, marble or talavera customers and suppliers.

Clients and Providers

As initial export policy, it was decided to open a store in California, United States, in order to reach customers directly, without intermediaries as they had been doing. However they faced the problem that was not easy access to that market since only 33 small businesses who were not buying volume, that they had no awareness of open market (Villa, M. 1997) could be contacted.

The company decided to focus on distributors, being the first contact in the United States. The U.S. market grew in such a way that it became their first source of demand, followed by the European market.

Production process

The production process in the company is done in two phases, functions of the workshops depend on the production process of integrating.

Functions of the associated workshops:

- Shred: This is the initial step, which involves cutting wood in longitudinal dimension tables, in order to take advantage of only that portion of wood.
- Cleaning: Refers to get square faces in wood, i.e. without imperfections and to the specified thickness.
- Dimensioning: It consists of giving the final dimensions of length, width and thickness to the tables.
- Assemblies: It is the work in wood which gives resistance to the assembly and therefore to the furniture.
- Assembly: furniture using galvanized nails are armed and it is made by subsystems. After this process gets a piece of furniture in white, which is as associated workshops delivered it to the company that this proceed with finishing steps.
- The furniture is designed by the company, which is delivered to the sizes, through the design of given parts and planes of the design prototype.
- Finished: the company controls this area internally through internal workshops specialized in sand, wax, metal fittings, sealed, moth control and repair of damage.
- Packing & crating: several types of gasket, which depend on the distributor are used. Among them is the paper carton, sealed air, corners, plastic film or boxes.
- Boarding: filled containers and trailer for the transport box.

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The company is responsible for going to the workshop to pick up furniture in white, which are carried to the furniture store area blank or product in process. It is here where the quality of the furniture as well as your stock is verified.

The design activity is generated from the company; the department of engineering of the product, performs the prototypes that will be delivered to the integrated micro and associated workshops.

Design prototypes are carried out under rules of standardization of given parts, which will be manufactured by the company and delivered to the associated workshops.

Analysis of modular technological capabilities

This section presents the description and analysis of technological capabilities in modular that they generated the two companies studied. The aim of this section is to present the level of capabilities that enterprises have achieved throughout his technology career.

The obtained information rests on analysis of interviews with companies, as well as the review of studies that have been done on them. From the evidence presented, it was possible to identify the set of capabilities.

We return to the definition of technological capabilities that exposes Richardson (1972), as "the skills, experience and knowledge that the company possess" capabilities that Kim (1997), requires "the ability to make effective use of technological knowledge, to assimilate, use, adapt, and change existing technologies, as well as the ability to create new technologies and to develop new products and processes in response to changes in the economic environment"

And connection to the modular ability, offers us a fertile framework for exploring and exploiting the design process, as a possibility for promotion and development of innovation process - product. Modularity has enabled different industries handle the increase in technological complexity. Result of a technological search of advancement through modifications in the production process, in the architecture of the product and in the management of relations between companies.

Breaking an enormous flexibility, different companies can take responsibility in modules or separate subsystems and fully trust that the product formed from the joint efforts will work properly (Takeishi & Fujimoto, 2001; Lara & Constantine, 2000; Taboada, 2005).

The following table is the matrix used for the analysis of the productive capacities of the cases.

Kind capacity	Settings	Production	Use	Commercialization
NULL	Design rules are determined	No replacement and sharing of components	The company defines the use and configuration of the product.	Final product integrated into a single unit not reconfigurable
	No need for interface design, but assemblies or specific joints for each component		The user has no option to modify the function which was established to the product by the production company	Product components are packed
			The target language is between specific components of the production process	It provides stacking for transport and packaging
BASIC	Integrated Architecture	Prior enabled components	Some components are assembled by the user	Reduction of dead space in storage and transport

	Standardization and minimum segmentation (reducing components)	Classification of raw materials and planned supply (vandalize and enabled parts)	Components to be assembled in specific position	
	Higher variability components and less variety of products	mproved production processes and services: segmenting, standardizing them, adapting	Easy replacement of components	Regulated by regional standards
	Least degree of substitution of components	Search product homogeneity	Contemplate the design rules, you can add a module, you can exclude a module	
	Intra-company communication	They arrive at the production line, raw materials and intermediate goods	Indications and assemblies joints between various components, is set in the production process	
		Governed by local or regional standards		
MEDIUM	Transition to modular architecture	Productive supply line component and module level	Components and user modules are assembled	It is packed by modules and components
	Less coordination between modules, greater coordination at a central module	Pre enabled components and modules	Components and versatility modules assembled in different positions	Some older user components will be assembled for ease of packaging. storage and distribution
	Flexible designs in its configuration and reconfiguration	Parts and modules arrive at the production line	Facilitates replacement of components and modules	Final package dimensions are reduced
	Incremental innovation	Definition of common subsystems intra company. Reduces Variability of components and increase the variety of designs	The user has the option to award some other functions to preset by the producer	Packaging for each product or modules
	Coordination between components allows for replacement or exchange of modules	Allows use some design rules can add a module. you can exclude a module, you can replace a module or can invest in a module position	Begin interaction with products of the same brand	Increases transportation capacity
	Reduced variability of components, as variety of products	Regulated by national standards	Begin use with limited customization of product variants (product family)	Reduce marketing operations and transportation costs
	Communicati on inside the company and between companies		Coupling previous delimitation of space with other products of other companies. Allows use some design rules can add a module, you can exclude a module, you can replace a module or can invest in a module position	Respond to national standards
			Indicative language component module, and user modules	
ADVANCED	Modular architecture (the parts can change position to change the function or use of the product)	Pre enabled modules and subsystems	Modules and subsystems user are assembled	It is packed modules and subsystems
	Greater coordination between modules and independence of a central module	Material and shared components for different products	It offers great flexibility for the user to configure the product according to your need	The modules and subsystems user will be assembled for ease of packaging, storage and distribution

	Reconfigurable designs	Independent modules that allow reconfiguration of subsystems	Full customization product	Packaging coupling between subsystems, increasing transportation capacity
	Development of design rules within and between companies	Interfaces defined and shared between companies (established rules of design)	Coupling established interfaces with other products of other companies	Reduce marketing operations and transportation costs
	Resists technological obsolescence	Definition of common subsystems between companies	Modules and subsystems with versatility assembled in different positions	Product assembly by the user
	Constant innovation	Providing coordinated among enterprises, network production	The user can assign a variety of functions preset by the producer	Reduce the volume of packaging
	Less variability in components, greater variety in products	Modules and subsystems come directly to the production line	Apply more design rules can add a module or subsystem, you can exclude a module or subsystem can replace a module or subsystem or can invest a module or subsystem position, can split and swap modules or subsystems with those produced	Maximum speed communication between companies for marketing
	High degree of substitution or exchange of modules and their-systems	Technology developed adapted to existing interfaces		Extensive communication between certain distribution networks
			Apply more design rules can add a module or subsystem, you can exclude a module or subsystem can replace a module or subsystem or can invest a module or subsystem	Regulated by international standards
				Extensive communication

Table 3 Modular capabilities matrix

This matrix allows an internal and external analysis of the productive organization, as well as it allows in the same way, analyzing an object in relation to its architecture and design rules, as well as its interconnectivity with other systems or subsystems.

It is divided into its ranks in four levels, the first of them are established features of a product that lacks of modularity (zero level).

The next level includes the minimum characteristics that may have a product that will denote how modular (basic level).

The two remaining (medium and advanced levels), establish modular products, only the difference between one and the other is by degree of interconnectivity in terms of design, with other products of the company in the case of the middle level and other companies in the case of the Advanced (González, 2014).

Below we present the analysis of the cases in the light of this instrument.

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VB Company

Modularity in the configuration

Basic Capabilities

- The design department develops parts of furniture, from the commercial dimensions of the wood, from the acquired technology and new processes of furniture finished. This is the result of an analysis of the problems of machining parts, and the resulting changes of acquiring new machinery and adopt new furniture finishes.

- Developed a multidisciplinary team of generation of new products, which gave it the ability to produce a new model in just 4 weeks. I & D area in the furniture design generated a process of standardization that had an impact in the Organization and in the process of production of furniture, providing the ability to produce more quickly. Also developed the ability to produce new models of versatile form through the exchange of parts and incremental changes in way to standardized parts.

The company had the ability to generate new models from established models, because as mentioned it has developed a process of standardization, which allows you to combine parts from different models which makes small modifications of shape or size, thus generating new designs.

Modularity in the production

Basic Capabilities

- Acquired an American in 1996 origin-numerically controlled machine, first numerically controlled machine that acquires the company and used for machining parts enabled and another, of German origin, acquired at the end of the 90's, which produced what produced 10 machines in just one hour a day. The acquisition of these CNC machines it was decided after doing a study of the production process and detect bottlenecks. This determined the need for the standardization of components.

- Because of a change in the process of finishing technology; pass a train of varnish to a train of U.V (ultra violet), the production process was substantially modified and redesigned interfaces between components and modules. The design of the furniture underwent changes, was redesigned the sequence of Assembly and Assembly form.

The Organization of the production process are rearranged, the finish area is put to the area of Assembly - layout - and followed by final quality changes.

More stringent measures regarding were taken to quality, grinding, the quality and tone of the pieces had to be uniform, so they jump not differences when assembling furniture, the interfaces between components should be more accurate, since with this new finish, misalignments not could be just hidden with varnish.

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- The design department had at other times its own area for development of prototypes, samples, scale 1:1 (area), this area was developed: from 1991 to 1992, a new line of designs; in 1993, it redesigns a new system of Assembly that provides greater resistance and quality; 1994 to 1995 amending the Assembly process and tested different types for different parts, also in this period that is the standardization of the furniture, which leads to a restructuring of the Organization of production, making it more efficient and; new materials are implemented as the MDF, which replaces the wood moldings and is implemented in the manufacture of doors at first, and then to different parts of the furniture.

- From that the design department was a process of standardization of parts of the furniture, the company implemented a parts enabled area. This area allowed them to have parts that can be used in different designs or as a stock of prefabricated parts that serve as rear mind in almost all designs, it is the case of the legs of the chairs.

- Only parts authorized area is located in Lerma plant, to the process of production of the chairs. The process allowed the company to have an area of authorized parts for replacement and stock for the production.

The company produces a number of models of chairs with a variability of only twelve components.

Modularity in the use

Null capabilities

- The company defines the use and configuration of the product.

- The user has the option of modifying the function which was established to the product by the production company.

- The indicative language occurs between specific components to the production process.

Modularity in the transportation

Null capabilities

- Final product integrated into a single unit not reconfigurable, without the possibility of reducing its volume or weight at the time of move inside and outside the company.

Levels	Configuration	Production	Use	Transportation
Null			The company defines the use and configuration of the product The user does not have the option of modifying the function which was established to the product by the production company.	A single unit not reconfigurable, components and the final product are no versatility, they are transported as complete elements, which cannot stacked, folded down, rearm, folded or compacted.
Basic	Minimum segmentation (reduction of components) and standardization Greater variability in components and less variety of products * low degree of substitution of components	Pre enabled components. Planned supply and classification of raw materials (given the Nuke and parts enabled). Improvement of production processes and		

	Communication inflow	services, segmenting them, standardizing them, adapting them. Commodity raw material and intermediate use goods arrive at the production line.		
Medium				
Advanced				

Table 4 Technological capabilities level modular reached by VB

The VB Company, reaches in the configuration modularity basic capabilities, at the time of the enabled pieces regarding the commercial dimensions of the wood. At the beginning of the standardization process of components, a process of standardization which enabled him to produce new models of versatile form through the exchange of incremental changes to standardized parts and components.

In the production modularity, achieves basic capabilities by purchasing CNC machines that also demanded the need of standardization of components.

The acquisition of UV finishes unit determined the redesigned the sequence of Assembly and Assembly of furniture form; the Organization of the production process are rearranged, the finish area is put to the area of Assembly - layout - and followed by final quality changes; the interfaces between components should be more precise, the production process was substantially modified and redesigned interfaces between components and modules. At the time of the implement of a parts enabled area.

This area allowed him to have parts that can be used in different designs or as a stock of prefabricated parts that serve as rear mind in almost all designs of chairs. The company produces a number of models of chairs with a variability of only twelve components.

In the use modularity and transport modularity not present any kind of modularity since the company defines the use and configuration of the product, the user does not have the option of modifying the function which was established to the product by the production company. The final product is integrated into a single unit not reconfigurable, without the possibility of reducing its volume in the transfers within the company or its marketing.

SGS Company

Configuration Modularity

Basic capabilities

- Enabled area represents a key role in the process and organization of production. It is here where begins the process of production of furniture that continues in the associated workshops.

Enabled area was possible given the process of study of the designs and the standardization of dimensions and some components of the furniture.

From its establishment, production, quality and design of the Cabinet could be controlled by the company.

The area enables the maquiladora wood workshops, absorbing 50% of the production of the final piece of furniture.

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Intermediate Capabilities

- Designed an assembly that allowed to establish constructive standards of the product, reducing the process of production of parts of subsystems as well as the process and Assembly time. The standardization of furniture and design of an Assembly that enables the company to enable parts that are generalized in design and dimensions, allowing the versatility of new models and increase the volume of production.

- The Department of engineering of the product in which the design center, is told with an area of research and development (ID) for the creation of prototypes.

This allowed the company to supply the market and consolidate its leadership in its market segment, at the time of enabling the evaluation of product and improvement of components.

Advanced Capabilities

- I & D area in the furniture design generated given because the process of standardization of parts, generating subsystems through the use of standardized components sides, doors, drawers, funds among others.

This systematization gave the company the ability to design versatile new products, be able to use for example, doors as sides, covers or drawer fronts. At a higher level, using sub-systems consist of these standardized components for user in different models, variations in subsystems, they generated new proposals of designs. Same sub-systems on various models.

Modularity in the production

Basic capabilities

- Before having a design department, associated workshops determining the dimensions and the production process of the piece of furniture that they manufacture. From the generation of the Department, models is shipping and have standardized versatile pieces, thus controlling the homogenization of the furniture.

- In 1995 the engineering department of the product, enables a molder of 7 heads which the company had acquired, which was on the floor of enabled.

Working directly in the redesign of parts, proposing alternatives, and a specific usage, the molder manages to increase the production process. This machine requires the standardization of components.

- The plant depends on the distribution of the given parts for the production, standardized parts: moldings, panels, backs, posts, doors and drawer fronts, in large volumes, which reduce production times and the workload of the manufacture workshops[8], reporting a higher utilization of the wood of pine and moth-eaten wood.

8 The manufacture workshops are those who work the moth-eaten wood and pine wood furniture. Refers to them as well to differentiate them from the workshops of forging, casting, fabric, finishes and wood carving. But all fall into the category of partners.

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Intermediate Capabilities

- The modularity of the furniture comes from face problems of production and use of furniture. Standardization aimed to develop a subsystem that would allow having different products, equal application and identical procedures and materials, parts and components like.

Facilitating the use of tools and replacement of parts, providing the Organization of simultaneous processes and production continuity.

Advanced capabilities

- Furnish was divided into different subsystems, their interfaces and their dimensions were redesigned.
- First worked in the saving of materials, on the basis of the commercial dimensions of the materials and studying the operations that apply to parts, moved a modulation and arrangement of parts that would be consistent with these dimensions.
- Second worked on the approval of production processes, which seeks that in essence production processes must be of the same nature, so that operators work under the same guidance, regardless of the model. Thus develops the standardized construction of parts for Assembly.
- Third is defining building standards, through a normalization of dimensions of the subsystems (drawers, doors, sides, shelves, seats and backs, legs and bases, etc.). Previously each workshop producing furniture according to their criterion of savings and use of material.
- Finally, they worked on the possibility of the versatility offered by these changes, for the development and design of new models, through the exchange of standardized parts and subsystems.

Modularity in the use

Basic capabilities

- Some components are assembled by the user, which in this company are the workshops, we will call them first users.
- Components to be assembled in a specific position, given the specifications of the company.
- Facilitates the replacement of components, the workshops have the ability to produce some of the components under specifications of the company, which to be standardized to facilitate their production and replacement.
- Language indicative of the production process, i.e. the company must set language clear and direct in the furniture processed semi production specifications, to prevent productive imbalances between it and the workshops.

Modularity in Transportation

Basic capabilities

- Components of the product are packed and transported to the workshops, which are the first users in this process.
- It includes stack for their transport and packaging for transport intra-company.

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- Reduction of dead storage and transportation space
- Regulated by the company quality standards.

Levels	Configuration	Production	Use	Transportation
Null				
Basic		Pre enabled components.		
			Some components are assembled by the user, which in this case are the workshops.	
		Planned supply and classification of raw materials (given the Nuke and parts enabled).		
			Assembled in position-specific components.	
	Minimum segmentation (reduction of components) and standarization	Improvement of production processes and services, segmenting them, standardizing them, adapting them.		The components of the product are packed and transported to the workshops, which are the first users in this process.
			Facilitates the replacement of components.	
	Greater variability in components and less variety of products	Search homogeneity of the product.		View stack for their transport and packaging for transport inflow.
	Low degree of substitution of components	Commodity raw material and intermediate use goods arrive at the production line.		Reduction of dead storage and transportation space.
			The indicative language is established between different components in the production process.	
	Communication inflow	Regulated by local or regional standards.		Regulated by standards of quality of the company.
Medium				
		Supply of the production line at the level component and module.		
		Pre enabled for components and modules.		
	Transition to modular architecture.			
	Flexible configuration and reconfiguration designs.			
		Parts and modules arrive at production line.		
	Incremental innovation.			

		Definition of common subsystems intra company. It reduces the variability of constituents and increase the variety of designs.		
	Coordination between components enables the replacement or exchange of modules.			
		Makes it possible to use some rules of design can add a module, you can exclude a module, you can replace a module or it can reverse a module position.		
	Lower variability of components.			
		Regulated by national and international standards.		
	Intra and inter business communication			
	Modular architecture, (parts may change position to change the function, the position of the product).			

Advanced	Greater coordination between modules, and independence of a central module.			
	Designs reconfigurable.	Pre enabled modules and subsystems		
	Less variability in components, greater variety of products.			
		Materials and components shared, for different products.		
	High degree of substitution or exchange of modules and sub-systems.			
		Independent modules enabling the reconfiguration of subsystems.		

Table 5 Technological capabilities level modular reached by SGS

The company SGS, accomplished in the modularity in the configuration basic capabilities: the area of enabled is where begins the process of production of furniture which continues in the associated workshops.

Before the standardization of furniture, the company developed the ability to perform incremental design their products, can be designed from an already accepted model, new incremental models with variations in its components which can be considered new models.

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In intermediate capabilities, designed an Assembly that allowed to establish constructive standards of the product, reducing the process of production of parts of subsystems as well as the process and Assembly time. Capabilities advanced, does them at the time that I & D area in the furniture design generated because already the process of standardization of parts and design an own ensemble, generate subsystems through the use of standardized components sides, doors, drawers, funds, among others.

Use formed by these components standardized subsystems to be user in different models, variations in subsystems, generated new proposals of designs. Same sub-systems on various models.

About modularity in the production, manages basic capabilities, from the generation of the department enabled, models shipping and have standardized versatile pieces, thus controlling the homogenization of the furniture. To enable a molder of 7 heads, this machine requires the standardization of components. The plant depends on the distribution of given parts for the production, standardized parts: moldings, panels, backs, posts, doors and drawer fronts, in large volumes, which reduce production times and the workload of the maquiladora workshops. Intermediate, furniture modularization capabilities emerges from face problems of production and use of furniture.

Modularization aimed to develop a subsystem that would allow having different products, equal application and identical procedures and materials, parts and components like.

Advanced capabilities are achieved to the moment in which we worked on the possibility of the versatility offered by these changes, for the development and design of new models. The furniture was divided into different subsystems, their interfaces and their dimensions were redesigned.

Develops the standardized construction of parts for Assembly. It is defining building standards, through a normalization of dimensions of the subsystems (drawers, doors, sides, shelves, seats and backs, legs and bases, etc.). He worked on the possibility of the versatility offered by these changes, for the development and design of new models, through the exchange of standardized parts and subsystems.

In the modularity in use reaches basic capabilities, some components are assembled by the user, which in this company are the workshops. The components will be assembled in a specific position, given the specifications of the company. Facilitating substitution of components by workshops, which have the capacity to produce some of the components, which to be standardized to facilitate their production and replacement.

The modularity in the transportation, reaches basic capabilities, since the components of the product are packed and transported to the workshops, which are the first users in this process. It includes stack for their transport and packaging for transport inflow. Seeks the reduction of spaces dead in storage and transport.

Conclution

The VB company your higher level modular capacity presented in the modularity in the production, where the process of standardization leads to generate a versatility in the design and production of furniture.

The standardization of parts of furniture allows the creation of a stock of standard parts that are used for the replacement of damaged parts and the production process is not delayed.

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It reduces the production of the furniture before standardization but also has allowed to establish a production plant that is dedicated only to the production of chairs, which given a modular architecture and a clear definition of the interfaces you has allows to design a variety of chairs with only a little variability of components. The company has strived to offer new products to the market, initially design pushing the Department of sales, currently sales pushes the design Department - now is the market to decide.

For which the company has developed throughout his career, a capacity of design, which allows you to develop a piece of furniture together with the development of new products and customers team in a period of 4 weeks and have it in production by a total of 6 weeks. Modularity in use and transport have not been served or sued by the company, although it is on a quest for export in addition to its domestic demand, has not established any strategy to attack the economic low density of your furniture.

The company SGS, reaches its highest level of modular capabilities through a standardization of components that has carried out a process of modularity in the production and in the configuration modularity, what you been allowing the exchange of parts for the production of new models, providing versatility and variety of the same.

He worked on the possibility of the versatility that they offered the changes of working components, modules for the development and design of new models, through the exchange of subsystems and standardized parts between them, increasing its capacity and production volume.

It also allowed him to create a storage area of pre modules enabled a large number of models, enabling the company, which operates under a model of enterprise integration, make 50% of the production and workshops the other 50%. Workshops may specialize in the manufacturing of in a type of furniture or can adapt to the demand for new models, given that large amount of pre-enabled modules. A flexible workshops and integrative enterprise production.

Level of modular capabilities accomplished by company VB

Levels	Configuration	Production	Use	Transportation
Null			The company defines the use and configuration of the product.	A single unit not reconfigurable.
Basic	Standardization and minimal segmentation (reduction of components)	Pre enabled components.		
Medium	Lower variability of components, equal variety of products.	Supply the production line at the level component and module.		
Advanced				

Modular capabilities level attained by the company SGS

Nivel	Configuration	Production	Use	Transportation
Null				
Basic	Estandarization	Pre enabled components.	Some components are assembled by the user, workshops.	The components of the product are packed and transported to the workshops.
Medium	Transition to modular architecture.	Supply of the production line at the level component and module.		

Advanced	High degree of substitution or exchange of modules and sub-systems.	Independent modules enabling the reconfiguration of subsystems.		

Table 6 Overview of modular capabilities achieved by both companies

The productive contexts of both company have led them to the modularity as a response to the productive pressures of their environment.
Both companies have taken the standardization as a means to decrease the variability between the components of the product. Likewise of quality costs to replace components and modules quickly and efficiently.

The redesign of interfaces for these companies allowed that these are common among modules or components, enabling the construction of the product with the minimum of parts.

Both companies chose to standardization, modularization and only one reached the level of subsystems as a strategy to reduce the complexity of managing a wide variety of designs and components.

Both companies found the need of the redesign of interfaces to component level or module, to first coordinate the variability of marriages, second for the reduction of external components that increase the number of components. Reducing the costs of coordination in Tin variability systems.

Companies found in the modularity an innovative passive resistance, they manage through the redesign, generate incremental innovations in short term costs and low efforts.

It increases the flexibility of designs, production, reduces the activity of manufacturing and the replacement cost, and improves coordination inflow, in both cases, either with another production plant or in the scheme of enterprise integration, with integrated workshops.

However the companies have not seen in Modularization response to a series of problems of cost, market or productive. The modularity in the present transportation is basic, however that the furniture industry produces goods of low economic density, not so, these companies cannot find products stackable, folding, buildable or reconfigurable by the end user. This modularity would be a key factor in the national and international marketing.

For both companies, having an area of I & D, appeared to be effective but expensive, although it was the origin of many production problems, both companies did not maintain these departments for research, design and development. It was a fairly expensive activity, since it implies a comprehensive creation, experimentation and testing of the different modules.

The development of modular architecture is more complicated than the of whole-grain products, in traditional or mature industries, as in the case of furniture. Since the pressure of the context has not sued make an effort not be glimpsed as a priority. Get modularity requires a thorough understanding of the functionality of the product and the distribution and interaction of its components and their interfaces. Coupled with their form of production has not filed a high degree of subcontracting or production network.

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However, in this same industry we see companies that have managed to obtain a higher penetration of market under the scheme of products "build it yourself" RTA, products that are packaged to be unarmed, in order to take up less space in the transportation. And once they reach the user or distributor, are reconfigured by manuals that relate the interfaces between components or modules, it is the case of the Ikea company, which sells its products globally. We also see increasingly more products that can be configured by the end user, of a series of options preset by the manufacturer, it is the case for companies that sell via virtual. And a series of products, collapsible, folding or reconfigurable by user, who see the modularity the added value of use and transport or storage.

The modularity in the production is the kind of modularity that most have implemented various manufacturing companies over the years, which has enabled them to divide the manufacturing processes and standardize components.

In case studies of VB and SGS, its modular behavior has allowed: i) standardization of parts of furniture allows the creation of a stock of components, ii) reduction of the time of production, iii) specializing in the production, iv) the exchange of parts for the production of different products and models, v) development of modules pre enabled a large number of model (vi) decrease of product components, vii) speed and innovativeness of designs, viii) reduced complexity of its processes and ix) greater coordination and production domain.

This matrix has allowed us to make a diagnosis on the level of complexity in the productive organization, and establishes specific measures, if among other things aims to reduce processes, control the order and the variability of the process, increase the variety of products and reduce the variability between components, reduce the cost of quality control, increase the flexibility of Assembly and manufacturing processes more flexible increase incremental innovation and radical innovation, encourage modular or architectural level.

If the modularity is the answer who have built companies such as in the automotive and electronic sector to confront the technological and organizational complexity. It is possible that then these knowledges of modularity are adopted by industries of various productive areas to cope with the accelerated changes of product and technology process of reconfiguration of the global production of components and subsystems, the demand for industry and innovation of the user, of the need for interconnection between products of different industries among others.

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Consumption habits of fish in Zacatecas city

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Abstract

In recent years, in Zacatecas has promoted the production of several species of fish, including tilapia, carp, bass, etc, through dams or farms. But recent studies have found that fish consumption annual per capita in the state is just 800 grams. This research is based on identifying and describing the habits of fish consumption in the city of Zacatecas as a base to detonate the merchandising of these products in the state.

Consumer habits, use of natural resources, commercialization.

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Introduction

This research is based on identifying the habits of fish consumption in the city of Zacatecas and conurbation, in order to lay the groundwork for, in subsequent studies, develop a strategy to help aquaculture producers in the region, to market and position their products in the state, as it is one of the activities, alternative to agriculture and livestock which has been promoted in recent years. People are unaware of these products, even though the state is landlocked. However it has several dams which are cultivating various aquaculture species, including tilapia, carp, and largemouth bass, among others.

This research consists of four sections. The first section describes the problem and justification of the research. In the second section it is exposed the contextual framework that gives rise to this investigation. In the third section it is established the methodology used to support research and ensuring the accuracy of the results. And the fourth and final section presents the results and conclusions presented.

Background of the problem

Under the National Development Plan, within the shaft 4 Mexico Prosper: 4.10 objective mentions the importance of building a productive agriculture and fisheries to ensure food security. Under this heading, in recent years, it has been encouraged aquaculture in the state of Zacatecas, mainly Tilapia production.

However, some of the farms for which resource and funding was granted for their installation, are currently without production and those that are producing, they have declared present stagnation and little or no increase in marketing their products.

Delimitation of the problem

With the results of this research it will obtained the fish consumer characteristics and habits in the consumption of it, being the basis for further research to culminate in a marketing program for this product, both at the state, national and international. This being the research question: What are the habits of fish consumption in the city and its suburbs Zacatecas?

Justification

One of the main aspects to establish a marketing program is primarily to know the consumer. In the case of aquaculture products produced in Zacatecas, there was so far a study to determine the characteristics and habits of customers for these products. That is why this research is crucial to know the consumer, then perform an integration program for aquaculture producers based on the needs of customers, including from cultivation to marketing their products.

Contextual framework of consumption and production of fish in Mexico

Although fish consumption has increased in recent years, reaching a per capita consumption of 10 kgs per year, this is below the world average, which is 18 kgs (CONAPESCA); and well below countries such as Japan and some European countries where consumption becomes more than 30 kg, per year. Similarly seafood, are the foods least consumed in Mexico.

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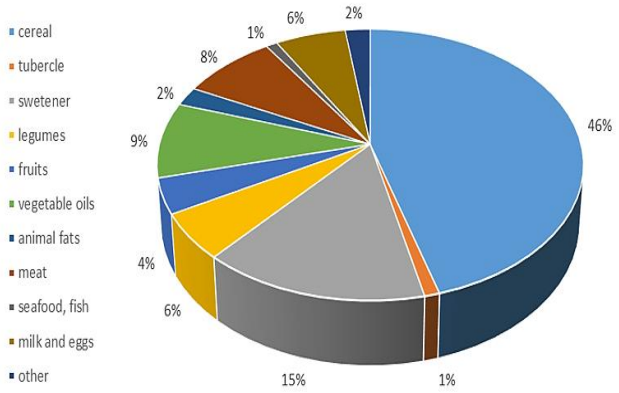

Figure 1 Percentage of food energy supplies in Mexican food

In Mexico, the total production is 1.7 million tons of which 249 thousand tons of product is exported at a cost of 842 billion dollars' worth of exports (COMEPESCA), making it the fourth country in the Americas with greater volume, just after Peru, USA and Chile (Cuéntame).

Of total production, 60 percent is made up of five species: shrimp, tilapia, oyster and carp.

Tons						
Kind	2007	2008	2009	2010	2011	2012
Total	**267772**	**283625**	**285019**	**270717**	**262855**	**254026**
Catfish	2801	3041	3145	3384	2929	3018
Shrimp	111787	130201	133282	104612	109815	100321
Carp fish	21798	24157	22620	24231	18528	19956
Charal	1483	2338	1876	1806	1226	1275
Crawfish	46	24	21	26	18	46
Lobina	1234	1221	1379	1354	1044	641
Crappie	73580	71018	73373	73899	71135	72779
Ostión	46491	42148	38974	47611	43757	43567
Trout	4345	4917	6065	6919	8480	7026
Other	4206	4561	4284	3789	5922	5397

Table 1 Volume of aquaculture production in live weight by main species. Annual series 2007-2012

Aquaculture production in Mexico is divided between coastal states (Pacific, Gulf and Caribbean), as well as landlocked states, where the states of the Pacific coast have the highest production.

Toneladas

Litoral y entidad federativa	2010	Part. %	2011	Part. %	2012	Part. %
Total	1 619 982	100.0	1 660 475	100.0	1 687 498	100.0
Litoral del Pacífico	1 296 582	80.0	1 379 995	83.1	1 393 324	82.6
Baja California	119 320	7.4	135 619	8.2	112 787	6.7
Baja California Sur	188 693	11.6	151 186	9.1	166 718	9.9
Sonora	561 166	34.6	610 706	36.8	618 799	36.7
Sinaloa	276 388	17.1	337 864	20.3	341 042	20.2
Nayarit	27 043	1.7	37 889	2.3	41 789	2.5
Jalisco	21 122	1.3	14 454	0.9	9 914	0.6
Colima	34 988	2.2	32 487	2.0	31 893	1.9
Michoacán de Ocampo	13 061	0.8	10 833	0.7	16 658	1.0
Guerrero	7 515	0.5	8 954	0.5	9 158	0.5
Oaxaca	13 568	0.8	10 148	0.6	9 218	0.5
Chiapas	33 715	2.1	29 873	1.8	35 348	2.1
Litoral del Golfo y Caribe	284 658	17.6	239 188	14.4	257 569	15.3
Tamaulipas	57 745	3.6	38 902	2.3	45 545	2.7
Veracruz de Ignacio de la Llave	91 218	5.6	79 268	4.8	75 270	4.5
Tabasco	40 773	2.5	37 998	2.3	40 741	2.4
Campeche	54 533	3.4	43 226	2.6	52 255	3.1
Yucatán	36 120	2.2	34 965	2.1	40 018	2.4
Quintana Roo	4 269	0.3	4 828	0.3	3 741	0.2
Entidades sin litoral	38 742	2.4	41 293	2.5	36 605	2.2
Aguascalientes	464	NS	59	NS	79	NS
Coahuila de Zaragoza	926	0.1	1 361	0.1	1 269	0.1
Chihuahua	823	0.1	758	NS	1 354	0.1
Durango	3 852	0.2	4 873	0.3	1 951	0.1
Guanajuato	3 055	0.2	2 866	0.2	2 679	0.2
Hidalgo	7 066	0.4	8 758	0.5	8 035	0.5
México	11 635	0.7	12 611	0.8	12 628	0.7
Morelos	1 165	0.1	1 658	0.1	829	NS
Nuevo León	125	NS	149	NS	186	NS
Puebla	4 653	0.3	3 349	0.2	2 430	0.1
Querétaro	685	NS	680	NS	356	NS
San Luis Potosí	1 559	0.1	1 655	0.1	2 445	0.1
Tlaxcala	608	NS	457	NS	465	NS
Zacatecas	2 106	0.1	2 069	0.1	1 880	0.1

Table 2 Volume of fish production in live weight and percentage share by coast and federal entity. Annual series from 2007 to 2012.

Contextual framework of fish consumption in Zacatecas

Zacatecas is among the states with landlocked aquaculture production. This production has increased in recent years:

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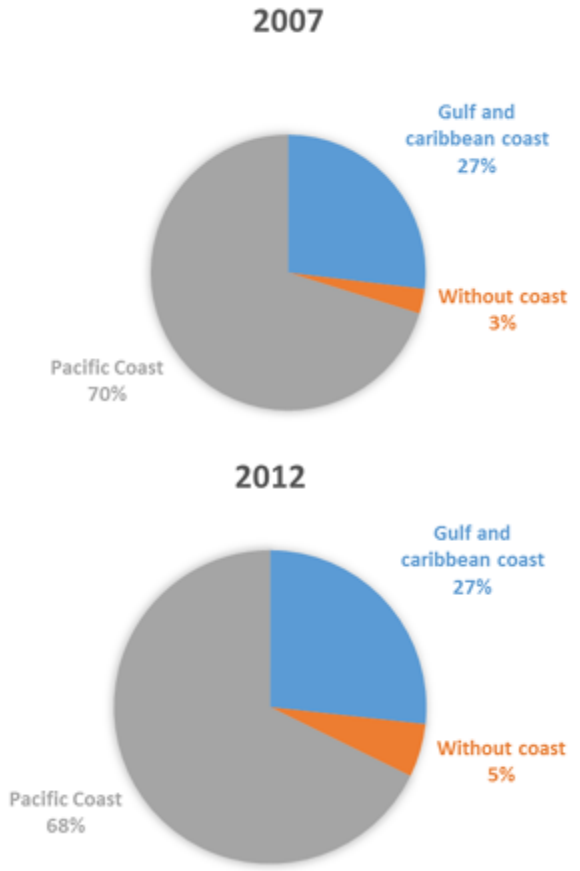

Figure 2 Percentage structure by type of coastline, 2007 and 2012

Among the species most occur in Zacatecas are crappie and carp:

Tons

Coast and state	2007	2008	2009	2010	2011	2012
Total	85 072	74 874	77 009	81 250	75 927	77 547
Pacific Coast	49 619	43 425	42 945	42 555	39 542	45 922
Baja California	43	75	75	53	144	200
Baja California Sur	359	343	373	539	392	395
Sonora	1 172	782	1 578	1 241	922	424
Sinaloa	7 243	7 500	6 974	9 192	6 335	6 017
Nayarit	6 753	6 292	6 809	7 048	6 107	7 990
Jalisco	9 706	7 731	8 098	9 732	7 677	4 170
Colima	1 739	308	193	432	345	331
Michoacán de Ocampo	14 884	12 725	9 129	5 824	6 597	13 330
Guerrero	1 820	1 796	1 924	1 500	1 168	1 533
Oaxaca	980	884	782	759	623	571
Chiapas	4 921	4 988	7 011	6 236	9 231	10 962
Gulf and Caribbean Coast	27 221	22 259	24 238	28 391	23 091	21 190
Tamaulipas	4 547	4 390	5 774	9 245	6 675	4 698
Veracruz de Ignacio de la Llav	15 185	13 142	13 523	14 839	11 561	11 292
Tabasco	6 334	3 774	3 972	3 082	3 487	3 840
Campeche	824	548	751	923	1 051	1 125
Yucatán	149	270	123	230	213	147
Quintana Roo	182	134	93	71	104	88
Without coast	8 231	9 190	9 826	10 303	13 294	10 436
Aguascalientes	298	306	291	268	35	36
Coahuila de Zaragoza	183	123	115	133	183	193
Chihuahua	172	143	113	173	136	194
Durango	720	890	890	579	2 005	567
Guanajuato	962	1 130	1 476	1 327	1 025	934
Hidalgo	2 339	2 318	2 392	2 141	4 538	3 991
México	559	656	925	972	1 033	1 100
Morelos	161	580	622	932	991	778
Nuevo León	26	44	44	60	77	104
Puebla	331	769	783	843	65	51
Querétaro	663	360	307	469	518	223
San Luis Potosí	279	243	243	688	1 048	785
Tlaxcala	33	42	38	77	30	19
Zacatecas	1 505	1 566	1 587	1 642	1 610	1 461

Table 3 Production of crappie

However, although in Zacatecas aquaculture products are produced, it is one of the states with lower processing industry:

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Economic activity and State	Number of Companies	Contract Personnel	Remuneration (thousands pesos)	Gross total production (thousands pesos)	Gross added Value (thousands pesos)	Gross fixed capital formation (thousand pesos)	Total changes in inventories (thousand pesos)	Total fixed assets (thousand pesos)
Preparation and packaging of seafood	208	12 617	512 155	8 952 781	2 549 826	453 086	- 78 370	3 301 668
Aguascalientes	ND	ND	ND	ND	ND	ND	ND	ND
Baja California	16	363	47 080	198 158	77 620	879	- 499	103 445
Baja California Sur	14	1 808	131 359	748 037	274 613	18 469	-1 625	306 978
Campeche	ND	23	971	19 564	9 958	0	0	9 328
Coahuila de Zaragoza	ND	3	186	2 400	1 149	0	0	55
Colima	ND	708	0	919 326	162 684	2 169	23	348 396
Chiapas	ND	246	11 181	41 475	12 447	274	0	24 616
Chihuahua	ND	3	0	48	15	0	0	6
Distrito Federal	ND	10	570	2 400	1 737	0	0	0
Durango	ND	ND	ND	ND	ND	ND	ND	ND
Guanajuato	ND	3	0	4 500	1 680	0	0	2 275
Guerrero	ND	ND	ND	ND	ND	ND	ND	ND
Hidalgo	ND	ND	ND	ND	ND	ND	ND	ND
Jalisco	ND	27	1 242	10 680	4 241	0	0	4 485
México	ND	60	13 717	81 184	41 758	0	0	12 516
Michoacán de Ocampo	9	99	3 660	38 370	21 205	4	0	27 252
Morelos	ND	ND	ND	ND	ND	ND	ND	ND
Nayarit	ND	113	0	31 313	7 428	1 395	0	9 116
Nuevo León	ND	ND	ND	ND	ND	ND	ND	ND
Oaxaca	13	25	48	3 801	931	0	0	128
Puebla	ND	27	2 123	19 797	6 504	263	25	1 468
Querétaro	ND	ND	ND	ND	ND	ND	ND	ND
Quintana Roo	ND	ND	ND	ND	ND	ND	ND	ND
San Luis Potosí	ND	ND	ND	ND	ND	ND	ND	ND
Sinaloa	45	3 977	75 213	4 035 570	844 626	293 096	- 78 491	1 356 460
Sonora	52	4 251	189 733	2 134 925	813 540	129 465	- 407	978 899
Tabasco	ND	ND	ND	ND	ND	ND	ND	ND
Tamaulipas	ND	457	8 582	231 941	134 906	306	- 917	22 139
Tlaxcala	ND	3	60	220	138	0	0	9
Veracruz de Ignacio de la Llave	12	64	2 507	30 886	4 860	658	4	5 833
Yucatán	13	344	23 923	397 884	127 735	6 108	3 517	88 239
Zacatecas	ND	3	0	302	21	0	0	25

Table 4 Enterprise characteristics of preparation and packaging of seafood

Research methods

For this research an analytical descriptive cross-sectional study in which 324 research instruments were applied and by which the level of consumption of aquaculture products was determined with particular emphasis on consumption zacatecana tilapia, among a random sample of people that were carried out in Zacatecas. The data included demographic aspects such as place of residence and colony, which helped them classify participants elements.

The data obtained were treated through SPSS Statics for Mac.

A descriptive analysis variable where measures of central tendency and descriptive statistics for each of the questions that formed the instrument used was obtained.

Results

After analyzing the data, the following results were obtained, which are usually presented (fish consumption) to the particular (zacatecana consumption tilapia).

As for fish consumption it was obtained that 75% of respondents said yes they consume fish as part of their diet, equivalent to 242 of total 324 respondents surveyed items (Figure 3).

Meanwhile, the 83 respondents who do not consume the product, they were asked what the reasons were for not doing so. The most frequently mentioned reasons were 53% who responded they did not like the taste and 12% avoiding the product due to the smell thereof.

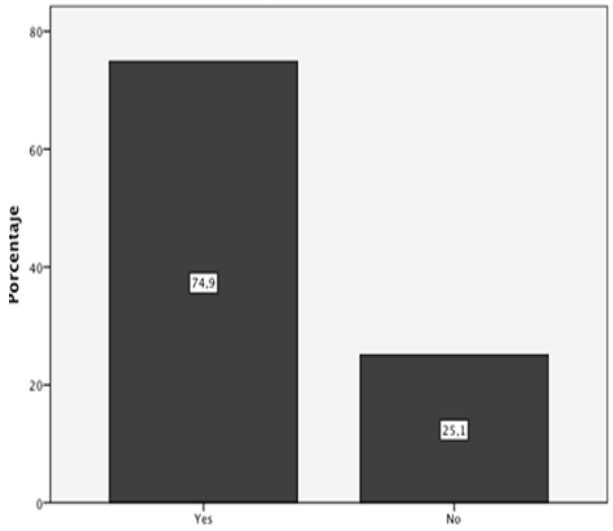

Figure 3 Consumption of fish zacatecana population

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Another aspect considered in the investigation was because they considered or not considered fish within the daily diet to which the 71% who think the fish mentioned it was mainly for being nutritious, healthy and tasty and 29% that considers the product within their daily diet mentioned that the main causes are that they do not like the taste or that causes allergy.

This can be seen in a better way in F.

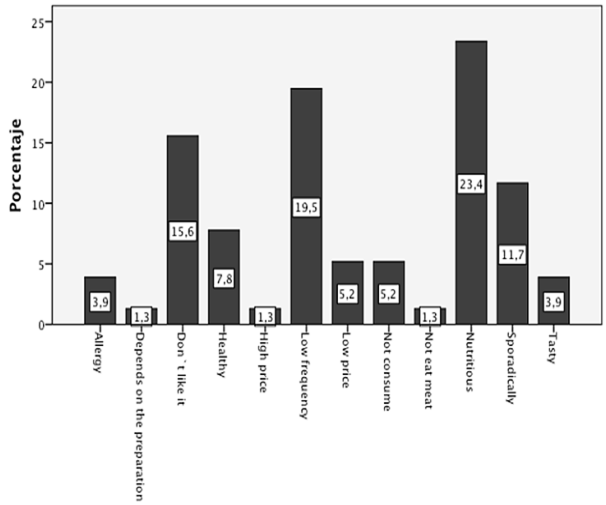

Figure 4 Consideration of fish as part of the daily diet

Because sometimes the perception that people have about the word 'everyday' may vary, the specific frequency of product consumption among the population was also investigated. The results are presented in Figure 5.

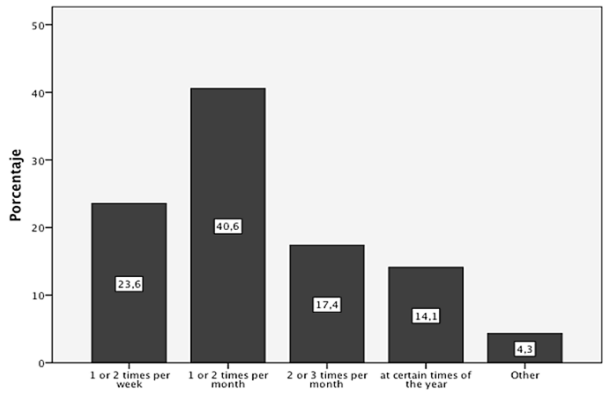

Figure 5 Frequency of fish consumption

As it can be seen, even when people mentioned who ate fish on a daily basis, when asked how often, 41% of the population said that consumed 1 to 2 times a month which can not necessarily be considered every day.

Another important aspect to consider in the investigation was the time of year when most frequently consumed product. The results showed that the time when more was consumed during Lent (69%).

In relation to the above, they were asked in what place used to take the fish, to what most people answered that at home (58%) (Figure 6)

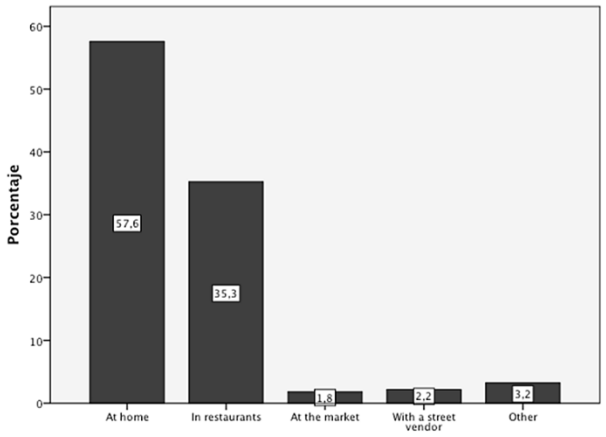

Figure 6 Place of fish consumption

Because one of the goals of the research was to know how much influences the difficulty in preparing fish for consumption thereof, an item to measure this aspect in particular was included where the results showed that 92% of respondents mentioned yes it influenced by the fact that people are not familiar with the various forms of preparation of fish consumption.

Subsequently, it was asked the population the way that prepares the product regularly where 48% responded that breading and 20% fried such responses constituted the majority (Figure 7).

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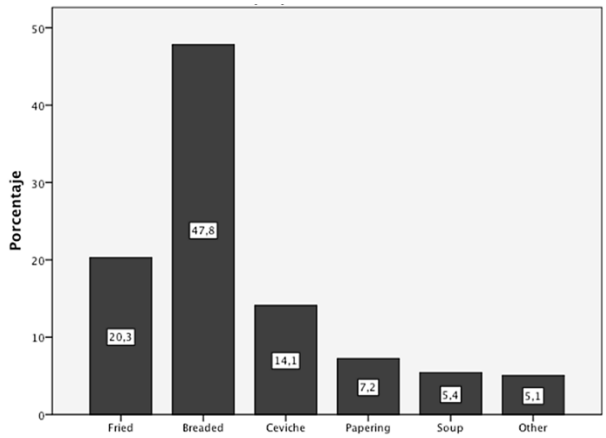

Figure 7 Preparation of fish.

Another specific objective of the research was to know if the product price directly influences the consumption of the population which asked respondents how much influence this factor. To give a point of comparison, it was estimated that the item had to be related to the cost of other meat. 33% of the population said the fish was more expensive than other meats, 24% less expensive, 26% considered to have the same cost and 16% mentioned not know about it. This is shown in Figure 8.

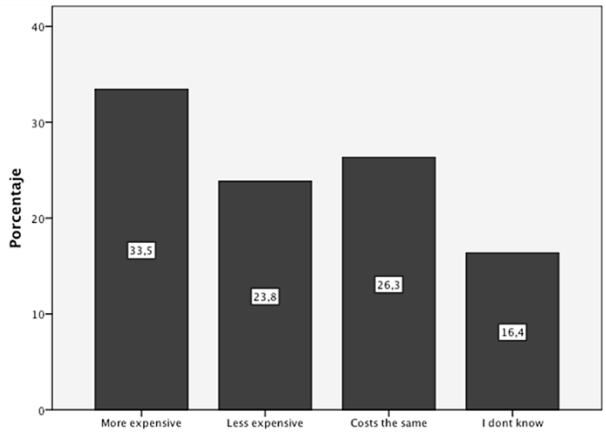

Figure 8 Cost of fish compared to other meats

In the same vein and comparing fish meat with other meats respondents were asked if they knew that the product brought the same quality of protein than beef to which 64% said no.

Similarly, they were asked if they knew that the fish meat had a higher amount of unsaturated fats compared to most consumed meat (beef, pork and chicken), to which 60% answered yes.

This shows that the zacatecanos know that fish is best in fat but had no knowledge of its content for protein.

To learn more about if people knew about the benefits of fish meat, it was asked openly what they saw as the specific contributions of fish health. In this aspect, the most frequently mentioned response was that fish is nutritious, followed by healthy and low in cholesterol (Figure 9).

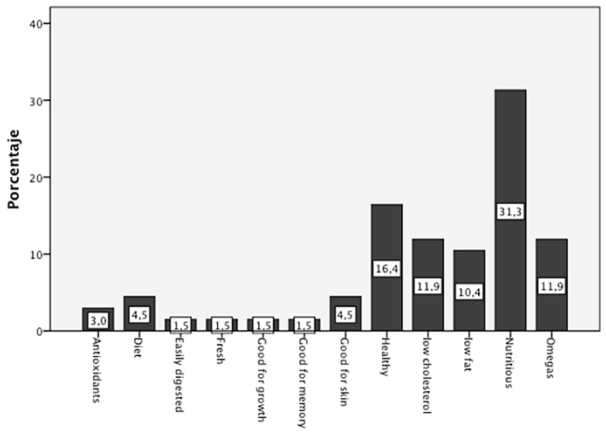

Figure 9 Health benefits of fish

Regarding marketing aspects, respondents were asked where they bought the fish, how much they would pay for one kilogram of fish and fish is what they buy more frequently.

The results of these questions were for the first fishmongers and supermarkets with 35 and 34% respectively.

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To the second question the answer with the most frequency was 100 to 120 pesos per kilogram (29%) and finally as the most consumed fish fillet and the result was crappie with 50 and 36% respectively.

Finally, respondents were asked about their knowledge of tilapia and cultivation of the same in a farm. For the above, they were considered some items related to knowledge of tilapia, consumption, where consumed, knowledge about the production of this product in Zacatecas farms and the benefits of tilapia produced in farms.

For the first 3 questions, 64% of respondents said yes they were aware about the existence of tilapia. However, they do not relate to the crappie but feel it is a completely different fish. 70% of respondents mentioned that although they have known, they have not consumed it, which contrasts with the type of product they buy where they mentioned that 36% buy crappie. Finally at 30% of people who reported eating tilapia they asked where have tried it. This percentage (72 of 324 people) 54% said they consumed at home and 22% in restaurants (Figures 10, 11 and 12).

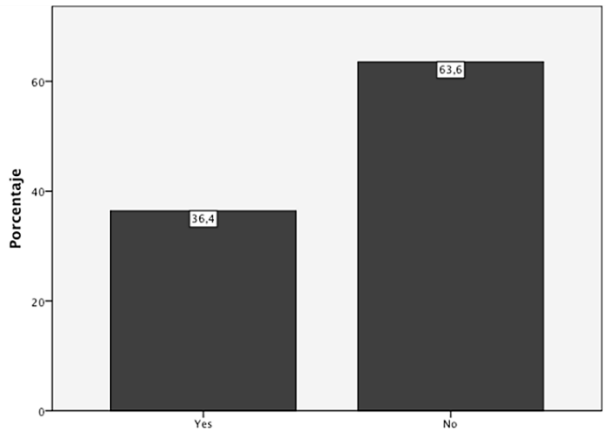

Figure 10 Knowledge of tilapia

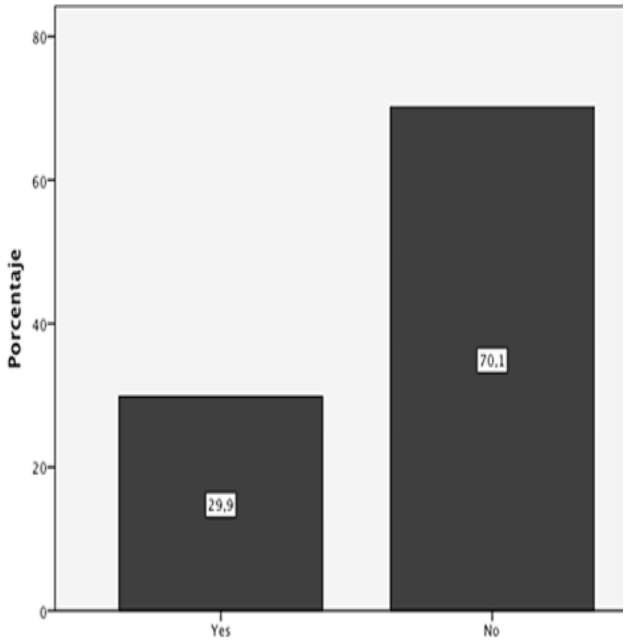

Figure 11 Consumption of tilapia

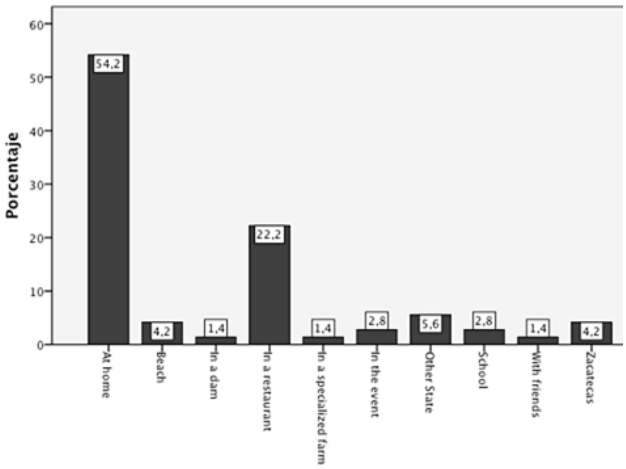

Figure 12 Place of consumption

As for the results of the tilapia produced on farm, of all respondents only 59 of 324 people said they knew the existence of tilapia farms in the state.

94% of interviewed people said not knowing the benefits that can be tilapia it produced on farms regarding tilapia in general and finally to the 18 people who said they knew the benefits of farmed tilapia were asked what were the benefits where most mentioned freshness (27%).

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Based on the above and after analyzing each of the above aspects, it can be concluded the following:

- 75% of respondents eat fish.
- Fish consumption in households is 1 or 2 times a month.
- Those who consume fish only eat special seasons particularly in Lent
- People consume fish mostly at home; they buy mostly in fishmongers and supermarkets.
- The most consumed fish fillet and crappie.
- Most people think that the preparation of fish consumption does affect consumption. However when asked how difficult it considered preparation that most responded that easy.
- The way it is prepared fish is mostly breading.
- Respondents consider that fish is more expensive than other types of meat which is proven with the fact that they are willing to pay between 100 and 120 pesos per kilogram.
- Finally, it is important to emphasize that even though the majority of respondents said not knowing the benefits that brought the fish to their health, they have in mind that fish is better than other meats. They perceived as nutritious and healthy and it has more "good fats".

Conclusions

The objective of this research was to determine consumer habits of fish in the metropolitan area of Zacatecas. In order to determine the consumer profile for aquaculture farms in the region, these farms grow mainly tilapia. The results yielded valuable information that will be considered for further research which aims to culminate in an efficient marketing strategy for the products of these farms, which allow positioning the fish farm between local and national consumers, finding an area of opportunity especially in data mentioned the fact that most of the population displays fish as better meat than other meats.

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Portfolio selection and investors, optimism and pessimism sentiment: empirical study in the Iran capital market

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Abstract

We investigate the link between behavioural investment strategies with optimism or pessimism market sentiment and compared them to the normal state. The proposed methods, thanks to its simplicity, can be applied to a wide range of investors. First, we evaluated the sentiment using Arms adjusted index. Since we observed no unit root for sentiments stationary, we confirmed the stock market inefficiency. Then, using the vector auto regression test, we analysed the relationships between sentiment, stock returns, and volatility. Ultimately, we tested contrarian and momentum portfolio strategies in conditions of optimism, pessimism, and normal behaviour based on the short-term Probit and ordinary least squares model coefficients. The results showed that the formation of a short-term portfolio in one and three-month periods of optimism and pessimism did not create an additional return and resulted in losses. Also, the outcomes indicate that the combination of normal market sentiment with behavioural finance strategies increases performances, with more significance results in the contrarian strategies compared with the momentum strategies. In terms of strategy effectiveness, portfolio formation based on momentum approach provides an efficient output in short term, while the contrarian performance is instead not efficient enough.

Contrarian and momentum strategy, Arms index, optimism and pessimism sentiment.

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Introduction

This study attempts to link between financial behavioural portfolio strategies and sentiment Indies. We tested portfolio formation strategies with due consideration of the sentiment index as a factor affecting portfolio formation. Investment strategies based on behavioural finance theories are established on the basis of two contrasting hypotheses, the over and low-reactive hypotheses. Overreaction results in poorly-performing loser stocks undergoing a low valuation. Bondt and Thaler (1985) Showed that loser portfolios, which had poor performance in the past due to over-reactivity, have better performance in future winner portfolios. The contrarian strategy triggers reverse in the prices. Previous studies assessed the contrarian strategy successfulness because of over-reaction in global financial markets (Mugwagwa, Ramiah, & Moosa, 2015).On the other hand, in the underreaction hypothesis, all the available information in the stock price is not reflected when the market does not work; therefore, the disclosure of information is delayed as well as the pertaining effects. Jegadeesh and Titman (1993, 2001) challenged the hypothesis of market efficiency confirming low reactivity. The author tested the momentum strategy, buying from a winner portfolio and selling loser portfolio, showing that this second strategy can yield a significant excess return. Other studies report that contrarian strategy is successful in various financial markets (Herberger & Kohlert, 2015), (Anusakumar, Ali, & Wooi, 2012).

Briefly, we aimed to test the effectiveness of momentum and contrarian strategies in different sentimental conditions. We tested these strategies after studying loser and winner portfolio in terms optimism and pessimism compared to normal conditions. First, we created a scale to measure trading behaviours.

On the basis of this scale, we classified the states of the investors' sentiments into optimism (over purchase), pessimistic (over sale) and normal behaviour. In the next step, we examined the relationship between this scale and stock returns, excess returns, and volatility to evaluate the effectiveness of the behavioural models in investment strategies. Then, considering investment strategies of momentum and contrarian, we tested the success of these strategies in different behavioural situations using the OLS test and probit model.

The present study measured the Stock Exchange investors' sentiments with sentiment index indirectly in Iran for the first time. Using Richard Arms (1989) trading behaviour index (trading index) and converting it to a 0 to 100 scale, we developed an application framework for optimism, pessimism, and normality. In emerging markets such as Iran, many indexes based on financial tools like the fear index, Put-Call-Ratio (PCR) and Baker's index are not available or not applicable enough. Therefore, models based on these tools are not used to gauge sentiments (Baker & Wurgler, 2006).

Portfolio selection model based on our method can be applied to a wide range of investors, as it is conceptually easy, clearly defined, simply measurable, and allows a timely selection of the optimal portfolio strategy. The final results showed that pessimism and optimism as well as momentum and contrarian investment strategies, not only do not yield positive returns, but also in most cases they yield negative returns. We also found, in agreement with other studies (Qiu & Welch, 2004), (Wang, Keswani, & Taylor, 2006) stationary of sentiment index. The stationary in market sentiment in Iran challenges its efficiency like other markets. Therefore, we illustrated optimism in the period of investigation.

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This study presents our result on the selection of momentum and contrarian strategies in different sentimental states, providing a decision-making framework and strategy measurement methods for the selection of an optimal market strategy.

This paper proceeds as follows: In the next section, we describe some related studies on financial behavioural investment strategies such as momentum and contrarian strategies. This section shows the role of sentiment indices in various financial markets. Then, the data pertaining to results of behavioural portfolio strategies, optimism and pessimism sentiment, stock returns, and volatility are gathered and presented. Then, the basic grounds of the examinations and inferences are presented. Consequently, the results are explicated and the conclusions are drawn.

Literature and research questions

Evidence of Behavioural portfolio strategies

Investment strategies based on behavioural finance theories are established on the basis of two contrasting hypotheses, the over and low-reactive hypotheses. Overreaction results in poorly-performing loser stocks undergoing a low valuation. Bondt and Thaler (1985) showed that loser portfolios, which had poor performance in the past due to over-reactivity, have better performance in future winner portfolios. The contrarian strategy triggers reverse in the prices. Previous studies assessed the contrarian strategy successfulness because of over-reaction in global financial markets (Lakonishok, Shleifer, & Vishny, 1994), (Mugwagwa et al., 2015).

On the other hand, in the underreaction hypothesis, all the available information in the stock price is not reflected when the market does not work; therefore, the disclosure of information is delayed as well as the pertaining effects. Jegadeesh and Titman (1993), Jegadeesh and Titman (2001) challenged the hypothesis of market efficiency confirming low reactivity. The author tested the momentum strategy, buying from a winner portfolio and selling loser portfolio, showing that this second strategy can yield a significant excess return. Other studies report that contrarian strategy is successful in various financial markets (Moskowitz & Grinblatt, 1999), (Griffin, Ji, & Martin, 2003), (Herberger & Kohlert, 2015), (Anusakumar et al., 2012).

Foster and Kharazi (2008) have reviewed Momentum and contrarian strategies in Iran stock market during 1997-2000, and evidence for short-term anomaly have not been found. They found no evidence for contrarian; however, the 3-12 month periods of momentum strategy were higher than the previous periods.

Kaniel, Saar, and Titman (2008) Concluded that volatility is a temporary and normal phenomenon. Chung, Hung, and Yeh (2012) Examined sentiments in expansion and recession states concluding that there is a relationship between economic state and sentiments. In economic expansion state, sentiment had the ability to predict the economic situation, while it could not predict in recession. Berger and Turtle (2012) studied the association between transparency and sentiments in stock companies, finding that the stock performance of transparent companies, unlike the opaque one, have a loose association with sentiment levels.

Anusakumar et al. (2012) showed in thirteen Asian countries in 2000 and 2011 indicated that the winner portfolio and momentum strategy has created positive returns for all pattern.

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9 out of 13 countries in Asia showed a statistically significant difference. The same study showed that loser portfolio had positive returns only in six countries. Bangladesh with 1.9%, South Korea with 1.13%, and Hong Kong with 1% had the maximum performance of momentum.

Luxianto (2010) tested momentum and contrarian strategies in the bearish and bullish condition in Indonesian capital market. He finds that that when market bearish, the momentum strategy ineffective performance while this strategy is effective in the bullish state. This result showed that in bearish market condition, contrarian strategy will be more effective.

Ma (2014) evaluated the performance of market winners and losers using evaluation of recession and expansion phases. They provide a model for the strategy momentum and market conditions. The author indicated that under both expansion- expansion phase and recession-recession phase, winners have positive returns and losers have negative or zero returns; therefore, the momentum strategy is inappropriate. Under expansion- recession phase, both losers and winners returns are negative while in expansion-recession phases both losers and winners have positive returns. Coelho (2015) indicates that sentiment impacts stock returns with complex arbitrage in the Swiss stock exchange.

Evidence of Sentiment role in financial markets

The basic assumption of traditional portfolio selection models is that investors are not influenced by sentiments.

Previous studies rejected these assumptions, showing that sentiments significantly affect stock returns (Barberis, Shleifer, & Vishny, 1998), (Neal & Wheatley, 1998), (Baker & Wurgler, 2006), (Baker & Wurgler, 2007), (Brown & Cliff, 2004), (Wang et al., 2006), (Yang & Copeland, 2014).

Empirical studies often disagree on investors' sentiment scales. Previous researchers did use two types of sentiment measurements so far. The first types are direct scale in the form of attitude questionnaires and qualitative. The second group consists of indexes that aim to quantitatively measure the investors' or market's sentimental behaviour. These indicators measure the market behaviour with quantitative financial models of the investors. Richard Arms (1989) was among the first ones to measure trade behaviour with a forecast index to predict short-term directions. This index is calculated by dividing two ratios. The first ratio is the result of dividing transactions volume of the shares with a price increase to transactions volume of the shares with a price decrease. The second ratio is the result of the numbers of the shares with a price increase to the shares with a price decrease. Then the outcomes of these two ratios are divided. If the result is lowered than 1, the trading volume in raising shares is higher than the falling shares which mean the market prices of the stock increases significantly. If the result is higher than 1, falling shares are higher than the raising shares and the market is likely to decline.

Support the significance of sentiment studies as learning behaviour errors creates opportunities for excess returns. Their results show, there is a strong correlation between a shift in the investors' sentiment at the individual level and newspapers while there are no significant changes at the market macro level simultaneously.

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Barberis et al. (1998) presented an investor sentiment model using under- and over-reaction for an abstract model of investors' behaviour. Neal and Wheatley (1998) designed a sentiment index on the basis of market ratios. De Long, Shleifer, Summers, and Waldmann (1990) pointed out that investors' behaviour during growth leads to an increase in purchases and stock prices, leading to a decrease of future expected returns through price pressure.

Shefrin (2008) considered sentiments being influenced by beliefs and priorities. Fisher and Statman (2000) reported a negative relationship between investors' sentiments and future stock returns.

Waggle and Agrrawal (2015) illustrated that low (high) returns are usually the result of high (low) levels of extreme positive sentiment; therefore, it illustrated contrarian effect of sentiment.

Baker and Wurgler (2006) provided sentiments measuring model examining the effect of investors' sentiments on the stock return cross-sectional data. They conducted their study by several financial parameters like the closed-end fund discount (CEFD), log turnover (TURN), the number of IPOs (NIPO), first-day return of IPOs (RIPO), dividend premium (PDND), and equity share in new issues (S) to coin sentiment index. The authors showed how sentiments are associated with stock returns of companies that are small, young, with high volatility, critical, with unpredictable profit, and no financial experience or stocks growth.

Baker and Wurgler (2007) showed that when the market sentiment is high, the market return is low. In optimistic markets, the monthly average return is of about %-0.41. When the market sentiment is very low, the average return is about 2.75%.

Using the portfolio weight index, high sentiments yield an average return of about 0.34%while the return of low sentiments is 1.18%. This difference is explained by the equal stock's weight in small companies. Baker, Wurgler, and Yuan (2012) showed that optimism correlates with lower future stock returns. The authors also concluded that market in Canada, France, Germany, Japan, the United Kingdom, and the United States do respect the statistical and economical return forecast as for market efficiency.

Schmeling (2009) found that there is the correlation Granger causality relationship between consumer sentiment and stock returns. Schmeling (2009) showed that sentiment effects on return and return effects on sentiment too. Granger causality is a statistical concept of causality that is based on the prediction. According to Granger causality, if a signal A1 "Granger-causes" a signal A2, then past values of A1 should contain information that helps predict A2 above and beyond the information contained in past values of A2 alone (Granger, 1969). The author's conclusions, in agreement with Baker and Wurgler (2007), indicate that optimism tends to reduce future returns.

Feldman (2010) explicated how to utilize sentiment indices as to find bubbles and financial crisis in financial markets. The bearish sentiment might not be that much strong as the investors gain profit (Feldman, 2010).

Brown and Cliff (2005) showed, using a sentiment direct measurement scale, a positive and significant relationship between sentiment and over-valuation of assets during the period of optimism. In the period from 1962 to 2000, the sentiment index had a positive skewness to the right. In the first group, the samples have positive skewness to the right (0.428), and the samples in the second group also had a negative skewness (-0.171).

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They used the B coefficient as the sentiment index with long-term negative returns, showing high arbitrage restrictions in advanced markets. Also, in the same study, the sentiment index distribution is normal. This shows that when investors are optimistic, market values are higher than the intrinsic values.

Shu and Chang (2015) extreme optimism of hopeful investors is the underlying reason for overvaluation of the stock; consequently, upon disappearance of the positive sentiment the bubble is gone and stock prices have declined dramatically which probably results in a fall down.

Wang et al. (2006) showed that there is little evidence that sentiments Granger cause returns. At the same time, sentiment granger cause returns and likelihood ratio (LR) for both surface and interrupts. Arms index has a two-way Granger causality relationship with price volatility. The authors found that the Arms index can predict volatility, but it is a poor tool to forecast returns. Their results show that the criteria of sentiments are usable as causal variables, but they are the effect variables. The results are consistent with those of Brown and Cliff (2004), showing that return is the casualty of sentiments. Hachicha and Bouri (2008) found that sentiments Granger causes efficiency in Tunisia, but the authors described sentiments as an unstable phenomenon as the results were positive in terms of field of activity, size, and the ratio of B/M and negative as for stock liquidity.

The authors also showed that sentiments Granger caused instability. Their study was in contrast to the results obtained by (Barberis, Shleifer, & Wurgler, 2005). Their results suggested that sentiments caused volatility and increasingly helps predict volatility.

A study on the role of investor sentiment in the British stock market revealed that bullish sentiment led to excess returns, and conversely, bearish behaviour led to a decrease in market excess returns (Yang & Copeland, 2014). At the first and second lag, there is no Granger causality between sentiments, change in sentiments, and market excess return; however, there is Granger causality between excess return and sentiments in the lag of the period six and twelve, and change in sentiments and excess stock return. When investors are optimistic, the six-month momentum strategy has significant profit and on the average has an efficiency of 1.64%. When investors are pessimistic, the momentum strategy increasingly loses its significance and drop to 0.56%.Therefore, the momentum strategy during a recession does not make a profit and it has an inverse effect on declining markets (Antoniou, Doukas, & Subrahmanyam, 2010). Momentum in a growth period has a significant and positive profitability that is about 1.8% on average but it has an inverse effect on declining markets (Antoniou et al., 2010). Arik (2011) measures individual investors' sentiment for the years 2010 and 2011, finding that 55% were optimistic in that period.

Data and Methodology

Data

The statistical population consisted of all companies listed on TSE (Tehran Stock Exchange) in Iran and the samples were collected from the most liquid stock companies (N =77) in various industries over the period 2008-2013[1].

1 We collect all data set from TSE (Tehran Stock Exchange) database and CBI (central bank of Iran).

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Variable

In this study, we investigated whether momentum and contrarian strategies were more suitable in conditions of optimism and pessimism compared to normal conditions.

In this line, we calculated the efficiency of each portfolio as the average of the monthly stock returns. We also calculated the monthly rate of returns and excess rate of returns of the portfolio which consisted of 77 public stock companies.

The excess return was calculated by the subtracting monthly rate of return from the monthly risk-free rate of return. The one-year standard deviation was used as the annual volatility index for each stock.
The cost of trading and short selling was not included in this research.

Proxy for sentiment

We use the Arms trading index (ARMS) to measure sentiments proxy. We calculated the Arms sentiment index as follows:

$$AD_t = \frac{ADV_t}{DEC_t} \quad (1)$$

$$VOLU_t = \frac{ADVOL_t}{DECVOL_t} \quad (2)$$

$$ARMS_t = \frac{AD_t}{VOLU_t} \quad (3)$$

Where, ADV_t is the number of companies with a price increase over the period of the study t, and DEC_t is the number of companies with a price decrease over the same period. AD_t is then the ratio between ADV_t and DEC_t. $ADVOL_{tis}$ the trading volume of companies with price increase the period of the study t, while $DECVOL_{tis}$ the trading volume of companies with a price decrease over the period of the study. $VOLU_{tis}$ then the ratio between $ADVOL_{tand}$ $DECVOL_t$. Arms sentiments index is obtained by dividing AD_t by$VOLU_t$. We used Wilder (1986) adjustment to normalize the Arms index, obtaining 0 as the lower limit and 100 the upper one.

This normalization allows to have a clear presentation for sentiments and to provide more concise formula as follows:

$$ARMS_t \text{ adj} = 100 - \frac{100}{1+ARMS_t} \quad (4)$$

We classified investors' sentiments conditions as optimism (over purchase), pessimistic (over-sale), or normal state. Over sale in the market is the condition under which asset price decreases and falls lower than the real value of the transaction (Keene [2013]).

This condition referred to as scepticism in our study, is usually caused by over-reactivity of stockholders who sell their stocks under value. For this study, we defined over-sale reaction as a situation with the market adjusted sentiment index higher than 60. Over-purchased is the condition under which one or more assets prices increase sharply to surpass the real value of the transaction. This generally happens with low reactivity and expensive assets purchases. This situation is referred to as unrealistic optimism in psychology which results in dramatic increase in the stock prices.

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Descriptive statistics

In our study, we defined market adjusted sentiment index lower than 40 as excessive purchases reaction and sales opportunities. We checked the sentiment indexes normality using Anderson-Darling model (Ryan & Joiner, 2001), finding the index to be abnormal (P-value =0.032). The Anderson-darling statistic is nearly 0.821, where the normal range was 0.641.The distribution of the adjusted sentiment indexes is skewed to the left with a negative coefficient of skewness equal to -0.402, indicating that market sentiment tended to be optimistic between 2008 and 2013, in accordance with previous reports (Arik, 2011), where the optimism ratio was 55±3%.

	Mean	Standard Deviation	Skewness	A-square	P-Value
$ARMS_t$	0.594	0.238	1.373	1.37	0.005
$ARMS_t$ adj	36.01	8.99	-.402	.82	0.032
RET	0.038	0.074	0.816	.085	0.027
ER	0028	0074	0765	086	0026
VOL	0.126	.0426	1.25	1.38	.005

Table 1 Data description

Note: These figures are based on data from 77 firms. ARMS, ARMS adj, RET,ER and VOL stand for of ARMS Trading index, adjusted Trading index, pessimism, stock return , excess return and volatility, respectively.

Research design

We commence by examining the bilateral relationship between sentiment (SENT) and stock returns (RET), excess returns (ER), and volatility (VOL) on the base Granger causality test and using the VAR model, in order to evaluate the effectiveness of behavioural models in developing investment strategies[2].

2 We followed previous studies Brown and Cliff [2004], Baker et al. [2012] Anusakumar et al. [2012], Yang and Copeland [2014] and tested the assumption that market sentiment Granger causes return, excess returns, and volatility using the VAR model.

Granger causality test was based on the assumption that information to predict variables such as SENT and VOL exclusively lies in the time-series data related to these variables. To do so, we specified the following VAR model:

$$\begin{aligned} RET_t &= a_0 + \sum_{k=1}^{l} \beta_{11l} RET_{t-k} + \sum_{k=1}^{l} \beta_{21l} SEN_{t-k} + \epsilon_{1t} \\ SEN_t &= a_0 + \sum_{k=1}^{l} \beta_{12l} RET_{t-k} + \sum_{k=1}^{l} \beta_{22l} SEN_{t-k} + \epsilon_{2t} \end{aligned} \quad (5)$$

$$\begin{aligned} ER_t &= a_0 + \sum_{k=1}^{l} \beta_{11l} ER_{t-k} + \sum_{k=1}^{l} \beta_{21l} SEN_{t-k} + \epsilon_{1t} \\ SEN_t &= a_0 + \sum_{k=1}^{l} \beta_{12l} ER_{t-k} + \sum_{k=1}^{l} \beta_{22l} SEN_{t-k} + \epsilon_{2t} \end{aligned} \quad (6)$$

$$\begin{aligned} VOL_t &= a_0 + \sum_{k=1}^{l} \beta_{11l} VOL_{t-k} + \sum_{k=1}^{l} \beta_{21l} SEN_{t-k} + \epsilon_{1t} \\ SEN_t &= a_0 + \sum_{k=1}^{l} \beta_{12l} VOL_{t-k} + \sum_{k=1}^{l} \beta_{22l} SEN_{t-k} + \epsilon_{2t} \end{aligned} \quad (7)$$

Where, l is the optimal lag(s), t is time, β_1 and β_2are the vector regression coefficients and ϵ_1t and ϵ_2tare unexplained errors. Akaike's information criterion, Schwarz Information Criterion, Hannan-Quinn Information Criterion, likelihood ratio, Final Prediction Error was used to determine the optimal number of lag(s) in the VAR model.

Following Baker and Wurgler (2006) we look further to see whether momentum and contrarian strategies were more suitable in conditions of optimism and pessimism compared with normal conditions.

Also, we asked whether these strategies in case of hard to difficult or easy to arbitrage portfolio formation performed better in a short-term period in different sentiment conditions.

Following Jegadeesh and Titman (1993) to construct the winner and loser portfolios, we selected portfolios sorting stocks going from the highest returns to the lowest, classifying the top 25% (16 top shares and in each formation period of one to three months) and bottom 25% (16 of the bottom shares and in each formation period of one to three months) stocks as winner and loser portfolios. Then, we ordered the shares from highest to lowest volatility, classifying the first half as high risk and the bottom half as low-risk portfolios.

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The portfolio will be formed in a 1 month and a 3 month periods and will be evaluated after 3 months, 6 months, and 12 months periods. The method is in rolling form. That is the portfolio formation process which will be repeated for 72 times in a period of 6 years and will be evaluated in different periods of 1, 3, 6, and 12 months after the formation.

We specify following models to test the effects of sentiments on behavioural portfolios strategies and performance of strategies:

$$RET_i = a_{i0} + \beta_1 RET_{i0} + \beta_2 OP_i + \beta_3 PES_i + \varepsilon_i \quad (8)$$

$$RET_i = a_{i0} + \beta_1 RET_{i0} + \beta_4 NORM_i + \varepsilon_i \quad (9)$$

Where, RET_iindicates the returns during portfolio evaluation, RET_i0 indicates the returns in the portfolio formation time, while OP_i, PES_iand NORM_ (i) stand for of optimism, pessimism, and normal condition during portfolio formation, and ε_ (i) is unexplained errors.

We estimated equations 8 and 9 using ordinary least squares estimator.

We also considered the dependent variable (RET_i), as a dummy variable; If RET_iwas positive in the evaluation time, the value of this variable would be equal to 1 and if negative to 0.For this case, we used Probit model. The β_1 the coefficient was expected to be positive and statistically significant with a momentum strategy and negative and significant in for contrarian strategy. The coefficients of optimism, pessimism and normality, β_2, β_3 and β_4are also expected to be positive and significant. Because of the cross-sectional data, he variance heteroscedasticity is likely to occur in terms errors. In order to control it and also to achieve consistent estimates, we used a robust estimator. In the present study, we corrected the coefficient variance using the White method.

Empirical analysis

Effect of sentiment on sample portfolio returns, excess return, and volatility

To test the mutual Relationship between sentiment and returns, excess return, and volatility, we estimated VAR models by equations No. 5, 6 and 7. To estimate VAR models by equations No. 5, 6 and 7, firstly we tested unit root hypothesis using ADF unit root test and prepared the results for the two models i.e. the model with constant state and the model with both constant state and trend in table 2. We selected the optimal lag(s) using Schwartz criteria. We selected 1 lag for all variables except for excess return for which 0.

Comparison of the test statistic value with the critical value (5%) showed that the unit root hypothesis for all variables was rejected. Based on these results, we could estimate the VAR model at the level of the variables.

Our findings also showed that the time series were not random walks, therefore; the market non-efficiency was confirmed as the unit root hypothesis was rejected.

Variable	model with constant			model with constant and trend		
	test statistic	Optimal lag	critical value	test statistic	Optimal lag	critical value
VOL	-	0	-	-	0	-
OPT	-	0	-	-	0	-
PES	-	0	-	-	0	-
NOR	-	0	-	-	0	-
ER	-	1	-	-	1	-

Table 2 ADF Unit root test results

Note: OPT, PES, NORM, RET, ER and VOL stand for of optimism, pessimism, normal Sentiment, stock returns, excess returns, and volatility, respectively. To save the space we did not report estimated values of VAR model's coefficients.

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We presented the Wald statistics and its p-value for each equation in VAR models No. 5, 6 and 7 in table 2. The result indicated Optimism is Granger causality for returns and excess returns (Wald statistic with p-value 0.018 and 0.017, respectively). We found no influence of pessimism on returns and excess return being influenced by pessimism.

The Wald statistics for granger causality from the stock returns and excess returns to pessimism were equal to 2.922 and 2.911 with p-value 0.087 and 0.088 respectively, which indicated a unilateral relationship.

Moreover, our results showed that there are not any interactions between pessimism and normality with returns and excess returns, in agreement with previous studies (Brown & Cliff, 2004), (Hachicha & Bouri, 2008), (Yang & Copeland, 2014). These results indicated that the periods of high optimism can influence market returns.

These results are in line with the findings obtained by Wang et al. (2006) for a period of pessimism and in contrast with a period of optimism.

The Granger causality test results indicated that investors' Sentiment in the states of optimism and pessimism did not affect volatility. Our results are consistent with previous studies (Wang et al., 2006). It suggested that the criteria of sentiment were causal variable when predicting volatility in spite of the results obtained by Hachicha and Bouri (2008) which stated criteria as effect variable. The results indicated that optimism affects both stock returns and excess returns (Brown & Cliff, 2004), (Hachicha & Bouri, 2008), (Yang & Copeland, 2014). However, we observed no effect of pessimism on returns and excess returns.

Furthermore, the casualty test results showed that volatility affect normal sentiment and it is not affected by optimism and pessimism.

	Dependent variable					
	OPT	**PES**	**NORM**	**RET**	**VOL**	**ER**
OPT				10.122	0.501	10.150
				(0.018)	(0.479)	(0.017)
PES				0.640	7.304	0.640
				(0.424)	(0.121)	(0.424)
NORM				0.001	2.822	0.000
				(0.980)	(0.244)	(0.999)
RET	1.262	2.922	1.541			
	(0.738)	(0.087)	(0.215)			
VOL	1.401	2.697	7.137			
	(0.237)	(0.610)	(0.028)			
ER	1.269	2.911	1.472			
	(0.736)	(0.088)	(0.225)			

Table 3 Granger causality between sentiment (optimism, Pessimism, normal) and stock returns, excess return and volatility

Note: the figure in the bracket is Wald statistic and the figure in the parentheses its p-value. OPT, PES, NORM, RET, ER and VOL stand for of optimism, pessimism, normal Sentiment, stock returns, excess returns, and volatility, respectively. We did not report estimated values of VAR model's coefficients to be concise.

Momentum and contrarian Strategies results in different sentimental

We measured the efficiency of investment strategies and evaluated them during one, three, six or twelve-month period after their formation. Our results showed that the contrarian and momentum strategies were not successful in periods of optimism and pessimism. In order to be able to confirm this result, we matched the outcomes of Probit and OLS.

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The summary of the coefficients' significant results of β_1 , β_2 ,β_3 and β_4 for probit and OLS test are summarized in table 4, 5. Table 4 present the results of the strategies coefficients and sentiments.

The β_1 the coefficient was expected to be positive and significant for a momentum strategy and it was expected to be negative and significant for contrarian strategy. The coefficients of optimism, pessimism and normality, β_2, β_3, and β_4 were also expected to be positive and significant too. In table 5, the Strategies' beta and sentiments' beta statistically have been indicated.

Our results showed that the momentum strategy was significant for the one-month formed portfolio which was evaluated after one and six month periods. Furthermore, our results showed that the momentum strategy was significant for the three-month formed portfolio which was evaluated after twelve month periods.

The Result of the study indicates that momentum and contrarian strategies led to the selection of portfolios which were not profitable and resulted in losses.

Our analysis of significance for normal sentiment conditions β_4 coefficient showed that the use of contrarian and momentum strategies in normal conditions led to an increase in return during the following periods. This indicates that combining the market normal sentiment with behavioural financial strategies leads to an increase in returns; however there were more significant results in the contrarian strategies in comparison with momentum strategies.

Our results, together with previous reports Antoniou et al. (2010), indicate that the momentum strategy in the period of recession does not lead to profit but also is counterproductive and it has a dangerous effect on declining markets.

Moreover, the β coefficient of sentiments indexes in momentum strategies showed to have long-term negative returns as previously reported (Brown & Cliff, 2004).

This confirms that optimism correlates with low future returns for high-risk portfolios, as already observed (Baker & Wurgler, 2007).

The contrarian strategy for lower risk portfolio in one-month formation period was successful six months later.

The contrarian strategy for lower risk portfolio in three-month formation period was successful one and six months later when they were evaluated.

Our results are consistent with what were previously studied (Antoniou et al., 2010), (Herberger & Kohlert, 2015), (Anusakumar et al., 2012).

Previously, momentum strategy has been found appropriate for periods of optimism, but we found out that contrarian strategies have more significant beta compared to momentum strategies under normal circumstances of the market.

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		OLS				PROBIT			
coefficient	portfolio strategy	evaluation period							
		1	3	6	12	1	3	6	12
Panel A. Optimism and pessimism sentiments									
β_1	Momentum and Higher risk	0.223	0.039	0.093	-0.020	2.166	0.786	1.615	0.737
		[0.025]	[0.356]	[0.004]	[0.270]	[0.058]	[0.499]	[0.293]	[0.795]
	Momentum and Lower risk	0.059	0.300	0.088	0.018	0.489	1.690	-1.365	-7.050
		[0.579]	[0.871]	[0.019]	[0.570]	[0.681]	[0.347]	[0.292]	[0.049]
	Reverse and Higher risk	0.346	0.019	0.081	-0.111	2.093	-1.245	4.388	-0.793
		[0.100]	[0.929]	[0.489]	[0.020]	[0.389]	[0.629]	[0.157]	[0.293]
	Reverse and Lower risk	0.639	0.078	0.120	-0.043	6.586	1.917	8.450	1.595
		[0.018]	[0.602]	[0.171]	[0.398]	[0.041]	[0.555]	[0.106]	[0.740]
β_2	Momentum and Higher risk	-0.094	-0.076	-0.126	-0.025	-1.730	-1.600	-4.081	-10.480
		[0.383]	[0.179]	[0.001]	[0.380]	[0.228]	[0.030]	[0.503]	[0.140]
	Momentum and Lower risk	0.004	-0.029	-0.129	-0.058	-0.454	-6.980	-1.770	-3.940
		[0.964]	[0.562]	[0.000]	[0.023]	[0.755]	[0.005]	[0.315]	[0.219]
	Reverse and Higher risk	-0.021	-0.065	-0.129	-0.041	-0.463	-0.868	-4.267	-0.222
		[0.841]	[0.278]	[0.001]	[0.042]	[0.724]	[0.539]	[0.011]	[0.425]
	Reverse and Lower risk	-0.003	-0.096	-0.132	-0.043	-1.536	-0.911	-6.418	-2.636
		[0.977]	[0.156]	[0.000]	[0.035]	[0.532]	[0.539]	[0.093]	[0.432]
β_3	Momentum and Higher risk	0.005	-0.024	0.038	0.041	-0.539	-0.199	0.204	-9.910
		[0.967]	[0.772]	[0.456]	[0.204]	[0.753]	[0.917]	[0.939]	[0.041]
	Momentum and Lower risk	0.127	0.073	-0.015	0.007	2.776	-1.517	-5.160	-0.047
		[0.170]	[0.382]	[0.773]	[0.812]	[0.111]	[0.449]	[0.063]	[0.991]
	Reverse and Higher risk	0.021	-0.058	-0.037	-0.009	0.797	-0.920	-1.015	-0.229
		[0.764]	[0.203]	[0.069]	[0.315]	[0.289]	[0.333]	[0.317]	[0.128]
	Reverse and Lower risk	-0.096	-0.187	-0.139	-0.033	-0.785	-1.961	-8.860	-3.100
		[0.508]	[0.046]	[0.007]	[0.178]	[0.692]	[0.294]	[0.022]	[0.412]
Panel B. Normal Sentiments									
β_1	Momentum and Higher risk	0.600	0.163	0.083	0.095	1.940	0.365	0.583	0.474
		[0.068]	[0.594]	[0.789]	[0.829]	[0.153]	[0.668]	[0.814]	[0.863]
	Momentum and Lower risk	0.038	0.009	0.062	0.000	-0.082	-1.415	1.139	-7.365
		[0.717]	[0.848]	[0.096]	[0.990]	[0.942]	[0.261]	[0.501]	[0.028]
	Reverse and Higher risk	0.299	-0.039	-0.002	-0.127	1.600	-2.338	1.743	-4.180
		[0.141]	[0.799]	[0.989]	[0.013]	[0.495]	[0.300]	[0.515]	[0.327]
	Reverse and Lower risk	0.681	0.134	0.125	-0.050	6.236	2.639	10.831	2.041
		[0.014]	[0.396]	[0.157]	[0.333]	[0.034]	[0.417]	[0.049]	[0.698]
β_4	Momentum and Higher risk	0.469	0.249	0.704	1.136	1.360	2.810	0.813	10.400
		[0.326]	[0.594]	[0.139]	[0.005]	[0.341]	[0.120]	[0.602]	[0.006]
	Momentum and Lower risk	0.041	0.002	0.093	0.036	-0.532	1.694	6.538	3.453
		[0.630]	[0.972]	[0.017]	[0.164]	[0.698]	[0.321]	[0.007]	[0.262]
	Reverse and Higher risk	0.056	0.101	0.071	-0.001	-0.376	1.888	1.444	0.630
		[0.491]	[0.056]	[0.025]	[0.946]	[0.658]	[0.058]	[0.139]	[0.612]
	Reverse and Lower risk	0.031	0.120	0.134	0.041	1.297	1.184	6.422	2.660
		[0.776]	[0.079]	[0.000]	[0.036]	[0.430]	[0.402]	[0.038]	[0.420]

Panel B. Normal Sentiments									
β_1	Momentum and Higher risk	0.600	0.163	0.083	0.095	1.940	0.365	0.583	0.474
		[0.068]	[0.594]	[0.789]	[0.829]	[0.153]	[0.668]	[0.814]	[0.863]
	Momentum and Lower risk	0.038	0.009	0.062	0.000	-0.082	-1.415	1.139	-7.365
		[0.717]	[0.848]	[0.096]	[0.990]	[0.942]	[0.261]	[0.501]	[0.028]
	Reverse and Higher risk	0.299	-0.039	-0.002	-0.127	1.600	-2.338	1.743	-4.180
		[0.141]	[0.799]	[0.989]	[0.013]	[0.495]	[0.300]	[0.515]	[0.327]
	Reverse and Lower risk	0.681	0.134	0.125	-0.050	6.236	2.639	10.831	2.041
		[0.014]	[0.396]	[0.157]	[0.333]	[0.034]	[0.417]	[0.049]	[0.698]
β_4	Momentum and Higher risk	0.469	0.249	0.704	1.136	1.360	2.810	0.813	10.400
		[0.326]	[0.594]	[0.139]	[0.005]	[0.341]	[0.120]	[0.602]	[0.006]
	Momentum and Lower risk	0.041	0.002	0.093	0.036	-0.532	1.694	6.538	3.453
		[0.630]	[0.972]	[0.017]	[0.164]	[0.698]	[0.321]	[0.007]	[0.262]
	Reverse and Higher risk	0.056	0.101	0.071	-0.001	-0.376	1.888	1.444	0.630
		[0.491]	[0.056]	[0.025]	[0.946]	[0.658]	[0.058]	[0.139]	[0.612]
	Reverse and Lower risk	0.031	0.120	0.134	0.041	1.297	1.184	6.422	2.660
		[0.776]	[0.079]	[0.000]	[0.036]	[0.430]	[0.402]	[0.038]	[0.420]

Table 4 Coefficients significance results of β_1, β_2, β_3, β_4 and for probit and OLS test of strategies analysis in a 1-month period

Note: The figures in the square brackets are P-value and the other is beta coefficients.

		OLS				PROBIT			
coefficient	portfolio strategy	evaluation period							
		1	3	6	12	1	3	6	12
Panel A. Optimism and pessimism sentiments									
β_1	Momentum and Higher risk	0.066	-0.220	0.141	0.038	-0.118	-1.480	3.966	8.196
		[0.668]	[0.827]	[0.033]	[0.527]	[0.965]	[0.565]	[0.174]	[0.019]
	Momentum and Lower risk	0.056	0.055	0.087	-0.003	2.757	0.391	4.079	-17.870
		[0.710]	[0.622]	[0.311]	[0.970]	[0.337]	[0.901]	[0.389]	[0.043]
	Reverse and Higher risk	0.285	0.065	0.067	-0.111	-0.195	0.724	4.374	-2.440
		[0.231]	[0.703]	[0.407]	[0.047]	[0.954]	[0.828]	[0.251]	[0.702]
	Reverse and Lower risk	0.315	0.057	0.138	0.035	-0.572	0.443	3.461	0.450
		[0.195]	[0.710]	[0.100]	[0.551]	[0.867]	[0.898]	[0.352]	[0.919]
β_2	Momentum and Higher risk	-0.053	-0.048	-0.202	-0.091	1.432	-1.920	-9.665	-31.280
		[0.694]	[0.511]	[0.005]	[0.007]	[0.681]	[0.376]	[0.036]	[0.028]
	Momentum and Lower risk	-0.053	-0.048	-0.202	-0.091	1.432	-1.920	-9.665	-31.280
		[0.650]	[0.554]	[0.002]	[0.022]	[0.485]	[0.406]	[0.005]	[0.002]
	Reverse and Higher risk	-0.282	-0.121	-0.242	-0.059	-3.163	-0.736	-8.259	-5.104
		[0.083]	[0.232]	[0.000]	[0.084]	[0.143]	[0.730]	[0.006]	[0.162]
	Reverse and Lower risk	-0.265	-0.193	-0.237	-0.048	-2.790	-2.844	-8.620	-3.552
		[0.126]	[0.029]	[0.000]	[0.190]	[0.194]	[0.185]	[0.013]	[0.217]
β_3	Momentum and Higher risk	-2.800	-0.184	-0.159	-0.095	-3.305	-2.416	-7.424	-6.858
		[0.125]	[0.149]	[0.056]	[0.445]	[0.166]	[0.376]	[0.109]	[0.057]
	Momentum and Lower risk	-0.166	-0.125	-0.219	-0.037	-1.870	-3.653	-9.073	-23.041
		[0.296]	[0.242]	[0.038]	[0.464]	[0.437]	[0.171]	[0.038]	[0.012]
	Reverse and Higher risk	-0.452	-0.167	-0.175	0.058	-6.439	-2.984	-8.714	3.138
		[0.005]	[0.174]	[0.070]	[0.255]	[0.013]	[0.253]	[0.021]	[0.589]
	Reverse and Lower risk	-0.392	-0.283	-0.166	0.056	-5.249	-4.436	-9.087	1.067
		[0.037]	[0.024]	[0.054]	[0.300]	[0.052]	[0.119]	[0.045]	[0.773]

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		Panel B. Normal Sentiment							
β_3	Momentum and Higher risk	0.106	0.004	0.149	0.037	0.370	-1.237	3.930	7.906
		[0.500]	[0.969]	[0.015]	[0.534]	[0.886]	[0.620]	[0.190]	[0.032]
	Momentum and Lower risk	0.087	0.079	0.093	-0.110	3.633	0.902	3.976	-13.376
		[0.549]	[0.488]	[0.234]	[0.886]	[0.188]	[0.768]	[0.407]	[0.050]
	Reverse and Higher risk	0.398	0.096	0.019	-0.201	1.984	2.227	4.762	-6.748
		[0.046]	[0.544]	[0.819]	[0.000]	[0.494]	[0.456]	[0.147]	[0.187]
	Reverse and Lower risk	0.392	0.113	0.089	-0.034	924.000	1.505	3.826	-2.450
		[0.087]	[0.441]	[0.274]	[0.520]	[0.764]	[0.636]	[0.252]	[0.548]
β_4	Momentum and Higher risk	0.108	0.083	0.169	0.085	1.525	1.318	7.197	5.865
		[0.447]	[0.366]	[0.010]	[0.017]	[0.469]	[0.552]	[0.050]	[0.029]
	Momentum and Lower risk	0.080	0.065	0.206	0.081	-0.639	2.270	9.497	23.552
		[0.513]	[0.443]	[0.003]	[0.039]	[0.750]	[0.320]	[0.008]	[0.000]
	Reverse and Higher risk	0.326	0.133	0.221	0.025	3.904	1.357	8.391	3.097
		[0.026]	[0.174]	[0.000]	[0.497]	[0.061]	[0.513]	[0.006]	[0.450]
	Reverse and Lower risk	0.030	0.216	0.217	0.021	3.384	3.300	8.748	2.618
		[0.075]	[0.020]	[0.000]	[0.589]	[0.105]	[0.123]	[0.015]	[0.399]

Table 5 Coefficients significance results of β_1, β_2, β_3, β_4 and for probit and OLS test of strategies analysis in a 3-month period

Note: The figures in the square brackets are P-value and the other is beta coefficients.

We calculated the significant of the coefficients of the probit model and OLS for the one month and three month formation periods (Table 6). Results of table 6 show that the total significance of coefficients at the level of 10% generally for guidelines in periods of 6 and 12 months based on OLS model is acceptable. In probit model, the total significance of coefficients is acceptable generally for guidelines in periods of 12 months. In table 6 reports the simultaneous significance of all coefficients with likelihood ratio statistics.

Although in binary regression models, the standard of goodness of fit was of secondary importance to the expected signs of the regression coefficients, but we used for further investigation the likelihood ratio statistic for testing the significance of all the regression coefficients.

We set the significance level to 10% for Probit model test of all coefficients.

Among the 64 probit tests, only 10 coefficients were significant, while in the OLS model the majority of the coefficients were instead significant.

			OLS				PROBIT			
			evaluation period							
Formation period	Portfolio	Sentiment	1	3	6	12	1	3	6	12
One Month	Momentum and high volatility	Optimism and pessimism	*0.05*	0.562	*0.014*	*0.045*	*0.06*	0.29	0.499	0.795
	Momentum and low volatility		0.55	0.421	*0.002*	*0.0027*	0.68	0.29	0.347	*0.049*
	Reverse and low volatility		0.34	0.549	*0.041*	*0.034*	0.39	0.63	0.157	0.293
	Reverse and high volatility		*0.02*	*0.075*	*0.003*	0.318	*0.04*	0.56	0.106	0.74
	Momentum and high volatility	Normal	0.23	0.792	0.279	*0.017*	0.15	0.67	0.814	0.863
	Momentum and low volatility		0.81	0.982	*0.021*	0.352	0.94	0.26	0.501	*0.028*
	Reverse and low volatility		0.15	*0.08*	0.065	0.053	0.5	0.36	0.515	0.327
	Reverse and high volatility		*0.01*	0.084	*0.001*	0.185	*0.03*	0.42	*0.049*	0.698
Three Months	Momentum and high volatility	Optimism and pessimism	0.33	0.418	*0.001*	0.94	0.97	0.57	0.174	*0.019*
	Momentum and low volatility		0.62	0.497	*0.002*	*0.06*	0.33	0.9	0.389	*0.043*
	Reverse and low volatility		*0.02*	0.428	*0.004*	*0*	0.95	0.83	0.251	0.702
	Reverse and high volatility		*0.05*	*0.048*	*0.002*	*0.065*	0.87	0.9	0.352	0.919
	Momentum and high volatility	Normal	0.58	0.674	*0.001*	*0.099*	0.87	0.62	0.19	*0.032*
	Momentum and low Volatility		0.63	0.48	*0*	*0.098*	0.19	0.77	0.407	*0.05*
	Reverse and low volatility		*0.01*	0.275	*0.002*	*0.004*	0.49	0.46	0.147	0.187
	Reverse and high volatility		*0.02*	*0.031*	*0.001*	0.753	0.76	0.64	0.252	0.548

Table 6 Results of likelihood ratio statistic (LR) for general test of probit model and OLS regression coefficients

Note: The figures are p-value for the overall test. The significance level is %10 in this research.

Conclusion

Results of Granger causality show that optimism is the cause of stock return and that stock return affects pessimism. Moreover, volatility is a causal variable which affects normal sentiments similar to what previously reported by Baker and Wurgler (2007). Furthermore, we found that market excess returns Granger cause pessimism.

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Sentiment indices are able to forecast returns for following months (Fisher & Statman, 2000), (Baker & Wurgler, 2007), (Baker et al., 2012), (Brown & Cliff, 2004), (Yang & Copeland, 2014), (De Long et al., 1990) and it can identify entry and exit time to the market.

The present study provides an exploratory framework for investment strategies in Tehran stock market.

Our results show that combining market normal sentiments with behavioural financial strategies leads to increase in returns, in particular with contrarian strategies.

From the perspective of strategic effectiveness, portfolio formation based on momentum approach provides appropriate returns in the short-term, but the contrarian strategy lacks the required efficiency. According to the results, it is strongly recommended to make use of the strategies evaluated in our study in normal conditions. We propose that investors do not constitute portfolio within the range of more than 60 and less than 40 of the sentiment index and they shall always be sensitive to the sentiment index. We recommend that models for investment pricing and evaluation should also consider the role of investors' behaviours since these influence stock pricing. Moreover, regulators should also be sensitive towards sentiments indices as to prevent and avoid economic shock.

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Inequality, joint participation and (re) distributive challenges in the Argentina Republic

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Abstract

The fiscal correspondence and a giving - back vision of fiscal and financial relationships between different scalar spheres is valid and adequate when the competence features are similar between subnational entities. But, in a clear situation of regional asymmetry (many Argentinas within the same Argentina), in a country that belongs to the most unequal continent in the World, this vision threatens the possibility of citizens living peripheral areas to enforce their constitutional rights and enable their development.The constitutional reform from 1994 incorporated among its multiple changes and additions, a substantial innovation in terms of fiscal federalism: the privileged hierarchization of the federal revenue sharing regime. In this way, the constitutional principles and purposes that may develop from the financial and tax field were consolidated. The principles of regional harmonious prosperity and equal human development acquired special emphasis in the spirit of the preexisting joint participation regime. Moreover, in the sixth transitional clause they established an express mandate to reelaborate the then current regime. The distance between the constitution and the fiscal reality becomes insurmountable until there exists a clarifying position regarding the ambiguity of the dominant discourses about fiscal decentralization that tend to consolidate the weakness of the state institutions in the country, and the growth of the regional asymmetries with their respective populational migration flow towards the cities with greater resources and/or their peripheries.

Fiscal federalism, equality of opportunity, regional asymmetries, public policies, tax system, financial system.

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Introduction

The fiscal federalism, understood as a phenomenon of competence and cooperative relationships on a vertical and horizontal level between the central government and subnational governments in financial and tax matters, is a key instrument to achieve equitable human development, as well as the harmonious development of the Argentine regions. In line with this position, the National Constitution -with more intensity after the 1994 reform-, gathers mandates in a considerable variety of its sections. It also describes the characteristics that the distribution of the shared tax revenue resources should have. In this way it formalized the link between state activity, equality, and rights.

However, the realization of the constitutional maxim finds a remarkable resistance that rests on unbalanced reality of the Argentine regions. In this sense, the territorial asymmetries constantly question the operability of the prescriptions in the Constitution, in the context of the unequal access to opportunities mainly through the public policies formalized and implemented in this regard.

Given this panorama, and completing a series of interlinked documents about this (vid. Rezzoagli, 2011; Rezzoagli and Bazza, 2012; Rezzoagli and Gamberg, 2014; Rezzoagli and Gamberg, 2105), examining the regional imbalances in terms of education and some relevant aspects of the quality of life (such as relevant exemplary indicators of the possible regional asymmetries and its implications), identifying causes and bottle necks, together with the described various discursive proposals to overcome the problems and the financial and tax tools used, are the main objectives of this research.

This research has a qualitative character and the main tools it uses are: the current published data from the National Institute of Statistic and Census (INDEC from its initials in Spanish), the historic and current legislation about Argentine fiscal federalism, and the specialized related doctrine on the national and international level, mainly the works published by the ECLAC, the World Bank, and the United Nations.

It is important to highlight and clarify, following Velázquez, Mikkelsen, Linares and Celemín (2014), that a good part of the socioeconomic variables related to Latin American countries are not available on second level territorial scales (specific data for the horizontal comparison of subnational territorial areas as states or provinces) for Argentina this means 23 provinces and the Autonomous City of Buenos Aires. This data decreases even more for the third level decentralization (municipalities and communes), or for more detailed levels such as the ones for fractions or census radios (approximately 5000 units in Argentina).

This means that the most interesting information is only available for not very interesting scales, for national or large region level, therefore and in spite of the progress in the national statistical systems, as you deepen the level of spatial analysis, the availability of information is more restricted and becomes diluted. Because of this, even if we acknowledge the great contributions of the research sponsored by international organizations about the inequality of opportunity and the taxation for development, they are not meaningful other than in a referential introductory level given the analysis we intend to perform in the scales and optics mentioned above.

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The Inequality of Opportunities and its Importance as an Engine of Development

A country is socially fair when its people have the same rights and potentially (without exogenous limitations) have the same possibilities of accessing social welfare. Thus, to achieve a respectable life, human development must be ensured, and then equality from a social point of view refers to a common minimum rights and obligations for all the members of the society (Barbieri, 2007).

In view of this objective there is a need for a state activity aimed at ensuring the compliance of individual and collective rights, as well as providing the suitable means to promote the potential of people, being these mainly: physical, cognitive, emotional, relational and intellectual. In other words, the equality of opportunities is another way to conceive of social justice.

In our current society, all the economic differences are translated to social inequalities, given that there is no political power capable of preventing those differences from translating into dependency relationships, submission or domination. Although there are other providers of welfare supplies and protection -such as the market, families, social organizations and communities- the primary responsibility to ensure the social, economic, and cultural rights, and fundamentally a free and unrestricted access to them, necessarily falls on the state. The estate has to guarantee its citizens living conditions that include a minimum income, access to quality social services, and the regulation labor market to promote formal and decent employment (Cecchini y Martínez, 2014).

In this context, to the extent that there exists an unequal access from a certain sector of the population to social services, or any restrictions on their human potential, faculties and / or rights (such as education and employment) for example, related to exogenous factors (gender, ethnicity, place of origin, or habitability conditions, etc.), these become an inherent part of the inequality of opportunity. In practice, it often happens that the concrete public policies find strong links with the specific objectives of certain groups of regional actors, although they are presented as regional objectives. These groups often monopolize the institutional channels and have the capacity of redirecting the programs objectives to their benefit, thus distorting the meaning of politics that aim to be more effective, inclusive, and democratic (Fernández, Vigil y Seval, 2013).

Policies base don clientelism which have greater strength on subnational scales, may also contribute, given that in their ambition to come to power, or to keep power, they give away goods and privileges instead of winning over voters by adopting policies that benefit them. Political parties that participate in clientelism do not have an incentive to improve the conditions of vulnerable sectors using redistributive policies because doing so would raise the price of their votes.

A difficulty to note is that very frequently, access to these development opportunities in individual and collective terms, is conditioned by several factors that hinder the access of the most vulnerable sectors of society, or in case they allow it, they do it in minimal degrees and with a difference in terms of length and quality.

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As an example of this analysis, if we consider the access of wealthy and poor families to the possibility of having electric power at home, we can assert that relatively wealthy families have electricity in almost every country in the world, but in countries like Panama, Peru, and Nicaragua among others that we could mention on the continental level, less than 20% of the total of poor families have access to electricity (UNDP, 2010).

We can state the same about the access to any public service, among other considerations, (Rezzoagli y Bazza, 2012) or with respect to work development opportunities (Rezzoagli y Gamberg, 2014) or educational opportunities. Thus, deepening this initial reasoning, we can affirm that it is not likely for the most capable children (in academic terms) that lack adequate financial resources, to have access to the best educational opportunities in accordance with their capacities. On the contrary, it is more likely that their poverty will restrict their educational possibilities, mainly in comparison with wealthier children which have a disproportionate access to the best schools. In this light, it is essential to analyze the state activity aimed at leveling what the society and the market do not spontaneously assume.

This difference between the citizens within a geographic scale to consider (local, provincial, national or international) is what shows the inequality of opportunities. If, this unequal situation is sustained over time, then the negative consequences will be alarming in terms of opportunity hoarding. This is the process that takes place when concrete groups control the resources, as well as the most valuable assets, for their own interest. This perpetuates and increases the inequalities, and the cycles of dominance and dependence (Rezzoagli, Gamberg, 2014).

As an example of opportunity hoarding we cannot fail to mention the challenge of hunger on an international level, the problem of food security, the complexity of recognizing and guaranteeing food as a right. In a context in which agriculture and natural resources are subject to: commodification, worldwide changes in consumer habits, environmental degradation, and climate change, which mean increasingly significant constraints. As well as international policies that bet on industrial agriculture and speculative trading, within a lax regulatory framework that leaves small producers unprotected and the most vulnerable without access to food (Manos Unidas, 2013). Inequality thus, is not only expressed in the purchasing gap in people's income, but also derives from the "discrimination" of class, race, gender, geographical origin, etc., that make it incompatible with our democratic ideals.

The great importance that emerges from what has been presented above, leaves no doubt: the equality opportunities is one of the greatest challenges to undertake with specific and targeted public policies to mitigate the current and distressing reality that considers not only Argentina, but all Latin America, as the most unequal region in the world to date, according to recent international reports from the United Nations, and the World Bank, among others.

An important change in the speech of the International Monetary Fund is that inequality is no longer just a matter of social justice, but has also become an obstacle for growth.

This seems to close a historical gap in the official economic thinking that differentiated the major issues of economic growth from the "social" issues of inequality and poverty.

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In this sense, provided that the society and the state have freedom, democracy, social justice and economic progress as objectives, equality will be an elemental and indispensable foundation (Oszlak, 2007). It should also be noted that the very concept of nation must be understood as a spectrum of responsibilities that exceed the diverse and conflicting interests of the civil society.

In regard to the expressed assessments, it is very important to examine the terms set by the Constitution. With relation to the subject that interest us, the constitutional maxims refer to the principles of equality of opportunities, and the creation of an equal level of development in all the regions of the country and for all its inhabitants, in accordance to solidarity and the creation of public policies (Rezzoagli, Gamberg, 2014). The following sections: 16, 37 -second paragraph-, 75 item 2 –paragraph 3-, items 19 and 23, highlight within their terminology and in a relational form, a particular concept of equality: the equality of opportunities.

This use of language works as an implicit acknowledgement of the disparate realities within the country (Grosman, 2012). This is why the constitutional maxims are related to positive actions, such as free education or the (re)distribution of the tax revenue. In other words, equality orders to appraise the specificity of difference, within the framework of an egalitarian policy (Barbieri, 2007).

A central aspect of analysis in terms of the proposed objectives is fiscal federalism

In this way, the state action on tax and financial matters can be understood as a way of deploying public policies to horizontally level regional capacities, which ultimately seek to achieve sustainable and uniform growth of all the fundamental political units of subnational category make up of Argentina.

The constituents wish of a homogenous regional development rests on a dialectical relationship between the constitutional requirements of equality, and the instrumentalization of fiscal federalism in general and joint participation in particular.

The design of the federal federalism (in general) and a regime of joint participation (in particular) is not an exclusively technical task. The criteria selected for the distribution, the political-economical-social aspects that can influence these criteria, and the objectives to achieve, can vary significantly the content of the same regime in different countries. This omission leads to the promotion of a set of public policies to overcome inequality that in most of the cases, did not manage to achieve their strategic objective in spite of the progress made. This produces constant sense of socio-political frustration that many times leads to surrender to the persistence of inequality.

Inequality of Opportunities. The Situation in Argentina

Even if there is no doubt that since 2003, "the country has gone through a path of growth, technical progress, job creation and reduction of poverty that has no precedents in over half a century" (Bárcena in Stumbro and Rivas, 2013:4) which managed to reverse to a large extent, the terrible economic and social damage produced by the liberal dynamics of the 90s, the current challenges regarding the horizontal regional leveling and the fight against the hoarding of opportunities are unavoidable in our country.

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We definitely agree with Velázquez, Mikkelsen, Linares, and Celemín (2014:161), who after analyzing the quality of life in Argentina –welfare ranking by department (2010) - come to the conclusion that the maps of 2010 show a much better situation that the one from 2001. The progress has been unavoidable in most dimensions of quality of life; there is a substantial increase in education, a reduction by half of the population with low levels of education, and an increase that doubled the number of college graduates during the decade 2000 – 2010. There are also important achievements in health, such as a decrease by half of infant mortality and a significant reduction in the population without social security. This encouraging data showing that the country was able, at least in these areas, to overcome the disastrous neoliberal stage of the nineties and its economic and social upheaval in 2001.

We consider that there is no doubt that the social upheaval of 2001 generated an ideological paradigm change - political and economic in the Argentine Republic, mainly since 2003, when there are glimpses of an economic policy aimed at strongly combating poverty, and achieving the equality of income through wage restructuring and of vast and fruitful social programs that attended the vital needs of citizens. The national state implemented these directives all throughout the country. The important road Argentina has taken together with several Latin American countries during the last decade, must necessarily address the restructuring of the productivity and employment variables in the various regions of the country, together with a prior or concomitant strengthening of state endogenous capacities from a financial point of view (vid. Rezzoagli y Gamberg, 2015).

However, the development of capacities, the access to services, to social safety nets, and the increase of work opportunities all throughout the social fabric may encounter barriers to their equitable distribution. Although it seems paradoxical, studying the degree of "welfare" from different sectors of society quickly leads us to associate it with its most significant opposites (Velázquez, 2010). This is why, in spite of the diversity of factors that condition the reality of the different social sectors, we will only consider some of them below - individually and collectively– which due to their importance and social impact, become critical indicators: specifically the consequences of poverty and destitution by regions, and the possibility of access to public services that are essential for a decent life.

The reason why we selected these factors over others that are equally determinant (such as age or gender) responds exclusively to a question of delimitation of representative information of what we intent to cover in this paper.

In accordance with the constitutional rules that incorporate a federal political and territorial organization -Section 1 National Constitution- and the goal of a harmonious and differentiated development that tends to equality in the progress of the provinces, and without prejudice to the study of the general situation national level, we will place emphasis on the particular situation of the fundamental political units of our country.

Levels of Poverty and Destitution in the National and Provincial Scopes

To begin with, it is important to highlight that the intensity of poverty and extreme poverty indicators is of great significance as they denote the percentage of deprivation experienced by low-income households in terms of access to basic services.

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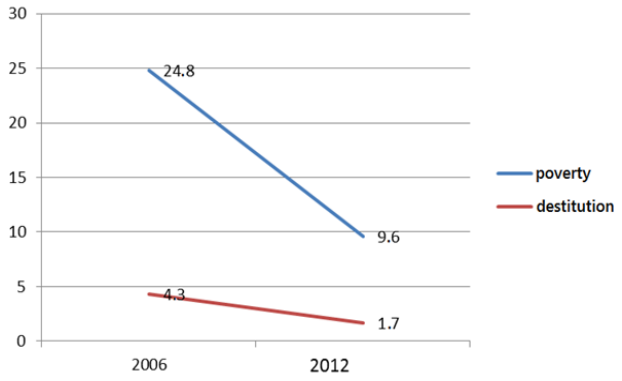
It is because of the dramatic consequences that these deficiencies bring along that in the last years the decrease of these social issues successfully set the course of the political, economic, social, and cultural decisions.



Graphic 1

We can observe in graphic I that in a period of six years, they have managed to decrease poverty in a meaningful way, as well as destitution though in less abrupt parameters. As show by data from the ECLAC (2014), poverty in Argentina decreased from 24.8% in 2006 to 9.6 % by the year 2010, as well as destitution which decreased from 4% in 2006, to 1.7% by 2010. Moreover, if we make a retrospective comparison using older indicators from the ECLAC, we can observe that in 2002 52% of the population was below the poverty threshold, and around 24% was below the destitution threshold.

Clearly this is a visible consequence of the shrinking of the neoliberal Argentine state from the 90s with its privatization and labor flexibility processes, its disastrous restrictive policies of social spending, and the destruction of the domestic industry, that ended up drowning the society with a disproportionate tax burden, as well as the exhaustion of the incessant and excessive debt with international creditors, which led to the collapse and the "corralito", known as the great crisis of 2001.

This crisis led to a paradigm shift in the position of the state and regarding its performance which is why from 2003 to date, we can distinguish with greater intensity three types of policies to alleviate poverty:

- Direct transfer policies –generally with conditions- from the national level to the subnational and local instances.
- Increasing revenue policies, through the perfectioning of the tax revenue system, and the introduction of withholding on exports, mainly of primary products.
- Increasing public job offer policies, by which the state assumes the restructuring cost that the market does not assume.

Since then and with the proliferation of social programs they have managed to decrease poverty, which brought along a decrease in the inequality rates. The issue then, given this progress, is to measure the effectiveness of these actions in time (the possibility that these poverty reduction programs naturally decrease through the incorporation of its benefits back to the work market), and in the horizontal spatial scope (between the different regions of the country, to avoid concentrating the benefits in a few regions, give that for example, in Argentina 62% of the population only occupies 30% of the country's territory.

It is necessary, therefore, to consider for this analysis the beneficiary subjects, the type of the solution in relation to time, the fiscal costs and maintainability, as the effective actual policies implemented to rebuild a genuine accumulation system that allows an increase in employment opportunities, the recomposition of the salary, the circulation of money, and the public spending as mobilizing elements of the economy.

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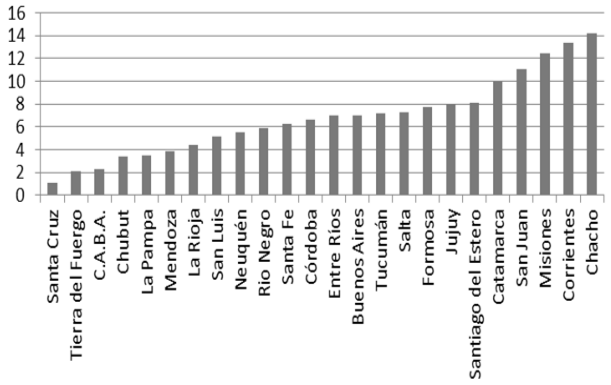
In this way, to measure the impact of direct transfers (i), different researches have calculated the poverty and destitution levels that would result if these transfers disappeared. This verified that if they stopped the direct transfer programs of a social content, to reduce the disproportionate public spending and decrease a possible growing inflationary process, then poverty levels would increase in 2 and 3 points, as a consequence of the lack of these social policies, and destitution levels would increase by 4 to 5 points (Susmel, 2012). This is why the importance of this type of intervention is highlighted. Additionally and in this same line, the increase of the minimum salaries (ii) and the general recomposition of wages generated a raise in the consumption that proved beneficial in terms of competence.

However, we must necessarily contrast this analysis of vertical relationship in the generation of public policies to reduce poverty and destitution, with respect to the consolidation of a middle class worker, with the horizontal leveling of opportunity seizing by region of the country. To do this, Graphic II shows the poverty rate by province in 2014, where you can see the divergences presented by the different regions.



Graphic 2 People under the powerty thresshold

As shown in this graphic, there are absolutely different realities for each of the province of the country.

While the percentage of people living in a poverty situation in Santa Cruz is 1.1%, in the province of Chaco this percentage is 14.2%. On the other hand, and completing this analysis that shows more than 13 percentual points of difference between the provinces in the two extremes, we can see in the in the income per capita for each of the provinces the contrast and inequality among the different regions of Argentina. For example, we find that according to the data offered by the Ministry of Economy with regard to the salary of employees in the private sector, the higher salaries are paid in the Autonomous City of Buenos Aires and in the Patagonic provinces (Neuquen, Chubut, Santa Cruz, and Tierra del Fuego). The latter in some cases duplicate the salaries of the rest of the provinces, specially the provinces from the Argentine northwest and northeast (Rezzoagli y Gamberg, 2014).

If we take into account the two graphics presented so far, we encounter a paradoxical reality: there is a reliable decrease of the poverty and destitution rates in the national average; however, in the light of this progress we can see the uneven effectiveness it had and has for each region of the country individually considered.

Regional Asymmetries. Comparative Analysis Between

Even if the Argentine Republic has a large territorial extension (approximately two million eight hundred thousand square kilometers), a distinctive feature of the country is that because of natural and human reasons the population concentrates on a reduced territory with large cities. To the extent that 66.7% of the population lives in the provinces of Buenos Aires (39%), Cordoba (8.2%), Santa Fe (8%), Mendoza (4.3%) and the Autonomous City of Buenos Aires (7.2%). Consequently large urban centers with a higher population density appear.

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As another example, while the Autonomous City of Buenos Aires has a population density of 14,450.8 inhabitants per Km², there are provinces with less than one inhabitant per Km ². Within the latter group, Tierra del Fuego is the greatest expression, given than in its territory the rate is 0.1 inhabitants/Km².

Taking into account another important variable regarding the analysis of the horizontal equality of opportunities, we highlight the access to education which represents one of the indicators that clearly exposes the contrast and the imbalances within the Argentine regions (from the most populated ones to the ones with medium or low density). In this matter, it is important to highlight that while the Autonomous City of Buenos Aires an 82% of the population attended and completed elementary school, in three northern provinces such as Corrientes, Chaco, and Misiones this percentage is a as low as 56.1%, 53.6% y 51% respectively.

On the other hand, regarding the attendance to educational institutions between ages 15 and 17, the Autonomous City of Buenos Aires shows the highest levels reaching a 90.5%, that is only exceeded by Tierra del Fuego with 94,8%. While in Santiago del Estero and Misiones, only attend school 66.5% and 71.6% respectively. On this note and taking the comparison to the total of the Argentine provinces, the levels of high school completion are clearly disparate though without rattling pronouncements as shown in Graphic III.

One of the greatest social achievements encouraged by the national government is the program called Universal Child Allowance (Asignación Universal por Hijo).

This is a right that belongs to the children of people who are unemployed, working in the informal economy with an income equal or below minimum living wage, small contributors (‘‘monotributistas’’), domestic workers, seasonal workers during the low season, or people that receive any of these plans: Argentina Trabaja, Manos a la Obra, Ellas Hacen, Programa de Trabajo Autogestionado, Jóvenes con Más y mejor Trabajo, Programa Promover la igualdad de Oportunidades y Seguro de Capacitación y Empleo. To cash the Universal Child Allowance people must present their children’s school certificate and health checks. Children must be under 18 years old, with a maximum of 5 kids, prioritizing younger and handicapped children. It is paid to only one of their parents, prioritizing the mother.

This is a program that has broken paradigms in the state action aimed to solve the problem of youth education, begging, and class differences, betting heavily on achieving a more fair and egalitarian society; trying in this way, to generate the suitable conditions to break with one of the main mechanisms of intergenerational transmission of poverty.

However, and without minimizing the important progress this program represents, there are at least two issues to (re)consider or (re)discuss to break the unequalizing process targeting exogenous variables like place of origin or habitability conditions:

- The first is related to the focal axis, as it is defined base on the recipients but does not take into account the provision and quality of service provided by the offerer; it is indisputable that it is an important progress to alleviate the vulnerable situation of children and adolescents, and to improve on the income of such households in every corner of the country.

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However, they need to work not to limit it exclusively to the conditionality of the demand, and to also take into account improving the quality/quantity of the offer.

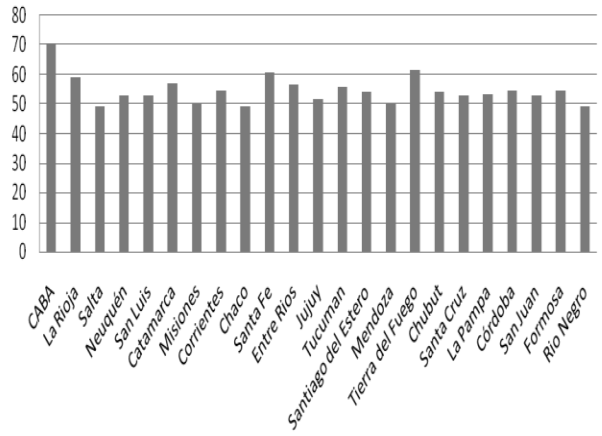
The key issue of the inequality in education lies in the quantity but above all in its quality. If there is not enough investment in the public system, which the system that can close gaps, then the effort is not enough, especially if we consider that this is a national program and the funding for the offer is mainly subnational (thought the nation collaborates with specific programs, elementary school and high school is decentralized to the subnational governments, which means they are responsible for the funding). Additionally the access conditions or distance to the establishments varies according to the place of living (village, town, municipality, county, region), and the infrastructure, materials, and the quality of the service are very uneven (if we analyze wealthy regions in contrast with the poorer regions) which results in a disparate use of the education opportunities all throughout the country. It is not only a matter of offering the opportunity, but also a matter of "giving an opportunity to the opportunity".

This means working hard and in coordination to take care of the endogenous capacities of the state and private structures that provide the service.

The second issue invites to a deeper reflection, subject to an analysis that we will not develop in this item, but that we would like to highlight nevertheless… and that is that coward and discriminatory voices may lie behind the criticism to the redistribution of this programs and hidden behind concepts such as freedom of choice, economic self-determination, federalism, and competivity.

These voices come from groups that instead of thinking in strengthening the system and the programs proclaim an alleged responsibility for the poor to overcome such poverty because they have been given an opportunity, and they have wasted it.

Moreover, this responsibility can transcend the sphere of the home and be raised as an element of social responsibility or cultural growth of the country, given that poverty would hinder such attainment. That is, the poor would end up being responsible for their condition and therefore for the country not growing as much as expected.



Graphic 3 Completion of Secondary Education

There are other variables that we might consider to analyze the regional asymmetries, mainly on a second level territorial scale, or more specific; and the current challenge of the Argentina Republic and the American continent in general in the fight against inequality of opportunities and opportunity hoarding – with regards to the access to public services, see Rezzoagli y Bazza (2013). To further deepen in the regional inequalities regarding formal employment and the generation of the gross geographic product, see Rezzoagli y Gamberg (2014).

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However, to the ends of this paper, we consider accomplished the challenge of demonstrating the existence of horizontal inequalities that imply a strengthening of the existent programs, and a rethinking of their scalar relations of management.

Fiscal Federalism as a Problematic Phenomenon

Porto (2004: 41) establishes that fiscal federalism is a theory that studies the problems with the assignment of functions, and sources of funding among the different government levels, from a vertical organization view, where the main debate is the centralization or decentralization of the fiscal decisions and competencies.

Stiglitz (2002) states that fiscal federalism can be seen as the distribution of financial responsibilities between the central, regional, and local administrations. For Oates (1999) it mainly refers to the full range of issues related to the vertical structure of the public sector, while Garello (2003) associates the term with the study of the distribution of fiscal power between the different layers of government given their jurisdictional autonomy.

Some authors put the main emphasis on spending efficiency (Avila, 2002), that is, achieve effective and measured relationship between public needs and expenses that must be done accordingly to meet or deal with them.

There are authors that lay the main emphasis on the spending efficiency (Ávila, 2002), that is achieving an effective and measured relationship between public needs and the expenses to cover or face these needs.

Evidently, functions such as promoting monetary and exchange stability correspond to the national government because they are closely related to the national territory and also there is a need to perform uniform actions in all the country. But other functions that can be assigned to other communities according to the problems and needs they solve, with or without external consequences for other territories, that may have distributive or redistributive character, etc, bring up the question of which is the most appropriate instance of the government to perform them.

The latter is according the mentioned doctrinal current, is the main basis for the analysis of fiscal federalism, as a theory that analyzes intergovernmental relationships, which, of course, affects the way of funding or obtaining resources related to the public expenditure growth (Rossingnolo, 2002).

We must state that fiscal federalism should not be understood as a theory that exclusively studies and develops the vertical relationship between the national government and the subnational instances; it does not refer either to the power struggle that exists or might exists between two or more autonomous governments, it should also analyze the horizontal relationship between the subnational instances with each other; these are two sides of the same coin. (Rezzoagli, Bazza, 2012).

The Complex System of Joint Competence

Section 75 of the Argentine Constitution, in its second item states regarding the power of the Congress:

"To levy indirect taxes as a power concurrent with the provinces. To levy direct taxes for a specified term and proportionally equal throughout the national territory, provided that the defense, common security and general welfare of the State so require it.

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The taxes under this subsection are subject to joint participation, except for those which, in part or in all, have specific allocation. An agreement-law based on understandings between the Nation and the provinces shall establish systems of joint participation for these taxes, guaranteeing the automatic remittance of funds. The distribution among the Nation, the provinces and the City of Buenos Aires, and among themselves, shall be carried out in direct relation to the jurisdictions, services and functions of each one of them taking into account objective sharing criteria.

It shall be based on principles of equity and solidarity giving priority to the achievement of a similar degree of development, of living standards and equal opportunities throughout the national territory…".

In this way, it limits the taxing powers of the nation and the provinces, and establishes the competence of the nation and the provinces regarding indirect taxes and reserves for the provinces the tax jurisdiction in relation to direct taxes. However this will not prevent the nation to enforce them -for a fixed amount of time- when required by the defense, common security and the general well being of the state. This constitutional section is related, among others, to section 75 item 18, section 75 item 19, and section 125, that provide a framework for the exemption power, and law 23548 of joint participation.

From a historic point of view, the organization of the fiscal relationships between the nation and the provinces can be divided, according to Fernández (1999: 33), into two main periods:

- The first period takes place between the creation of the national state in 1860 and 1935. The main characteristic of this period is the lack of any form of fiscal joint participation; therefore, the central authority as well as the subnational authorities were self sufficient through the use of their own resources following the rules established by the constitution of that time.

- The second period that takes place from 1935 to the present is characterized by fiscal joint participation agreements. In 1935, a fiscal joint participation agreement for specific taxes is established for the first time (in 1952 they included the tax to the free transfer of assets).

In 1973 the existing systems are unified and for the first time in the history of the nation, a percentage is fixed for the nation and another percentage is fixed for the provinces.

In 1988 the law 23548 is passed, putting an end to an intermediate stage of joint participation anarchy that began in 1983 with the abandonment of the previous system; the third section of this law states that the total amount of the proceeds from the taxes referred affected by this law will be distributed: 42.34% for the nation, 54.66% for the group of provinces that adhere to this law, 2% to recover the relative level of the provinces it mentions, and 1% to a fund for contributions for the National Treasury (fondo ATN).

With regard to the distribution of spending responsibilities, Argentina acknowledges two marked periods:

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- The first one starts with the national organization -last quarter of the XIX century- and is characterized by a growing national public spending, which was often done at the expense of functions that according to the National Constitution were an exclusive concern of the provinces. As a result of these processes, a spending pattern that assigned approximately 75% of the total spending to the nation and 25% to the provinces was structured. These rates were sustained almost for a century, in spite of the deep changes that took place in the public sector during this period.

- By the early 60s this trend began to reverse as a result of different decentralization plans. The provinces took on new roles, some of them through delegation, such as education and health, and others that compete with the private sector.

For over 50 years we can verify a gradual increase in public spending in the provinces without a comparable increase in their correlative joint participation income, which allows us to confirm the decentralization of spending as an important feature of the Argentine fiscal federalism and the tendency to sustain this in the future.

In practice, most taxes are collected by the nation and are joint participated afterwards, provinces collect four main taxes (property tax, automobile tax, stamp duty, and gross receipts tax) that enables them to afford in average a third percent of their spending.

Although with marked differences between jurisdictions, the rest is done through joint participation, other transfer from the central government, debt and, in some provinces, with royalties related to the existence of important natural resources.

For reasons of administrative efficiency and economies of scale in the collection, in a division of functions and resources between different levels of government, where decentralization is feasible essentially function or allocative branch of the budget, the implementation of broad-base taxes or dynamic taxes to the central government is suggested; while the fix-based taxes that are can be geographically divided should remain in the regional or intermediate sphere (Asensio, 2001).

The result is a concentrated schema with a strong vertical fiscal imbalance that has to be covered by transfers of the surplus in resources, where the national government collects more than 80% while their share in the public spending barely exceeds the 50% (Rubinzal, 2010).

The mentioned item 2, first part, of section 75 from the National Constitution, should be understood in harmony with the statements in items 12, 13, and 18 from section 75, when they respectively make reference to the passing of background legislation; the authority to regulate the international and interprovincial commerce and the so called "progress clause" thanks to which the federal Congress was able to establish exemptions of local taxes to certain activities for national interest purposes. Also, fundamentally with item 19, through the incorporation of a new mandate that was already implied in the constitutional text.

There it says that it is a responsibility of the Congress "... To provide for the harmonious growth of the Nation and the settlement of its territory; to promote differential policies in order to balance the relative unequal development of provinces and regions..."

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This ruling makes explicit recognition of the existing regional asymmetries, and the state's duty to act to fight these asymmetries, which is directly related to the established in paragraph 2 of the same section 75 of the constitution, which states for the distribution of resources that make up the joint participation mass "...it shall be based on principles of equity and solidarity giving priority to the achievement of a similar degree of development, of living standards and equal opportunities throughout the national territory..."

Today, legally, the regime precariously rests on two rules:

- Section 15° of law 23.548 that establishes the automatic extension of its validity "in the absence of a replacement of the current regime."

- Laws 24.699 and 24.919 that according to the exposed extend the fulfilling of the pact's clauses for the production, employment and growth…" (Dalla, 1998, pages 20 and 21).

However the constitutional mandate of item 2 section 75 of the National Constitution, in its second part, states that the joint participation mass of resources should be defined through "…An agreement-law based on understandings between the Nation and the provinces shall establish systems of joint participation for these taxes, guaranteeing the automatic remittance of funds.

The distribution among the Nation, the provinces and the City of Buenos Aires, and among themselves, shall be carried out in direct relation to the jurisdictions, services and functions of each one of them taking into account objective sharing criteria…"; the fact is that to date the temporary mandate that imposed by the transient sixth clause of the constitution has not been respected.

This adds complexity to the distribution mechanism, since it the agreement law was not passed and is replaces by a set of rules and agreements with various distribution criteria. Due to the absence of an agreement law, the primary distribution of joint participation taxes must necessarily be detailed according to each of the rules involved in the system. In this context Law N° 25.570, established that the distribution of resources after 03/01/2002 should be done according to the following schema:

- According to Law N° 23.548 of Joint Participation of Taxes the primary distribution is: 42.34 % for the national treasury, 56.66 % for the provinces, and 1 % for the Ministry of Internal Affairs (Fund of contributions from the national treasury to the provinces - ATN).

- However the state retains 15% from the mass of joint participation taxes, by Nº 24.130 and 26.078, for the payment of national social security duties and other operational expenses, and the sum of $45.8 million per month, to distribute among provincial states.

- Additionally, some taxes have a previous distribution mechanism described in each of them, for example: Laws 20628 and 20078 about the Income Tax; Value Added Tax - Law nº 23,966, section 5th, item 2 and Law N° 26,078; Domestic Taxes - Law Nº 24,674: except Insurances; Tax on the Transfer of Property for Individuals and Undivided Estates - Law nº 23,905, Title VII; Emergency Levy on Certain Game Awards from Sweepstakes and Sport Contests - Law nº 20,630 and its modifications.

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And many others that because they have specific assignments (section 75, item 3, National Constitution), are not part of the primary joint participation mass described in item 3 from Law 23548.

During the 90s the national government and the governors from the provinces endorsed the so called Fiscal Agreements. On August 12th 1992 they celebrated the Agreement between the National Government and the Provincial Governments with the goal of funding the national social security duties. On that occasion it was considered necessary to remove a percentage (15%) from the joint participation mass ("pre-joint participation": before proceeding to its distribution) which was specifically affected to this objective. This agreement is known as Fiscal Agreement I.

On August 12th 1993 the President of Argentina and the governors from the provinces signed the Federal Agreement for Employment, Production and Growth. This agreement was ratified by the National Congress in a particular way, and by the provincial legislatures. It established the subsumption and extension of the first Fiscal Agreement (signed a year before) and a series of duties for both levels of government: some of immediate fulfillment and others of progressive fulfillment. This agreement is known as Fiscal Agreement II.

In our days, the mentioned agreement is under judicial attack from different provinces that claim among other reasons, that it no longer serves any purpose after the nationalization of the national retirement and pension system that left behind the private AFJP system.

In turn, Santa Fe, and subsequently Cordoba and Corrientes, initiated legal action before the National Supreme Court of Justice filing a complaint against the referred agreement, and in the specific case of Cordoba, stopped contributing with 15% to the social security system. The latter province also entered another tax dispute with the national government when it created, almost at the end of 2012, the "road tax" that applies to fuels in that province. This tax was reported to the National Supreme Court by the National Ministry of Economy for considering it (materially) an undemocratic and unconstitutional tax.

With the sanction of law Nº 25,570 on 5/3/02, the national government ratifies the "Nation-Provinces Agreement on the Financial Relationship and the Basis for a Tax Joint Participation Regime" that was celebrated on 2/27/02.

This allowed provinces to improve their relative fiscal position (in the post crisis 2001 moment) given that they could return to the previous regime, the federal commitment from 1999 (law nº 25,235 sanctioned on 12/15/99 and published in the Official State Gazette on 1/7/00 that ratified the agreement subscribed between the national government and the provinces elected governors, denominated Federal Commitment that was carried out on 12/6/99) of automatic distribution and by coefficient, and by the lowest payment of services that was a result of the debt swap and the 15% limit in the allocation of the joint participation for the payment of debt services

However, an important fact that since the mid-twentieth century until now Argentina's tax structure has made very little progress on reforms aimed at improving income distribution. On the contrary, a great part of the adopted measures had regressive effects, that is taxes create inequality (Nun, 2011).

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On a strictly tax collection scope we can reflect upon two important and representative taxes for the country, one of them supposedly progressive and the other regressive. Firstly let us analyze the Income Tax (companies and individuals) that in percentage of the GDP is almost three times inferior to those of the central countries, even if the tax collection increased in the last years to an average of 6%. A problem with taxes is evasion, estimated above 50%. If you add tax avoidance and the lack of real political will for a progressive collection (because of competency considerations that escape the notion of tax justice itself), the result is that a substantial part of this tax is simply not collected. Those who cannot escape it are registered and formal workers, because it is directly discounted from their salaries. Thus 80% of the collection of the income tax comes from the salaries and only the remaining 20% comes from other sources.

There is no doubt that the cause of the disparity is the numerous exemptions that benefit the capital gain of the individuals, such as the ones generated from the buying and selling of stock shares, from dividends, from the financial transactions, from the interest on government securities, etc. These tax exemptions were eliminated in the region by Brazil, Chile, Uruguay, Colombia, Mexico and Paraguay (Nun, 2011).

The VAT has an average collection level close to 10% of the GDP, added to the sales taxes charged by provinces and that equal a 3% of the GDP.

In this way, the total consumption taxes duplicate what is collected for the income tax, placing Argentina above the Latin American average, as well as the average of the countries of the OECD, however the aforementioned magnitudes are balanced when export rights –withholdings- are incorporated. In turn, the evasion on this tax is high and hard to fight.

If the evasion decreased to the rates in Chile for example, then the general fee of 21% could be lowered between 6 and 8 percentage points.

The redistribution of income in Argentina is undoubtedly progressive, but this is mainly due to the increase and restructuring of the public expenditure. If we use as benchmarks the years between 1997 and 2010, we can see that it increased significantly from 30.3% to 45.5% of GDP. In the same way, the allocation for health and family allowances were duplicated in average. Of course from 2010 to 2015 that progressiveness remained being a characteristic of the public expenditure, mainly of social type, and these percentages were increased to date.

However, the structure of the tax system has not been substantially modified, although they had to appeal to a series of tax measures that made it possible for the aforementioned increase in spending, such as the inclusion of export duties, the tax on banking transactions, the increase in the share of the income tax due to grow tax base caused by the rise in income and prices, and the elimination of the individual capitalization regime for the social security system. There is no doubt that the current challenge in tax collection matters is the need to promote a greater equality through a deep tax reform.

The (Re) Distributive Positioning in Relation to the Public Spending

Federalism is more than a historic event or a regulatory requirement, it is a definition of a life style of equality of opportunities, of even and sustainable development, of growing based on our own strength and weaknesses with the conviction of support and protection from other levels of the government.

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We cannot fail to mention that under solemn invocations of federalism we hear voices that threaten solidarity and the possibility of a horizontal harmonic integration, just to mention the statements of the various political leaders of economically successful regions who angrily demand that the resources be distributed according to the contribution of each jurisdiction.

The previous vision that addresses the fiscal correspondence in an unorthodox way in a fiscal joint participation environment, even if well-founded and respectable from a certain field of discussion (fight against political clientelism, fight against the tax illusion between what actually is collected and what it is spent, the need to develop strategies to improve the effectiveness of the tax system, etc.), is functional to the perpetuation of acute territorial asymmetry that currently exists in Argentina, where population and productive distribution is highly unequal.

How to achieve a greater equality of conditions in a capitalist society like ours which, by definition, is generating inequality? Fundamentally, through public spending aimed at income redistribution, but without forgetting the need to progressively make the revenue collection systems more effective. Therefore, the focus should be given to the horizontal leveling, that is maintaining or encouraging a subnational adjustment.

The fiscal correspondence and a giving-back vision of fiscal and financial relationships between different scalar spheres is valid and adequate when the competence features are similar between subnational entities; but in a clear situation of regional asymmetry this vision threatens the possibility of citizens living peripheral areas to enforce their constitutional rights and enable their development.

It would be like organizing a race and placing a Formula 1 car and a bicycle at the starting line and waving the checkered flag. Evidently there is no other result than the hoarding from the Formula 1 car, of all the opportunities the race represents.

While there are negatives in redistribution, such as the mismatch between what is provided and is obtained, the clientelism that favors subordinate political relationship rather than economic and administrative efficiency, the fiscal illusion between what is collected and what it is spent, and the uncertainty in the long-term maintenance of the abundance of resources due to the lack of a system of legitimate and effective accumulation; these disadvantages are a lesser evil compared to the equalizing possibility to reduce these asymmetries. Precisely a well implemented redistributive system over time tends to overcome these negative aspects that appear at the beginning with gradual processes of incorporation of competencies. The Canadian experience where the least favored regions (such as Nova Scotia or New Brunswick) receive more funds than the wealthier provinces (such as Alberta or Ontario), provides us an example of equalization that we must take into account.

According to ECLAC (2013), this progressive evolution of public social spending from 2005 to date, is related to the strengthening of social programs, particularly those aimed at fighting poverty, which include mechanisms to make direct transfers to homes.

They are also related to the efforts to achieve universal primary education, extend the coverage of secondary education, and increase the access to the public health system. Even if the increasing tendency in the public social spending is present in almost all countries in the Latin American region, their levels as well as their composition are different.

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In Bolivia, Ecuador, Guatemala, Honduras, Nicaragua, and Paraguay the annual spending per capita does not exceed the 300 dollars. While in various countries from South America such as Argentina, Brazil, Uruguay, Venezuela, Costa Rica, and Panamá, the public social spending exceed the 1,000 dollars per inhabitant.

Internal migration is an essential element in the process mentioned above, as Tiebout (1978) pointed out, the mobility of citizens in search of better living conditions, and the decentralization of public provision are the basis for the mechanism of choice described as free rider or "vote with the feet", that is the shifting to territories that provide better development possibilities.

In this way, we assume that if individuals are perfectly informed and have not restrictions for geographic shifting, then each person can chose the most favorable market conditions as well as the combination of public services (health, education, security, etc) offered by the different subnational governments, that better adjust to their personal preferences.

Compared to what happens in other federal countries in the World, the asymmetries between the provinces in the Argentine Republic are still very striking to date. Evidently Argentina does not escape to the general Latin American context, which the ECLAC considers the most unequal continent in the World.

The asymmetric distribution between spending responsibilities and interjurisdictional taxing powers is the result of a long historical process. The discursive constructions that argue the need to reverse this situation through a decentralizing discourse and a new division of taxation powers, without regarding this factor, ignore the strong territorial concentration on building national wealth, and therefore, are partial and inconsistent.

Final Considerations

Having passed more than 20 years since the reform of the constitution, without fulfilling the transient clause sixth, and in spite of the progress made in the decrease of poverty and consolidation of the middle class since 2001 to the present.

There are still great imbalances regarding the equality of opportunities between the different regions of the country. This is a great challenge and a priority agenda for the state.

The development and implementation of the fiscal federalism must necessarily addresses the horizontal leveling of opportunities in the different regions of the country, as the main premise for the vertical structuring of competencies and the improvement in the efficiency of the public spending, from an ascending and coordinated point of view. Implementing the constitutional mandates leads to continue to have a coordinating national government, which implies that, far from defending the positions that tend to favor the decentralization and the autonomy of subnational regions with respect to each other, and with respect to the central government; we should deepen the equalizing redistributive system from with the national level, and for its own sake.

An important challenge is to give greater implication to the bottom-up process in the configuration or reconfiguration of public policies, currently marked by discretionality, in order to pursue consensual policies and decisions that feel close to the citizens all throughout the country.

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Strategic alliances in the Mexican film industry to acquire and maintain a competitive advantage from the decade of the nineties

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Abstract

The MFI (Mexican Film Industry) is an economic activity and one that is very important for society, because it is a cultural and recreational activity that generates jobs and that, at certain times, has contributed to the development of the country. In 2009, cultural and recreational industries came to indicate nearly 7% of the Gross Domestic Product (GDP) in Mexico (empresaexterior.com 2009). Given the importance of the FMI in terms of its contribution to the growth and development of Mexico, the overall objective of this research focuses on identifying and assessing the importance of the development of cooperation agreements among members of the productive chain, such as producers, distributors, and exhibitors, in order to create and sustain competitive advantages in this industry and the manner in which these advantages can be exploited to obtain superior results. Additionally, it sought to determine whether these agreements developed by the MFI have actually improved in terms of the aspects that led to their implementation, assessing the results in terms of number of films produced, jobs created, and product positioning.

Mexican film industry, strategic alliances, competitive advantage.

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Introduction

The world has undergone, and continues to undergo, a process of opening in new and different markets. Mexico has not remained behind in this movement, above all since the coming into effect of the North American Free Trade Agreement (NAFTA). As a consequence of globalization, international competition has increased daily, and the Mexican Film Industry (MFI) has been in need of constant innovation, obliging it to modify and to adapt its structures, as well as optimize the relationship among members of the productive chain.

Among these strategies are the agreements of cooperation, highlighting strategic alliances developed among producers, distributors, and exhibitors. The objective of the formation of alliances is increasingly more innovative in order to satisfy consumer demands in terms of variety and quality, and to achieve product positioning through participation in festivals and the obtaining awards, seeking to achieve sustained growth in the MFI.

Collaboration agreements can be gained for large as well as for Small and Medium Enterprises (SEM); these agreements can arise in any sector and with foreign competitors. The objectives are diverse and extensive and include some or all of the members of the productive chain, favoring the competitive position of the sector-in-question.

The history of the Mexican cinema has been classified in two great periods: first, the preindustrial stage that embraced the years 1897 to 1937; this is divided into its silent phase and the "talkies" phase.

The silent phase was characterized by the production of documentaries and by the predominance of the plot film (fiction); the "talkies" phase was devoted to experimentation, the conquest of markets, and the leap to the second stage (De la Vega, 1991).

Later, the Mexican film industry experienced what has been denominated its "Golden Age", this reflected in the greater number of productions, some very popular. This era relied on certain features of success, such as the following: themes of films developed in a stable rural environment and one without hardships; urban scenarios framed to a greater degree in romanticism than in realism; great performances by the films' personages; the structure of the cinematographic films; the ingenuity of the producers and the vision of the directors; the price of the ticket to see the film was accessible for all types of public; the support on the part of the state with favorable measures for financing, production, and distribution, and the relationship of cooperation and mutual support established with the U.S. during World War II (García Riera, 1986; Reyes, 2007).

After this era, the Mexican cinematographic industry began to undergo a drop in the number of productions due to certain factors as follows: the entry of 8-mm and 16-mm film technology; the installation of television in home, and union problems, among others. After this Mexican film era, highs and lows have been observed with respect to the number of films produced (García Riera, 1986; 1998).

In the decade of the nineties, Mexican films started to witness a transition due to the international opening afforded by Mexico toward an international film industry.

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The Mexican film industry has had to face acceptance of and adaptation to their international opening, and has sought the formation of alliances with distributors and exhibitors, and the creation of new organisms favoring this industry, among other actions (Matute, 2002).

There have been various factors that have contributed to the current situation in the Mexican film industry, some of which have benefited it and others, contrariwise, have harmed it.

The latter caused private enterprises to be those that most resented the effects of the agreement. Ninety percent of producers in active service were unable to recover their investments due to, above all, to the distributors and exhibitors, of strong transnational presence, who garnered the greater part of the box-office income, giving rise to investors increasingly drawing away from film and with the sole, constant production from enterprises with capital within reach of the telecommunication oligopolies (Apanco, 2007; Ugalde, 2012).

Methodology of the investigation

The problem to investigate

Therefore, the present investigation deals with the need to introduce the MFI, on having to identify novel ways to compete, granting greater added value, at a lower cost and in the least time possible, bringing about the need to reform and reinforce its strategies. Also noteworthy is the importance of the MFI for the economic and social activity of Mexico, in addition to emphasizing how this industry, as others, is one that requires being subjected to analysis and study from the theoretical bases of administrative science.

Concretely, we arrive at the point at which the problem of investigation approaches the negative effect that occurred in the competitive advantage of the MFI, on opening the borders and not possessing the capacity to face the big transnational enterprises, thus establishing, in this manner, the question-to-investigate:

Is the formation of cooperation agreements of MFI producers with other members of the productive chain related with the competitive advantage of this industry?

Hypothesis

The formation of cooperation agreements of MFI producers with the members of the productive chain is positively correlated with the competitive advantage of this industry.

The competitive advantage is conferred when the MFI possesses some differential characteristics, whether in productions, production processes, novel marketing focuses of Mexican films, and innovations with regard to its competitors that derive from a good image as well as from an additional benefit of the productions (Porter, 2001).

Cooperation agreements are formed among members of the MFI productive chain to share resources, capacities, or activities with the purpose of mutual learning and improvement of its competitive position. The following are considered:

- Coproduction of Mexican cinema
- Agreements with different distribution channels of Mexican films and the alliances attained by Mexican productions
- Alliances with exhibitor enterprises in Mexico of Mexican productions

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Type and design of the investigation

This investigation is quantitative, direct, and documental, and correlational in reach (Rojas, 2002; Torres Solís, 1999).

Study universe and sample size

On being a quantitative investigation, measurement is obtained, on the one hand, by means of the compiling of information that the industry possesses and, on the other hand, with the method known as survey and interview, directed toward the executives and/or employees of the enterprises making up the MFI. With the complied information, descriptive statistics was utilized for estimating certain economic indicators that are affected by this industry.

Different MFI information sources were consulted to obtain the subjects. First, databases on the MFI were consulted in different organisms, such as FIDECINE (Fund for Investment and Stimuli for Cinema), FOPROCINE (Fund for Quality Cinematographic Production), IMCINE (Mexican Institute of Cinematography), CANACINE (National Chamber of the Film Industry), CONACULTA (National Board for Culture and The Arts), INEGI (National Institute of Statistics and Geography), ACNielsen, and the Bank of Mexico. IMCINE directories were obtained that listed cinematographic institutions and organizations, which include the following: producer enterprises; distributors and exhibitors of cinematographic services; cinematographic education centers; film festivals in Mexico, and filmmaking commissions and support offices for audiovisual production in Mexico.

From the latter, 341 enterprises, organisms, festivals, schools, etc., were obtained that were related, in one way or another, with the MFI.

The second step was to select those that were associated with the cinematographic production of Mexican films, taking into account that there are production enterprises that, to obtain financing or subsidies, with one production company per film; therefore, only the matrix of the productions was selected, with a remaining objective study population of 105.

With this information and given the natural limitations, a sample was obtained of 36 participants, with the objective of generating a tendency in the diagnosis on the state of Mexican cinematic production in terms of its participation in the market, its capacity to face international competition, and its cooperation agreements for achieving a competitive advantage.

Measurement instrument

The instrument employed for requesting information was a structured questionnaire in which the surveyees responded to the questions formulated without the intervention of the surveyor, except in some cases in which some interviews were conducted to clarify a response and/or to elaborate on the information.

The dimensions utilized for formulating the measurement questionnaire have been tested in studies applied to different industries and/or sectors. For the questionnaire's elaboration, various sources were consulted, such as the questionnaire of the survey on competitivity of the Complejo Tecnológico Industrial of Málaga and other sources, such as Thorogood Publishing, Ltd., Arthur Andersen, Panayides Photis, among others.

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In addition, Dr. Fernando Casani Fernández de Navarrete of the Universidad Autónoma de Madrid and Dr. Esteban García-Canal of the Universidad de Oviedo were contacted directly (these academicians have a great number of publications and studies to their credit in different journals on cooperation agreements, competitive strategies, and strategic alliances); they kindly sent us the contributions and questionnaires that they have employed in their investigations.

The questionnaires were adapted to the conditions that prevail in the Mexican film industry and to the objectives of the present study. The questionnaire obtained, in order to be reliable, was validated, by consultants, academicians, and by individuals working within the MFI at executive levels.

Theoretical framework

The theoretical framework approaches the antecedents of the theories of the strategy and competitive advantage with the objective of identifying the reasons for the formation of cooperation agreements and the advantages that this strategy type offers for competing at present, considering the environment in which it is undertaken.

The Resource-Based Theory (RBT) is analyzed, in that it explains the functioning of foreign companies that, due to their structure, determine the rules of the competitive game and consequently, the film producing enterprises in Mexico; in addition, thanks to their possessing certain resources and unique capacities, they can form cooperation agreements with foreign enterprises and achieve positioning themselves competitively in the international market.

Resource-based Theory

MFI production enterprises possess a series of unique resources and capacities, in which a subset of these allows them to achieve a competitive advantage, and another subset of these leads to superior performance in the long term. The advantage can be sustained for long time periods as long as the company can protect itself against imitation of resources, transferences, or substitutions (Penrose, 1959).

The study of Mahoney and Pandian (1992) presents the RBT from three different perspectives as follows:

First, it incorporates current strategic concepts. The strategic posture has been viewed as a continuous search for profits (Bowman, 1974), defined as a yield of resources above their opportunity costs, as defined by Tollison (1982).

Second, the RBT also fit into the current of the organizational economy. RBT, as understood by Aharoni and Sticht (1990), Dosi et al. (1990), and Prahalad and Hamel (1990), concentrated on two key factors of an enterprise's behavioral success that in particular achieves certain specific advantages, with a portfolio of routines and differential competencies coherent with the skills and the unique property of know-how (Mahoney & Pandian, 1992: 365).

Third, RBT is complementary to the industrial organization, as established by Caves (1982) and Porter (1980-81). The competitive advantage is a function of the analysis of an industry, organizational government, and the effects of the enterprise (in the form of advantages in resources and strategies).

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Competitive Advantage

As described by Porter (2001), the competitive advantage derives fundamentally from the value that a sector is capable of creating for its consumers, which exceeds the cost of creating it. Porter (2005) distinguishes two types of competitive advantage: leadership in costs and differentiation, and all of the activities of the value chain contribute to increasing the value for the purchaser. These links can lead to the competitive advantage in two ways: optimization and/or coordination. An enterprise should optimize the links that reflect its strategy for achieving the competitive advantage.

Sustainability of the competitive advantage depends on three conditions: interior-order advantages, such as workforce costs or cheap raw materials, which are relatively easy to imitate; superior-order advantages, which are more durable, such as process technology, product differentiation, brand recognition, and relations with protected clients due to high costs, and of the activity required to create and sustain the competitive advantage, which comprises challenges and which often can be profoundly unpleasant. The latter basically derives from improvement, from innovation, and from change; embracing the entire system of values, it is sustained with incessant improvement and requires implementing strategies of international focus (Porter, 1990).

Cooperation Agreements

The enterprise participates in a series of activities or functions that may or may not be technologically related: the purchase of goods; transforming these goods into semi-finished products; designing products and conducting investigation on product innovation; the search for financing; granting credit to buyers; seeking suppliers and new markets, etc. (Mariti and Smiley, 1983).

In order to implement these activities, the enterprise has, at least, three alternatives: organize it internally; make individual market transaction resources, and/or develop a cooperation agreement with one or more enterprises, which is a form of intermediate organization that can generate economies of scale.

In the entrepreneurial ambit, cooperation has become a new form of competing in the market, a means of reaching and maintaining a competitive advantage (Casani, 1996).

Cooperation agreements affect the organization and modify the competitive structures, configuring new markets. This gives rise to the need to define the manner in which these agreements affect the alliance and the cooperation strategies at the general competitive level, thus how they exert an influence on the system's efficiency based on the free market. These cooperative events are currently modifying the traditional concept of the competitive market; therefore, the alliances, rather than suppressing, transform the rivalry or the manner of competing, creating a new scenario that can be more virulent or more rigid than the former one.

With respect to the definition comprising the concept of cooperation and that is utilized in the present investigation, the definition provided by authors Mariti and Smiley (1983) is underscored; they conceive of the cooperation agreement between enterprises as a clear and explicit covenant, arranged over the long term between two or more organization. For these authors, the agreement should be crystal-clear, although not necessarily in writing; it can be verbal, but there should be a clear will to comply with the agreement.

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The cooperation agreement must be adhered to a priori, with a long-term relationship, not only simply involving sporadic actions because, in this case, it would be about some timely cooperation, and not an agreement (Sanfiel, 2004).

On embarking upon cooperation agreements, the following factors will be considered: the size of the members of the strategic alliances, and the degree of rigidity or flexibility of the strategies. At present, the great industries have developed their growth through rigid strategies, fusions, and/or participation with other enterprises, which implies strong investments and monetary layouts, as in the case of the Hollywood film industry. The MFI is made up of SEM that, on opening this sector at the international level, found themselves in need of developing certain strategies, such as the agreements that they enter into with other organizations, in that the more an enterprise becomes more specialized in the activities that they have mastery over and that are advantageous for it, the greater positive results they will have with regard to their competitive advantage as a sector.

As Casani establishes (1993), the field that can take on cooperation as any form of immediate organization between the market and the hierarchy must be very wide-ranging. Therefore, these are studied with an eye to the following distinct perspectives: the objectives that they pursue; the legal form that they adopt based on strategic action; field of activity; size of the enterprise; and operative classifications.

According to the objectives of this investigation, two types of agreements are relevant: the strategic action, and the size of the enterprise:

Regarding strategic action (Table 1), many authors establish distinct cooperation-agreement modalities based on the distinct activities that configure the enterprise's value chain (Mariti and Smiley, 1983; Porter and Fuller, 1988; Chesnais, 1988).

Modality	Activities of the Value Chain
Financial cooperation	The need for financial resources and the difficulty in finding financing
Technological cooperation	The rapidity in the development of the technology and its complexity
Cooperation in production	The fundamental search for acquiring scale and within-reach economies that permit the reduction of production-associated costs and risks
Commercial cooperation	Seek the following objectives: reduce costs and risks in the commercialization process, penetrate new markets, complete the gamma of products offered, procure access to distribution channels, etc.

Table 1 Cooperation Agreements regarding Strategic Action

Within commercial cooperation is found piggy-back cooperation, which consists of a distribution or commercialization agreement under which a company lends another company its international distribution network for the commercialization of its products in foreign countries under determined conditions. This modality tends to be utilized by SEM, as in the case of the MFI.

In terms of the size of the enterprise, this tends to vary based on the activity sector or the geographic ambit in which this acts. However, there are diverse criteria, generally accepted, for classifying enterprises by their size. The most customary of these comprise the number of employees, the sales volume, the capital, the added value, etc.

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Cooperation for MFI production enterprises appears as an intermediate route that allows reaching competitive size in the activities of the value chain. Where these were lacking, they maintain judicial and patrimonial independence, thus preserving the qualities associated with the small enterprise, in reference to flexibility and innovative capacity (Casani, 1995).

The model developed by Gómez et al. (2000) presents the advantages of cooperation agreements for SEM as in the case of MFI production enterprises seeking internationalization and that do not possess the experience and/or sufficient resources for maintaining a competitive advantage. The model leads to inter-entrepreneurial cooperation as the strategic alternative, rather than to the option of confrontation in isolated fashion.

The cinematographic industry in Mexico has been following a focus strategy, which implies differentiation and/or a cost advantage with respect to the segment selected. It also follows a product adaptation developed for the needs of the consumer, learning from the experience of the leader.

The cinematographic industry at the worldwide level presents high fixed costs in the production of the first copy; later, the marginal costs of reproduction and distribution tend to be very low or null. This type of industry presents economies of scale, favoring large-scale production and the formation of oligopolies (Muñoz Larroa, 2009).

Film production costs are substantial and the same occurs with marketing costs.

Additionally, the investment recovery period tends to be long and there is a negative phase gap between the purchase of goods and income derived from commercialization, these with repercussions on financing and in general, on sector-expansion opportunities. Having to depend on external financing resources and on the confidence of these to support production varies from company to company, from film industry to film industry, and from country to country (Muñoz Larroa, 2009).

This type of industry is required to deal with the uncertainty that the market presents in terms of demand, investment, production, transactions, and the game plan of their competitors. Enterprises acquire an important role, generating strategies and developing certain operative strategies, the objective being the creation of a stable relationship with the public, strategies such as planning opening dates, the repertory or catalog as a marketing strategy on offering a great variety of films, and successful projects that compensate for losses. However, at present, the big film studios have decided to reduce the amount of films per year and to make budget superproductions (Muñoz Larroa, 2009).

Other strategies developed with regard to marketing and publicity include the fact that now the great publicity campaigns are linked with horizontal integration, that is, the acquisition of other cultural industries, of electronics, or informatics, and/or of telecommunications. The situation has increased with entrepreneurial fusions and technological convergence. Being the owners of various means of communication (magazines, television channels and radio stations, Internet portals, discographic labels, etc.), allows enterprises to reduce their work plant, launch cross-publicity campaigns to promote a film, and are the same time to generate economies derived from other industries (Muñoz Larroa, 2009).

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Cooperation can facilitate access to new market opportunities through marketing agreements, which permit the enterprise to utilize distribution networks that are already installed. This pathway is very important for the possibilities of international expansion for MFI enterprises, in view of their limited resources and their normally lacking competitive international experience. These enterprises can see their possibilities of success increased if they attempt to open to new markets hand in hand with an established partner (Casani, 1993).

Cruz (1999) cites that cooperation as the main tool for stimulating the motivation of members of the channel and it acts by means of a process by which a member of the channel seeks the support of another, fulfilling its commercial objectives. However, putting cooperative performance into action is not free of difficulties, because there are numerous barriers that limit or impede channel members from wagering on this relational model. Concretely, highlights include the desire to maintain autonomy, lack of confidence, self-interest, and a deficient cost-benefit relation.

Results

The development and presentation of the results is performed under two headings. First, a descriptive analysis and the frequencies found are presented. The second heading depicts the correlations found among the variables.

Presentation of the results

The surveys were performed in enterprises pertaining to different activities of this industry, which range from producers, distributors, and exhibitors, up to the government. Those surveyed are, in the majority, dedicated to the production of films, and 89.5% of the enterprises are PEM.

The effects on the MFI with NAFTA's taking effect have been low participation of Mexican productions in the last 6 years: between one and 10 productions and once a year. Of these productions, 26.1% are 100% Mexican productions and few productions participate in the private sector or in that of the government, while 47.8% participate in both types of production: domestic and foreign.

With regard to the source of income, it is observed that 56.5% originate from other activities subsequent to commercialization. And with respect to subcontracting, we note that there is tendency toward this activity: more exhibitors are subcontracted to achieve commercialization of the films, because this type of relationship tends, to a greater extent, through cooperation agreements, and in that 57% are national companies. In addition, the enterprises studied report being subcontracted in 53% of cases and mainly through strategic alliances pertaining to the MFI and from a national source.

Commercialization of Mexican film productions shows us the final portion of the productive chain. In this part, 30.4% of those surveyed consider that a new geographical segment is being attacked since 6 years ago, this after NAFTA taking effect. Concerning the manner of distribution, after the opening, 39.1% establish that this has been carried out directly and with intermediaries, and that this is of benefit to the industry (39.1%) or that has not harmed it (43.5%). On the part on the entry of international exhibitors into the MFI, the surveyees consider that the industry has not been benefited, not has it been harmed (34.8%). Last, with respect to commercialization, 60.9% consider it convenient for alliances to be formed with various organisms, enterprises, and institutions.

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Test of the hypothesis and discussion of the results

In general, it was established that the formation of cooperation agreements within the MFI improves the competitive advantage in this industry in terms of its confirming that competitiveness correlates positively with the amount of cooperation agreements formed with MFI members, all of this with the aim of improving the sector's competitive advantage.

To arrive at acceptance of the hypothesis, analysis was performed with nominal or ordinal and categorical data. In the initial phase, it was observed that whether the sample utilized was or was not reliable was effected through a confidence analysis. The variables selected were those in reference to the different areas analyzed and according to the theoretical framework. On applying the alpha model, certain cases were eliminated to achieve a significant Cronbach alpha.

Afterward, a factorial analysis was carried out for data reduction and to find homogeneous groups of variables. In the following phase, tests such as the non-parametric, the coefficient of unilateral and bilateral correlations, and the Spearman rho were employed (Hernández Sampieri, 2010).

In the case of the Bartlett test, the analysis was divided according to the indicators that made up each scale to obtain factor acceptance or rejection. In addition, self-values were obtained, beginning with the highest and considering those of >1 (total explained variance).

The following point for consideration was the matrix of the components, where we can observe the burdens of each of the indicators of >0.5 for an exploratory factorial analysis.

Following this is the rotation matrix, which must be considered because it permits a sole variable to indicate a sole component.

Next, the results are presented in three sections:

Productions, subcontracted services, and main income source

The results show that the factors with greatest representativity are the following: participation in Mexican productions from NAFTA's taking effect (0.780); the income source (0.656); participation in productions with alliances (0.634), and the frequency with which these productions are supported (0.631).

The first two components explain 60.626% of the variance, these being the most representative. The first component, "time and form of participation in productions", explains 32.05% of the variance, and the second, "productions with alliances", 28.57%.

Next involved arriving at the following indicators-for-use, given the level of significance that they exhibited, as follows: participation in Mexican productions since NAFTA taking effect; production with national and international presence; participation in productions with alliances; subcontracted services, and income source.

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Linkage with other enterprises and production innovations in Mexican cinema

The results demonstrated that these are well-represented factors, such as in the case of the following: whether the enterprise is subcontracted (0.803); type of relation to the subcontractor (0.704); integration with other enterprises (0.743); linkage with organisms (0.792); changes benefiting the MFI (0.550); new production processes (0.790), and Mexican films in a new geographic market (0.619) and segment (0.588).

The first three components explain 66.35% of the variant, these being the most representative. The first component, "linkage with other enterprises", explains 25.96% of the variance, the second, "type of integration", 21.43%, and the third, "innovations in Mexican cinema production", explains 18.96%.

Thus, we obtained the following indicators-for-use, given the significance level that they exhibited in terms of the enterprise subcontracted: type of relationship; linkage of the enterprise with others; type of integration; form of production in 10 years; changes to the benefit of Mexican productions, and Mexican films in a new segment and geographic market.

Strategies followed by the industry and new forms of distribution and exhibition of Mexican cinema

The results are satisfactory and show that there are well-represented factors, as in the case of the following: strategy followed from entry into NAFTA (0.903); support on the part of the executives (0.799); benefits in new forms of distribution (0.753) and exhibition (0.793), and the formation of alliances to be more competitive (0.786).

We continue here with the total analysis of variance explaining the first three components, with an explanation of 70.86% of the variance, these being the most representative. The first component, "benefits of the distribution strategies", explains 33.23% of the variant, while the second component, "strategy and exhibition", explains 21.26%, and the third, "organizational strategy, alliances, and distributions systems", 16.36%.

The following indicators-to-use were obtained due to their significance level, which exhibited the following: executives favor the Mexican cinema; the benefits of the forms of distribution and exhibition; distribution systems in 10 years; company strategies since NAFTA, organizational strategy since NAFTA; forms of organizational strategy, and the formation of alliances for competitiveness.

Existing correlations: MCI cooperation agreements and the competitive advantage

With the factorial analysis, we obtained the most relevant variables, these were confronted, and in this manner, concluded with regard to the hypothesis posed. The most representative variables were grouped in six components that define the MFI competitive advantage (Figure 1). The Spearman rho test was applied for variables relative to measurement of the results. Analyses relative to the statistical tests cited resulted in interesting relationships that demonstrated the advantage of forming cooperation agreements to improve the competitive advantage of this industry since the signing of NAFTA.

According to the results obtained, we can visualize, in Figure 1, the following correlations among the variables:

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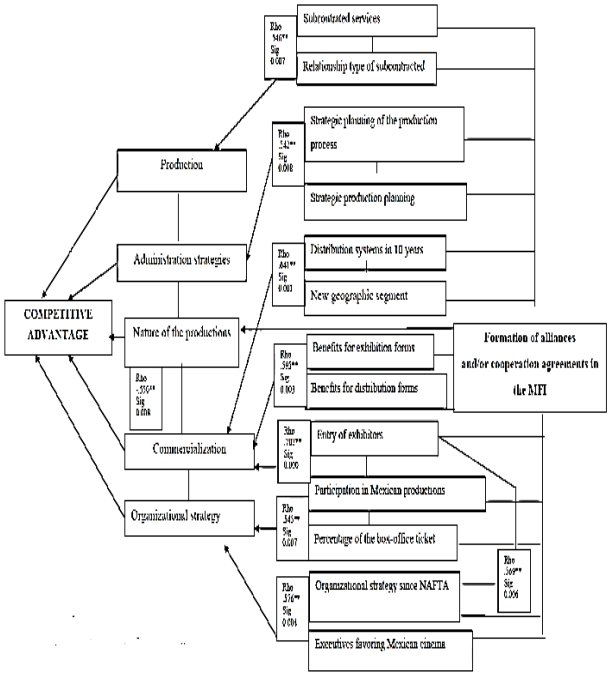

Figure 1 Diagram of significant results

As can be observed on carrying out the Spearman test, the following relevant results were found. On the one hand, a relation was found of 54% between the strategic planning of the production and of the production process, noting that this is very closely related with what is to be produced and how it will be produced, in order to improve the competitiveness of Mexican productions. In addition, the results demonstrated that the participation of Mexican productions since NAFTA has been characterized by the formation of cooperation agreements among members of the MFI productive chain (55%).

In relation to the existence between the form of distribution of the last 10 years and the Mexican cinema in other geographic segments, we observed that during the last 10 years, distribution systems have been increasingly utilized through intermediaries, in the form of cooperation agreements, giving rise to Mexican cinema achieving inroads into new geographic segments, favoring its competitive positioning, by 64%.

Also, distribution through intermediaries and the formation of cooperation agreements with new exhibitors has benefited the production of Mexican cinema, at a relation of 60%.

A relation of 55% that was found shows that the formation of cooperation agreements among MFI members favors the competitiveness of this industry. Additionally, the correlations found demonstrate that 55% noted that greater participation in Mexican productions in the market has achieved increasing the percentage of the ticket at the box office allotted to these, and also due to the entry of the exhibitors, with a relation of 70%.

Finally, the relation was found of 58% between the benefits of the entry of new exhibitors and the strategies employed by Mexican cinema producers. The tendency has arisen that follows the market leaders, but with their differentiation, in order to improve their competitiveness in the industry, in addition to that executives tend to favor the marketing of already proven productions from the time of the initiation of NAFTA, with a relation of 58%.

Thus, on arriving at the conclusion that, and according to the hypothesis proposed affirming that the formation of cooperation agreements of MCI producers with the members of the productive chain correlates positively with this industry's competitive advantage, this is approved, in that it confirms that the competitive advantage correlated with the production, the administrative strategies, the nature of the productions, the commercialization, and the organizational strategy of the MFI. The latter was achieved through the formation of cooperation agreements among members of the MFI productive chain to the benefit of this industry, as shown by the previously presented results.

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Conclusions

The theme of strategic alliances for acquiring and/or maintaining the competitive advantage in an industry has taken on great importance; thus, a study was conducted of how this type of strategy as utilized by the MFI has impacted its competitive improvement.

The investigation has allowed demonstrating that cooperation agreements improve the competitive advantage of this industry, but it is important to consider all of the members of the productive chain in order to avoid the strongest from being the only ones benefited. On analyzing the changes in Mexican productions from the time of NAFTA taking effect, we observe that the benefits received have been greater thanks to the formation of cooperation agreements among members of the productive chain, these having achieved Mexican productions being more innovative and also achieving their positioning in the market, employing foreign technology and the specific industry machinery.

The production enterprises of the Mexican cinema industry require the subcontracting of services such as technicians, distribution, commercialization, cinematographic studios, equipment rental, exhibition, and sound studios, among others. The options that these enterprises have for obtaining these services comprises subcontracting, but this option presents greater costs, no risk-sharing, and no maintenance of the relationship at the long term. Another option, which already exists and which tends to be utilized more and more, is the strategy of cooperation agreements, in which costs may be lowered, in which the members of an agreement share risks and maintain a long-term relationship.

In view of the latter, we can conclude that in effect, we have had, in the last 6 years, a greater number of cooperation agreements, but these continue to be insufficient, and there has been an increase in the number of Mexican productions with a national and international presence. Enterprises belonging to the MFI tend to subcontract increasingly and, in the majority of cases, this has been effected to be able to compete at the international level. Additionally, more cooperation agreements have been formed with exhibitors and distributors, with the objective of achieving commercialization of its films and, in this manner, delivering the product to the final consumer.

The Mexican cinema industry can compete with that of Hollywood, but does not achieve this due to the exhibition problem: there are few spaces for exhibition in comparison with the U.S., in addition to that films from Hollywood are shown first, last only la short time on the billboard, and are not debuted in all movies theaters and not during the best show times.

The advantage that we have in Mexico that is important to exploit is that there is a greater number of individuals here who pay out-of-pocket to see a Mexican film and they like them. The Mexican film industry already participates in various world festivals and obtains awards, although much is left to accomplish with regard to the production and distribution of Mexican films.

The MFI has problems; in addition, importance must not be subtracted from the fact that the cinema possess very close substitutes, such as open television, which presents the advantage that films have various repetitions through the year and that these are programmed at attractive viewing times.

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Also presenting a challenge is the time that a film takes to proceed through the different distribution channels, which has been progressively shortened: the wait is increasingly less for a film to be launched for sale in its physical format from its first appearance on the billboard, causing the family, given the price and the expenditure for a family to go to the movies, to wait until the film is shown on open television or on some other physical format. In addition, it must be taken into consideration that films are distributed through the Internet, offering a greater variety of film titles and with the facility of viewing these at any time.

Taken together, it can be concluded that the formation of cooperation agreements positively impacts the MFI, whenever these agreements are to be benefit of the entire productive chain. The agreements must be formed among different enterprises, organisms, and institutions and they must benefit the producers as well as the distributors and exhibitors.

Mexican producers have had to sign agreements, preferring to do so, but this has been to maintain their participation in the market; it has not been to innovate and to invest in production processes and to lower the costs of production.

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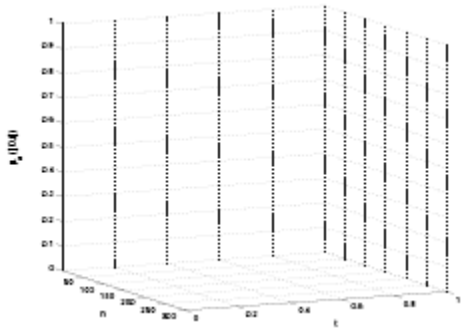

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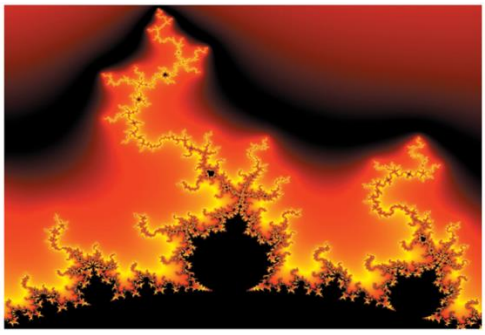

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