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NON-FINANCIAL PERFORMANCE INDICATORS AND BUSINESS PERFORMANCE

Correlation results from the Chinese automotive market

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EXECUTIVE SUMMARY

The evaluation of a firm is traditionally based on financial performance measures. However, this type of information indicates what the company has achieved in the past, but the real value of the company must include future perspectives. What we need is non-financial performance measures, which can tell us about what is going to happen with the financial results in the future (Neely, 2002).

Morissette (1996) provides a widely accepted definition of non-financial performance indicators. Non-financial measures include any quantitative measure of either an individual's or an entity's performance that is not expressed in monetary units. This includes any ratio-based performance measure that omits any monetary metric in either the numerator or denominator of that ratio.

One non-financial measure emphasized in this discussion is customer satisfaction. In particular, the work will follow the steps below:

- Overview of literature review and previous empirical evidence of customer satisfaction relation with business results;
- Definition of main customer satisfaction indexes: from country specific customer satisfaction indexes to industry specific ones;
- Focus on Chinese automotive market: data collection of customer satisfaction and business results, definition of the hypotheses on correlation and regressive results.
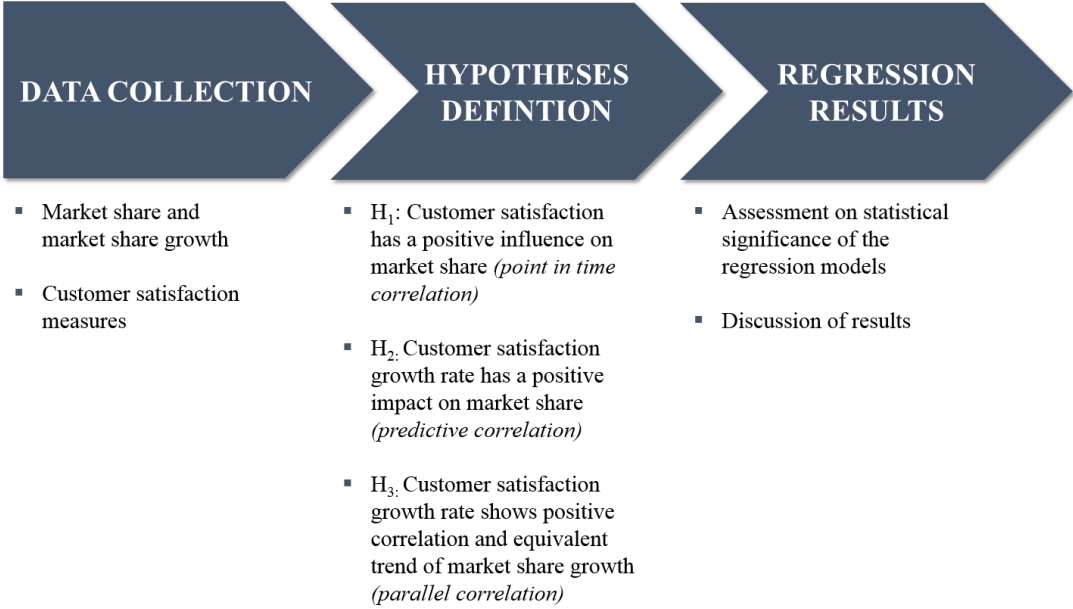
Goal of this study is to evaluate the relevance of non-financial performance indicators on business performance. The work discusses the chance of using non-financial measures as predictive methods of business growth.

A regressive model captures the relation between two indicators:

- Customer satisfaction measures and satisfaction growth, representing non-financial indicators;

- Market share and market share growth, proxy of business performance and development.

The choice to study the Chinese automotive market is driven by its dynamic context and the availability of information on customer satisfaction, This background provide an opportunity to analyze significant changes in market share and to connect these market shifts to non-financial performance indicators.

The regressive analysis process is divided in three main steps:

DATA COLLECTION

- Market share and market share growth
- Customer satisfaction measures

HYPOTHESES DEFINTION

- H_1: Customer satisfaction has a positive influence on market share *(point in time correlation)*
- H_2: Customer satisfaction growth rate has a positive impact on market share *(predictive correlation)*
- H_3: Customer satisfaction growth rate shows positive correlation and equivalent trend of market share growth *(parallel correlation)*

REGRESSION RESULTS

- Assessment on statistical significance of the regression models
- Discussion of results

DATA COLLECTION

MARKET SHARE AND MARKET SHARE GROWTH

Market share data refer to ten main Chinese automotive players, covering almost 65% of total market volume.

Western automotive manufacturers dominate the Chinese market. Market shares of Chinese brands, which still lack brand power, have been declining steadily. Even though the Chinese Association of Automobile Manufacturers lists more than 80 private and state-owned Chinese automotive makers, Chinese market is still controlled by foreign automakers:

Exhibit 1: Market share data collection
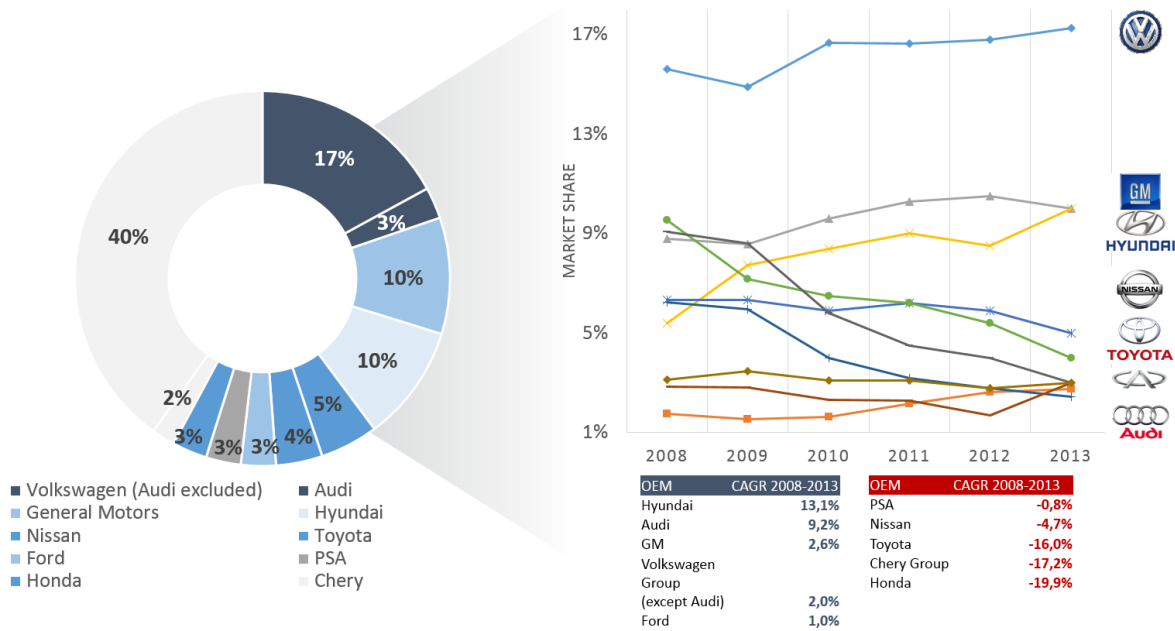
Source: Euler Hermes, Volkswagen, 2014

German, Japanese and American Original Equipment Manufacturers (OEMs) play a principal role currently in China. In particular:

- *Volkswagen Group* is market leader with more than 3,3 million vehicles, including imports, sold in 2013, resulting in 20% market share. The presence of Volkswagen Group in the Chinese passenger car comprises over 60 models from Volkswagen, Audi, Skoda, Seat, Lamborghini, Bentley, Porsche and Bugatti brands [1] (Volkswagen, 2014).

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[1] 93% of total sales come only from Volkswagen and Audi branded vehicles' deliveries.

- *General Motors* and its eleven joint ventures hit 3 million sales[2] in 2013 GM and its joint ventures offer more than 40 different models under seven brands in China. Their products range from mini-cars to luxury sedans and from mini-commercial vehicles to light-duty trucks. Buick and Cadillac passenger cars show relevant sales increase from 2012, reaching respectively 800.000 and 57.541 units.

- *Hyundai Motors* and affiliate Kia Motors reached respectively 970.000 and 500.000 vehicles sold in 2013, with a growth rate from 2012 of 13% and 4% (Bloomberg, 2014). The two carmakers sold a combined 1,47 million units, becoming the third biggest seller in China, behind Volkswagen and General Motors.

- Residual 50% of market share is divided between few foreign OEMs (Ford, Honda, PSA Peugeot Citroen) and several local firms.

Market share trends provide a dynamic picture of the Chinese automotive industry. It is possible to identify three relevant tendencies:

- *Disruptive players:* Hyundai and Audi show highest growth rate in market share from 2008 (Compound Annual Growth Rate of 13,1% and 9,2% respectively). In particular, Audi became top seller of premium cars delivering in 2013 almost 500.000 vehicle. Analyses forecast its deliveries in the world's largest auto market will increase by a "double-digit" percentage in next years (Bloomberg, 2014)

- *Stable players:* GM and Volkswagen, excluding Audi branded vehicles, reached 2% growth yearly during 2008-2015 period.

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[2] Data on GM sales do not match Exhibit 1 market share since does not include Chinese branded vehicles sales (e.g. Baojun, Jiefang and Wuling).

- *Shrinking* players: Japanese OEMs faced a strong loss of market share in recent years. Despite the depreciating yen that foster Japanese cars imports, Toyota and other Japanese automakers were hurt by political and social tensions flared in the recent years (International Business Times, 2013).

CHINESE AUTOMOTIVE CUSTOMER SATISFACTION RESULTS

Information regarding customer satisfaction for Chinese automotive market are acquired from J.D. Power research studies. J.D. Power, a business unit of McGraw Hill Financial, is a global marketing information services company providing performance improvement, social media and customer satisfaction insights and solutions. The company's quality and satisfaction measurements are based on responses from millions of consumers annually (J. D. Power, 2015). From 2008, five different reports on various aspects of customer satisfaction have been delivered for Chinese automotive industry. Today, J.D. Power China provides 12 different benchmarking reports every year. However, this study is focused only on the initial five measurement systems in order to allow a comparative analysis of results obtained for the whole period assessed (2008-2013). The five customer satisfaction indexes analysed are:

1. **Automotive Performance, Execution and Layout Study (APEAL)**

   The APEAL Study provides an industry benchmark for new-vehicle appeal, assessing customer gratification for owning and driving a new vehicle during the first two to six months of ownership. Customer satisfaction is measured on a 1.000-points scale.

2. **Customer Service Index (CSI)**

The CSI study evaluates satisfaction of vehicle owners who have owned their vehicle between 12 and 24 months and who visited an authorized dealer's service department for maintenance or repair work during last six months. Customer satisfaction is measured on a 1.000-points scale.

3. Initial Quality Study (IQS)

The IQS study, examines problems experienced by new-vehicle owners within the first two to six months of ownership in two distinct categories: design-related problems and malfunctions. Total initial quality score is defined as problems reported per 100 vehicles (PP100). A lower rate of problems experienced indicates higher quality.
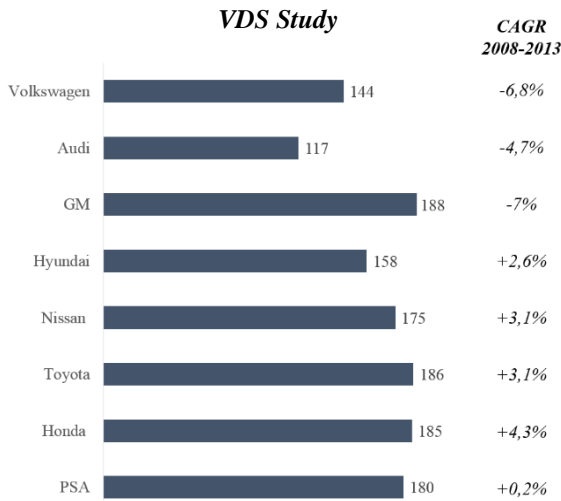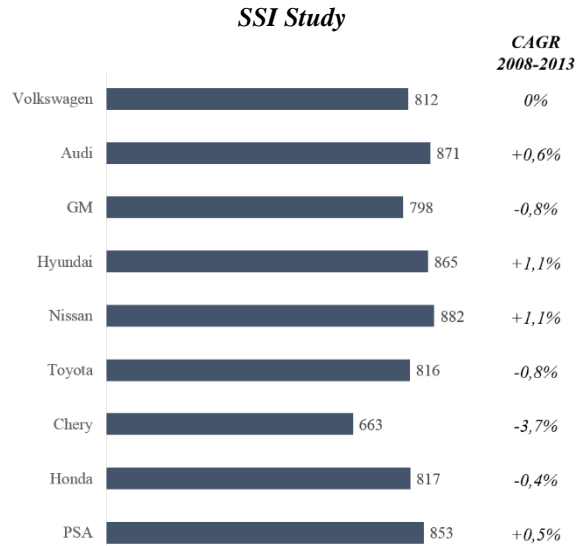
4. Sales Satisfaction Index

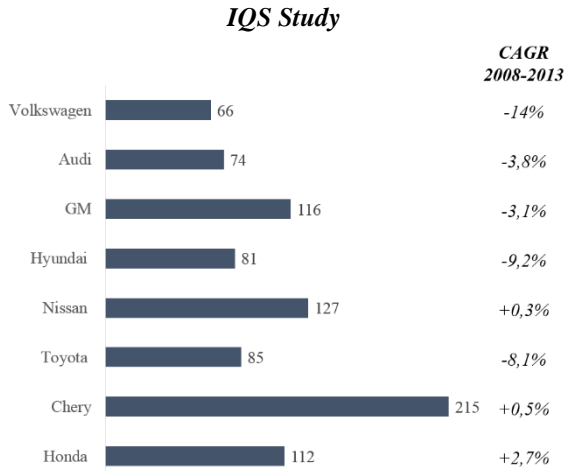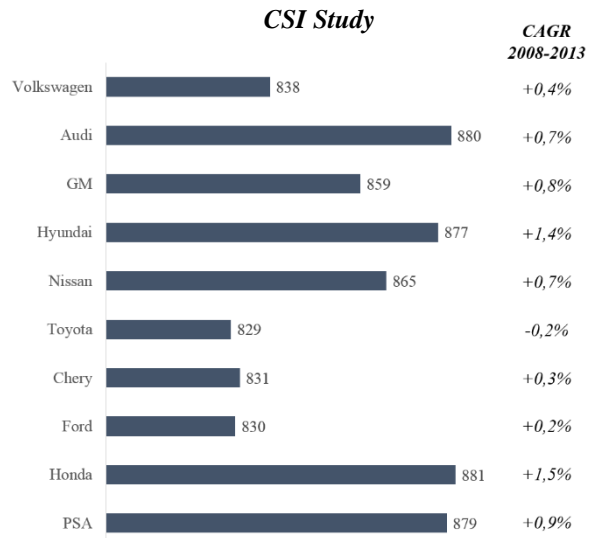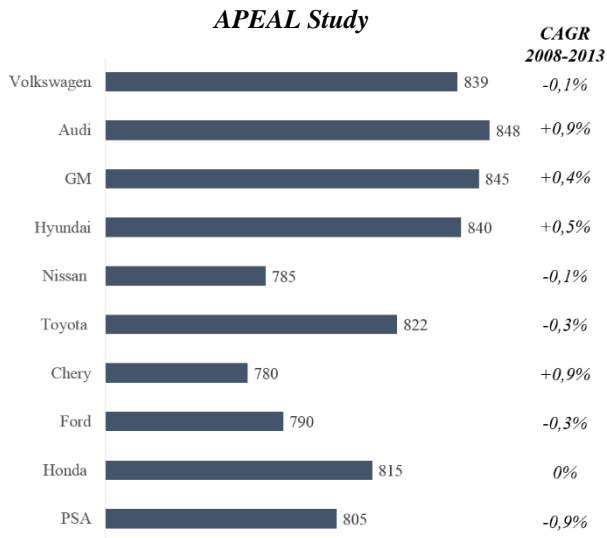The Sales Satisfaction Index study measures customer satisfaction with the new-vehicle purchase experience. Customer satisfaction is measured on a 1.000-points scale.

5. Vehicle Dependability Study

The Vehicle Dependability Study examines problems experienced during the past six months by vehicle owners after 25 to 36 months. Score is defined as problems reported per 100 vehicles (PP100).

Exhibit 2: Customer satisfaction data collection

APEAL Study

Brand	Score	CAGR 2008-2013
Volkswagen	839	-0,1%
Audi	848	+0,9%
GM	845	+0,4%
Hyundai	840	+0,5%
Nissan	785	-0,1%
Toyota	822	-0,3%
Chery	780	+0,9%
Ford	790	-0,3%
Honda	815	0%
PSA	805	-0,9%

CSI Study

Brand	Score	CAGR 2008-2013
Volkswagen	838	+0,4%
Audi	880	+0,7%
GM	859	+0,8%
Hyundai	877	+1,4%
Nissan	865	+0,7%
Toyota	829	-0,2%
Chery	831	+0,3%
Ford	830	+0,2%
Honda	881	+1,5%
PSA	879	+0,9%

IQS Study

Brand	Score	CAGR 2008-2013
Volkswagen	66	-14%
Audi	74	-3,8%
GM	116	-3,1%
Hyundai	81	-9,2%
Nissan	127	+0,3%
Toyota	85	-8,1%
Chery	215	+0,5%
Honda	112	+2,7%

SSI Study

Brand	Score	CAGR 2008-2013
Volkswagen	812	0%
Audi	871	+0,6%
GM	798	-0,8%
Hyundai	865	+1,1%
Nissan	882	+1,1%
Toyota	816	-0,8%
Chery	663	-3,7%
Honda	817	-0,4%
PSA	853	+0,5%

VDS Study

Brand	Score	CAGR 2008-2013
Volkswagen	144	-6,8%
Audi	117	-4,7%
GM	188	-7%
Hyundai	158	+2,6%
Nissan	175	+3,1%
Toyota	186	+3,1%
Honda	185	+4,3%
PSA	180	+0,2%

Customer satisfaction measures are divided in indicators of reliability (Initial Quality Study and Vehicle Dependability Study), indicators of connected services (Customer Service Index and Sales Satisfaction Index) and indicators of initial satisfaction and impressions (APEAL index).

J.D. Power customer satisfaction indexes show overall higher results for foreign automotive players while Chinese manufacturers still are far behind in term of reliability of vehicles and quality of connected services.

HYPHOTESES DEFINITION

Goal of this study is to evaluate any relation between customer satisfaction and business performance. Following hypotheses are tested:

- H_1: Customer satisfaction has a positive influence on market share *(point in time correlation).* Customer satisfaction and market share are analysed in 2013 absolute values.). Hypothesis 1 states that high (low) customer satisfaction in a specific year results in high (low) market share in same year.

- H_2: Customer satisfaction growth rate has a positive impact on market share *(predictive correlation).* In this case, the regression analysis is performed between customer satisfaction 2008-2013 CAGR and 2013 absolute value of market share. Hypothesis 2 outlines the connection between growth rate of customer satisfaction in previous years (2008-2013), and market share at the end of the period considered (2013). In case of positive and significant results, the analysis can argue the predictive quality of customer satisfaction over market share.

- H₃: Customer satisfaction growth rate shows positive correlation and equivalent trend of market share growth *(parallel correlation)*. The analysis is implemented taking into account 2008-2013 CAGR of both customer satisfaction and market share in order to understand if satisfaction growth impacts simultaneously on market share growth.

Simple linear Regression models are used to test the hypotheses mentioned above. *Pearson Product Moment Correlation, R-squared* and *P-value* are the *s*tatistics observed to evaluate the significance of regression between the indicators.

REGRESSION RESULTS

Summary of regression results are presented below:

Table 1: Regression results[3]

H₁: Customer satisfaction has a positive influence on market share *(point in time correlation)*.

	2013 value				
	APEAL	CSI	IQS	SSI	VDS
2013 Market share	✗	✗	✗	✗	✗

H₂: Customer satisfaction growth rate has a positive impact on market share *(predictive correlation)*.

	2008-2013 CAGR				
	APEAL	CSI	IQS	SSI	VDS
2013 Market share	✗	✗	✓	✗	✓

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3 Regression defined strongly significant (✓) if p-value is lower than 0,05. Modest significance in case of p-value lower than 0,1.

H₃; Customer satisfaction growth rate shows positive correlation and equivalent trend of market share growth *(parallel correlation).*

	2008-2013 CAGR				
	APEAL	CSI	IQS	SSI	VDS
2008-2013 CAGR Market share	✗	✗	✓	✓	✓

1. *Hypothesis 1;* There is no statistical proof of correlation between market share and customer satisfaction in a specific point in time. Contradictory to popular thought, market leaders' customers do not show higher customer satisfaction. Previous research confirm these results, believing that larger companies are not able to satisfy a large customer base with their differing needs and requirements, which therefore results in dissatisfied customers (Rego *et al.*, 2013).

2. *Hypothesis 2;* Statistical significance is observed for correlation between market share and CAGR of two customer satisfaction indicators. In particular:

   - 2008-2013 CAGR of Initial Quality Study and 2013 Market share regression provide significant results. Pearson correlation shows a negative connection of -0,68 between the two variables. Therefore, 1% increase in IQS CAGR (measure of problems experienced in the short term) is reflected in 0,68% loss of market share at the end of the period. The regression line fits well the data series with a R-squared of 0,54, while statistical significance is proved by a p-value lower than 0,05.

   - 2008-2013 CAGR of Vehicle Dependability Study and 2013 Market share regression show significance. Pearson correlation indicates a negative

connection of -0,76 between the two variables. Therefore, 1% increase in VDS CAGR (measure of problems experienced in the long term) is reflected in 0,76% loss of market share at the end of the period. Despite the R-squared lower than 0,5, modest statistical significance is proved by a p-value equal to 0,06 (significant at 0,1 level of significance).

3. *Hypothesis 3;* Statistical significance is observed for correlation between market share CAGR and CAGR of three customer satisfaction indicators. In particular:

- 2008-2013 CAGR of Initial Quality Study and 2008-2013 CAGR of Market share regression provide significant results. Pearson correlation shows a negative connection of -1,32 between the two variables, meaning that 1% increase in IQS CAGR is reflected in 1,32% loss of market share growth rate over the same period. Even though the regression line fits weakly the data series (R-squared lower than 0,5), p-value of 0,08 proves modest significance of the regression (significant at 0,1 level of significance).

- 2008-2013 CAGR of Sales Satisfaction Index and 2008-2013 CAGR of Market share regression deliver significant results. Pearson correlation shows a positive connection of +5,036 between the two variables. A 1% increase in SSI CAGR is reflected in 5% increase of market share growth rate in the same period. Even though the regression line fits weakly the data series (R-squared lower than 0,5), p-value of 0,06 proves modest significance of the regression (significant at 0,1 level of significance).

- 2008-2013 CAGR of Vehicle Dependability Study and 2008-2013 CAGR of Market share regression provide significant results. Pearson correlation shows a negative connection of -1,87 between the two variables, meaning that 1% increase in IQS CAGR is reflected in 1,87% loss of market share growth rate over 5 years' period. The regression line fits well the data series (R-squared equal to 0,57) and p-value of 0,03 proves strong significance of the regression (significant at 0,05 level of significance).

In conclusion, it is possible to state following arguments:

- No connection between current indicators has been found (point in time correlation), providing similar results to previous research. For this reason, the study has shifted its focus on growth rate indicators in order to capture the improvements in terms of market share and customer satisfaction of main players of the Chinese automotive market.

- Relevant outcomes emerge from growth of customer satisfaction and final market share regression. Specifically, the correlation is strong, when analysing IQS and VDS, measures of reliability of vehicles delivered. No connection, instead, has been found for customer satisfaction indicators evaluating pre and post-sale services (CSI and SSI) and first impressions of vehicles purchased (APEAL).

- Finally, significant correlation is achieved when analysing customer satisfaction and market share trends in last 5 years. Still, significance in regression comes from indicators measuring reliability and problems experienced after vehicles purchase. However, in this case a strong relation takes place even when evaluating Sale

Satisfaction index, hence, when measuring the impact of pre-sale service on market share growth. A possible reason of such difference from results in hypothesis 2 might be the short-term effect of quality of pre-sale service and sale process on customer satisfaction. This particular part of the overall customer satisfaction journey is reflected instantaneously on market share growth, but does not affect results in final market share.

Therefore, two key messages arise from the study:

- Customer satisfaction influences market share when looking at indicators' growth rates;

- Satisfaction indexes, measuring reliability of vehicles, show strong connection with business results, proving their predictive quality of market share trends.

Finally, Audi and Toyota cases provide further details of correlation. In particular, while Audi successful story of increased customer satisfaction finds correlation with business results, Toyota decreasing market presence in the Chinese automotive market is strongly influenced by socio-political factors and no connection with satisfaction measures have been found. The Toyota case highlights the limits of the regressive analysis, since the impact of several factors on the overall business performance. Eventually, further studies are necessary in trying to isolate the relation customer satisfaction-market share from external conditions.