

# Efficient Consumer Response (ECR) Practices as Responsible for the Creation of Knowledge and Sustainable Competitive Advantages in the Grocery Industry

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## Abstract

This paper presents a model to measure and to explain knowledge and sustainable competitive advantages generation within the Efficient Consumer Response (ECR) framework. Some specific goals are: a) identification, selection and validation of intellectual capital and of sustainable competitive advantages, b) study of what we name *associate concepts*: facilitators, implantation drivers and critical success factors, c) develop a validation of a methodology for the measurement model and of the indicators adaptation degree, meeting the demand of related companies and consultants.

Results show that individual improvement, work conditions, management style, learning improvement, education, management by objectives and work environment influence directly the human capital increase. Data mining techniques, generation of manuals of procedures and processes, and continuous improvement can be evidenced for a structural capital increase. Increase of relational capital is in direct relationship with the creation and improving of standard procedures for clients, their satisfaction, management by categories, and loyalty programs. To conclude, the implementation of ECR practices generates and increases the intellectual capital, or knowledge, in the organizations by positively promoting the generation of sustainable competitive advantages.

**Key words:** efficient consumer response, ECR, cooperation strategies, best practices, intellectual capital, sustainable competitive advantages, structural equations model

## Introduction

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The Efficient Consumer Response initiatives (ECR) have their origin in the United States, after the Annual Conference of the Food Marketing Institute and previous to a pioneer action coming from Walt Mart, with the main purpose of improving the productivity in the products supply chain from a global perspective.

Between 1992 and 1993 many consultants started to develop the concept ECR inspired by the production system in Toyota, more concretely in the “just in time” system. After that, in 1996, the 1<sup>st</sup> ECR Conference in Europe was held. That same year, ten different organisations started the Project ECR-Spain. In 2002, according to the AECOC, ECR- Spain and Accenture Report (2002), more than 26.000 collaboration and communication agreements in ECR practices were established in the areas of demand and supply of this kind of services.

ECR is a strategy in the groceries industry. According to it, suppliers and intermediaries work together in order to produce better results for the final consumer (Kurt Salmon Associates, 1993) and improve the attraction of demand (AECOC, 2005; ECR-Spain, 1998; PROMARCA, 2000). ECR practices are more “collaboration strategies” in the supply chain than a new concept of management. It has to do more with a process of elaboration of “best practices”.

We think that the adoption of ECR practices introduces a change in some areas and activities in a firm. Amposen (1991), Nonaka (1995), Ciborra and Andreu (2001) amongst others, link the change and the learning efforts in a firm with the generation and management of knowledge. The results of the MERITUM project in the European Union stress the strategic importance of organisational knowledge for the building of competitive advantages in firms (Ordóñez, 2000).

From Brooking (1996) the measurement of knowledge (intellectual capital) has always been of researchers’ interest. We have revisited the most important models for intellectual capital measurement and tried to collect the most interesting approaches for our paper.

To measure the impact of ECR practices in the generation of competitive advantages, we have made use of the ITSGA concept “information technology strategic generic actions” (Andreu, Ricart, & Valor, 1997). Literature has recently paid attention to this methodology, mainly in order to incorporate into the firm’s strategic objectives the experiences coming from other firms and the possibilities that the information and communication technologies offer to achieve competitive advantages (Gil & Guarch, 2006, Palou, 2006, Rambla, 2006, Soto & Tapia, 2006).

Figure 1 offers the main concepts included in our model

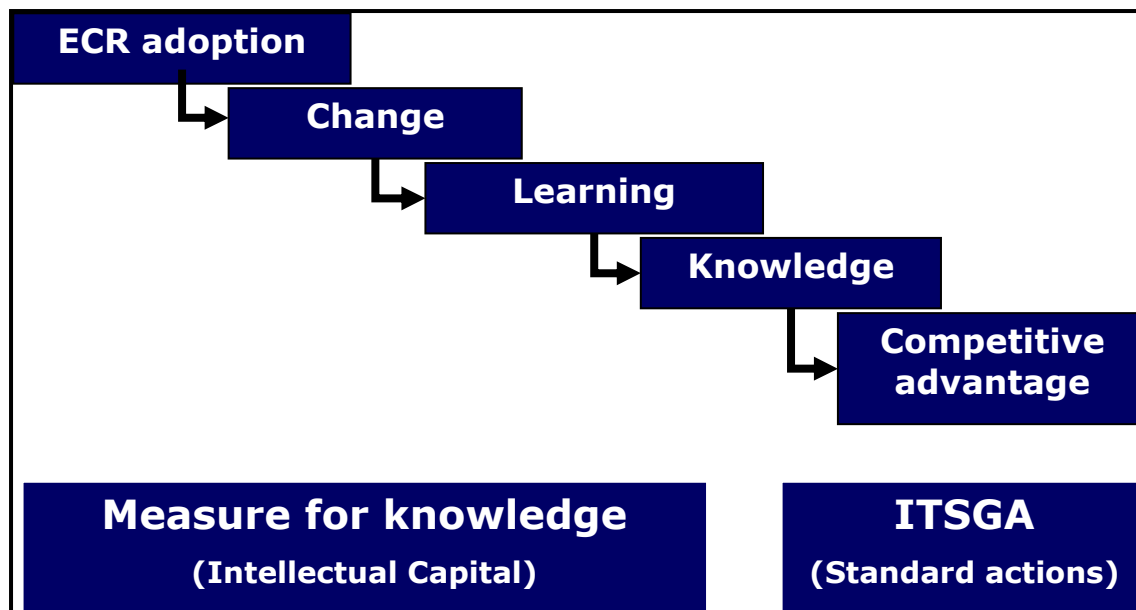


Figure 1. ECR, knowledge and competitive advantages (Soret, 2007)

## ECR: Definition and Elements

ECR is a joint strategy for providers and distribution channels, dedicated to providing final consumers with the highest value, the best service and the greatest variety of products, by fitting together the needs coming from the firm's supply chain and the customer's needs (AECOC, 2000; PROMARCA, 2000). Solé (2000) refers to ECR as a system and sometimes as a movement. He indicates that it appears in Europe in 1994 in order to eliminate the unnecessary costs in the supply chain and the need of looking for a faster and proper reaction to consumer demands. Ferrer and del Castillo (1996), Stern, Ansary, Curchlan, & Cruz (1999) and Whipple, Frankel, and Anselmi (1999) have referred to this concept in the same way.

Amongst the main elements considered necessary to the final success in the adoption and implementation of ECR practices we can cite: the relationship between manufacturers and distribution channels (Merrefield, 1992). It requires changes in the firm's structure and in the processes (Shulman, 1993). The ECR practices must not be implemented without considering the creativity in merchandising practices and promotions (Veiders, 1993). ECR implies an investment in information and communication technologies (ICT). The most common ones are: executive information systems (EIS), electronic data interchange (EDI) and radio devices (Buddenbaum, 1994). Effectiveness, flexibility and customer orientation are the principles that must orient the joint actions of all members in the value chain in order to reach the proposed objective (Mejías, García, & Prado, 2001).

In this work, taking into consideration an orientation towards learning, knowledge and the generation of competitive advantages, we propose the following definition: the initiative ECR is a technique composed by a group of collaboration technologies and procedures that allow the cooperation amongst the stakeholders in a supply chain and that permits the organizational learning and the generation and management of knowledge by promoting a group of distinct capabilities in all the stakeholders that take part, contributing to the establishment of sustainable competitive advantages.

Figure 2 offers the main elements that constitute the ECR initiative.

ECR ELEMENTS		
<b>Collaboration strategies</b>	<ul style="list-style-type: none"> <li>• Efficient replenishment (ER)</li> <li>• Efficient promotions</li> <li>• Efficient portfolio</li> <li>• Efficient offer of new products</li> </ul>	
<b>ECR practices in ER</b>	<b>AFM</b>	Alignment of key files
	<b>OER</b>	Orders of entrance and reception
	<b>CRP</b>	Continuous replenishment
	<b>CPFR</b>	Collaborative planning in replenishment and forecast
	<b>ASN</b>	Anticipated sales announcement
	<b>GXC</b>	Management by categories
	<b>C-D</b>	<i>Cross-docking</i>

<b>Enabling tools</b>	<b>EDI</b>	Electronic data interchange
	<b>EAN</b>	Identification codes
	<b>DW/DM</b>	Data warehouse and Data mining
	<b>DPP</b>	Direct product productivity
<b>Associate concepts</b>	<b>BPR</b>	Business process redesign
	<b>ABC</b>	Activity based costs
	<b>KAIZEN</b>	Continuous improvement
	<b>MRP/DRP</b>	Material replenishment programs
	<b>JIT</b>	Just in time
	<b>TRADE MK</b>	Trade marketing
	<b>BENCH</b>	Benchmarking
	<b>OUTSOURCING</b>	Outsourcing

**Figure 2. ECR elements for the study**

## The Model

This paper has as its main objective the proposal of a model for measuring the knowledge and the generation of sustainable competitive advantages in the area of ECR practices.

Amongst the specific objectives, we can stress the following ones:

- Identification, selection and validation of indicators for intellectual capital and sustainable competitive advantages.
- The study of what we have called “associate concepts”. The study of facilitators and promoters for the implementation of ECR practices and critical success factors.
- The proposal of a methodology for validating the proposed model.
- The fitting of the various selected indicators, according to the observed demand, by a group of firms in the chosen industry and consultancy firms.

The model is composed by two main parts: one of knowledge or intellectual capital and the other one composed by sustainable competitive advantages. In order to promote both parts we have revisited the existent models on intellectual capital and the methodology for strategic planning, and the information technology strategic generic actions (ITSGA) that we have mentioned in the introduction.

The most significant models in measuring knowledge in ECR practices are: the Global Scorecard, the derived ECR Scorecard, the five capitals, and the INTELECT models.

We have chosen the INTELECT model for the following reasons:

- It is easy to understand. It is an open, flexible and universal model (Bueno, Rodríguez and Salmador, 2003).
- It is the most extended and operative model in the Spanish market considered by very important firms: BBVA, PriceWaterhouseCoopers, Telefonica R&D, Zara, etc.

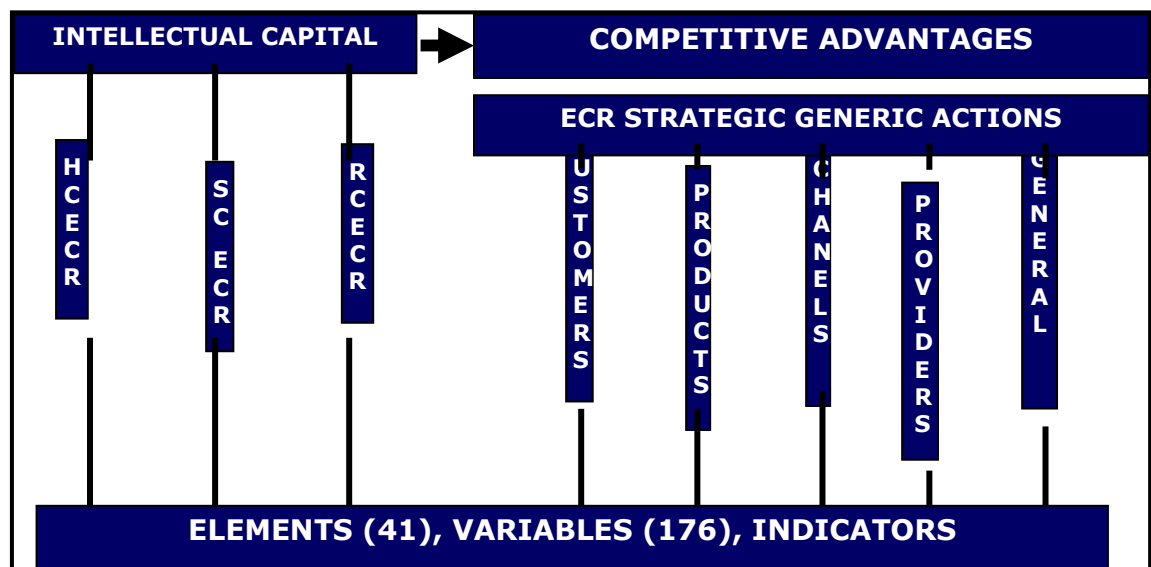
For measuring the impact of ECR practices in the sustainable competitive advantages we have used the methodology for strategic planning ITSGA (Andreu et al., 1997). It tries to identify “strategic generic actions” that make the achievement of competitive advantages possible. International firms such as Sears, Federal Express or TRW have identified different ITGSA categories for strategic applications such as “transactions by considering customer data”, the “development of new products” or “the establishment of new models of collaboration”.

In our model, we have considered the three components of intellectual capital: human capital (HC), structural capital (SC) and relational capital (RC). For measuring possible competitive advantages we consider 5 categories of standard actions “product”, “customers”, “channels”, “providers” and of “general interest”. We name them ECRSGA, this means strategic generic actions coming from ECR practices.

Each of these 8 blocks (3 of IC and 5 of ECRSGA) is divided into elements. Each block has three components; therefore, there are 41 items that constitute the questionnaire that we have used to validate our model.

Each element can have various alternatives that can not be excluded, all together they sum 176 variables measured by “improvement perceptions” in a typical Likert scale.

Figure 3 shows the model for measurement we propose in our analysis.



**Figure 3. Proposed model for the measurement of IC and CA in the ECR practices (Soret, 2007)**

So then by considering the 8 defined blocks, we have established the following hypotheses:

- H1: The ECR initiative generates and/or increases the human capital of the firm
- H2: The ECR initiative generates and/or increases the structural capital in the firm
- H3: The ECR initiative generates and/or increases the relational capital in the firm
- H4: The knowledge created by the adoption of ECR generates sustainable competitive advantages related with products
- H5: The knowledge created by the adoption of ECR generates sustainable competitive advantages related with customers

H6: The knowledge created by the adoption of ECR generates sustainable competitive advantages related with distribution channels

H7: The knowledge created by the adoption of ECR generates sustainable competitive advantages related with providers

H8: The knowledge created by the adoption of ECR generates sustainable competitive advantages related with general aspects

The three first hypotheses confirm a general hypothesis: the ECR initiative generates and/or increases the human, the structural and relational capital. That is to say, the intellectual capital in the organisations.

The rest of the hypotheses confirm another general one: the knowledge generated by the adoption of ECR practices offers sustainable competitive advantages related with various categories.

We will try then, by using a confirmatory analysis, to contrast that the creation or increase of intellectual capital promotes sustainable competitive advantages in the ECR practices.

In the Appendix we present the 176 variables or indexes used. Block I presents indexes for human capital, block II for structural capital, block III for relational capital and from block IV until block VIII we offer indexes for sustainable competitive advantages. Block IX refers to the study of the “associated concepts” as enablers in the implementation.

## Work Methodology

For obtaining the internal and external secondary information, 15 interviews have been conducted with external experts coming from different firms working with ECR practices. From all we have constituted a group of 8 experts.

With this group, we have worked by following a methodology of group dynamics and a further in-depth interview with one of the members. We have achieved a consensus according to the structure for the most adequate model in the industry; finally for the final survey we have established, 8 blocks, 41 elements and 176 variables.

With the help of another group of experts in marketing research, we have designed the questionnaire.

For obtaining the sample framework, we organised a professional meeting in ESIC (Business and Marketing School) in collaboration with LOGICA, the main organisation representing logistic providers in the Spanish market.

We have used some communication media in order to promote the meeting: we offered information in the economic and business press for 4 days; we mailed the information to 2500 different companies and also offered the information in radio and in the web page [www.erieta.com](http://www.erieta.com)

From the meeting we received 65 completed surveys. Afterwards, we received another 27 by conducting personal interviews. All together we got 92 completed surveys. The data have been processed by using SPSS and AMOS. We have realised descriptive and factorial analysis by principal components. The main objective is to obtain a final confirmatory analysis by a system of structural equations containing latent variables and measure errors.

Amongst the participants in the sample we have three groups of business applying ECR practices: logistic operators, firms distributing the products directly to final consumers, and consultants and academics practicing or providing research in ECR practices. These three groups are also the beneficiaries of the results of the research.

Figures 4.1 and 4.2 represent the research process and the main methodology.

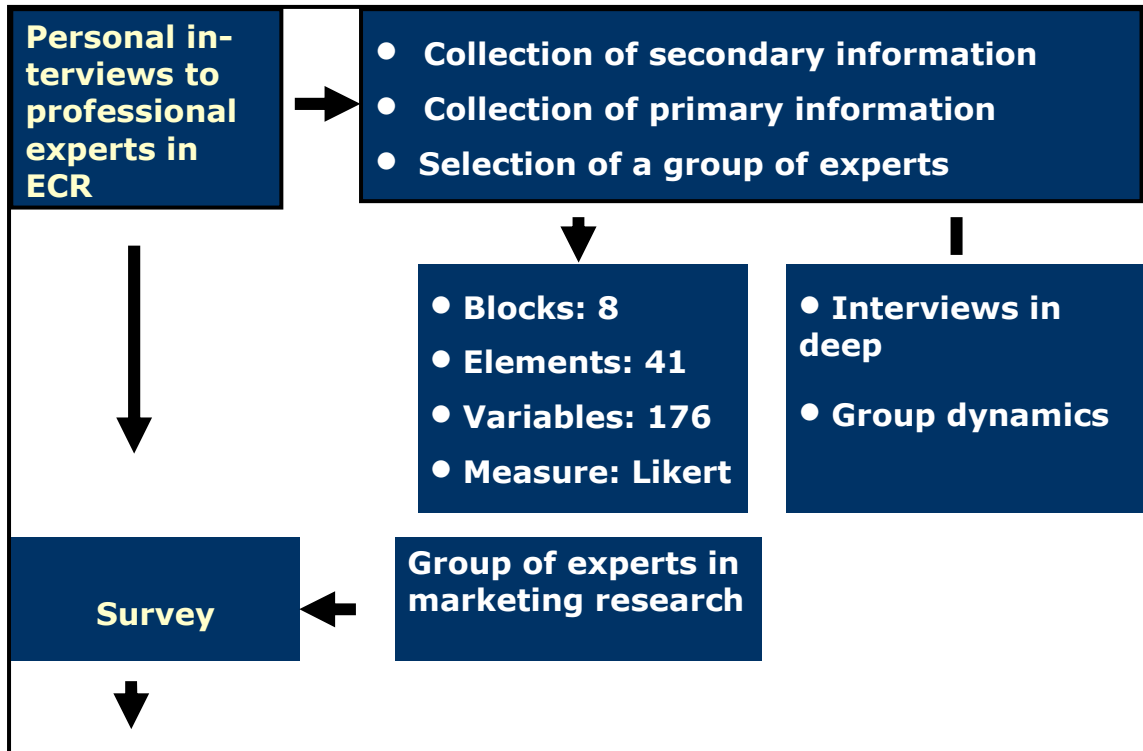


Figure 4.1. Design of the research and methodology

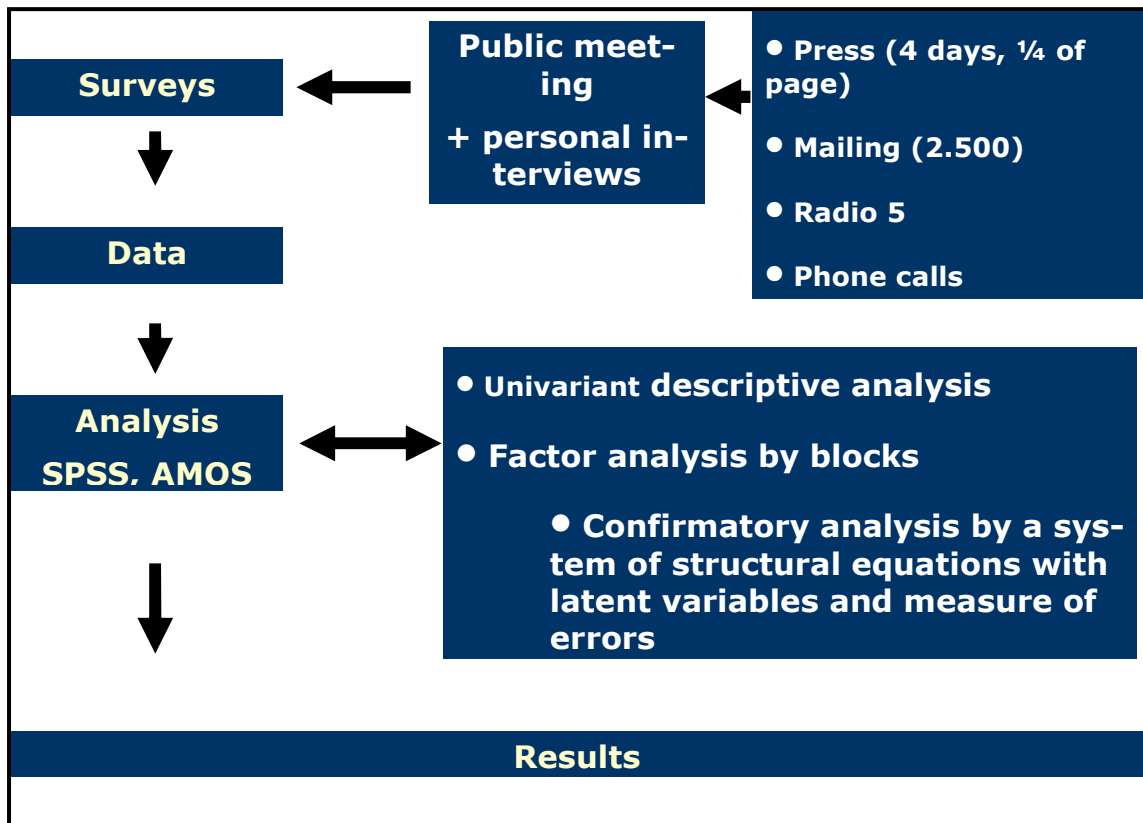


Figure 4.2. Design of the research and methodology

The factorial analysis offers different dimensions or factors for the different blocks of IC and CA, which will be used as variables in a model of structural equations, MSE, with latent variables and errors in the measure.

The general model of the structural equations systems is a formal mathematical model containing a group of linear equations that comprise variables that can be directly observed and latent variables that represent associated concepts.

Our model for measuring IC and SCA perfectly fits with the structure of a model of linear structural equations.

The general model is composed by two sub models:

- The structural model that relates the latent variables.
- The model for measure, which relates each latent variable with the variables that measure them (the corresponding indicators).

The latent variables in the structural model are represented by ellipsis and in our case they are HC, SC, RC, and SCA

The model establishes that there exists a direct relationship amongst the three capitals with the generation of SCA.

It also establishes a certain relationship amongst the various capitals, although it has been considered a model with direct non reciprocal joint relationships for modelling and identification purposes.

Besides and as a distinct characteristic desirable in the model, the measure errors are explicitly included for each variable in the process of estimation. In Figures 5 and 6 the two cited sub models are offered.

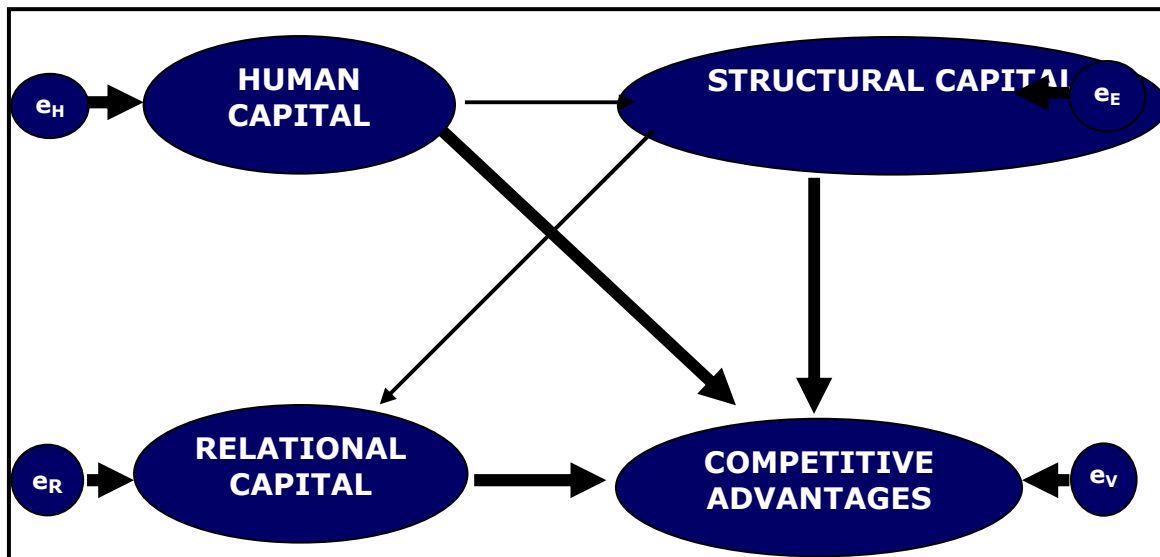
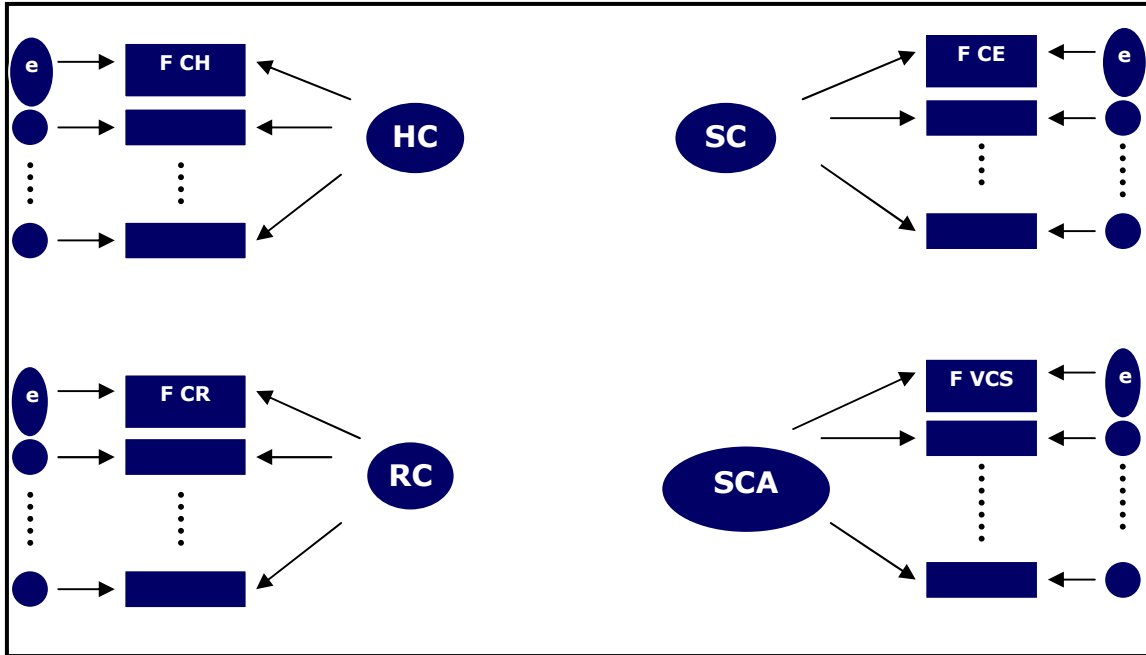


Figure 5. Structural equations model. Structural sub-model



**Figure 6. Structural equation models. Sub models of measure**

The measurement model relates each latent variable with the correspondent factors (variables used to measure them), by assuming that there exists a causal structure amongst the latent variables. The same way as in the previous structural model, the errors of measurement are included for the whole variable in the estimation process.

The general model is defined (Jöreskog, 1993) by a system of lineal structural equations with the following matrix representation,

$$\eta = \alpha + B\eta + \Gamma\xi + \zeta \tag{1}$$

where  $\eta$  ( $m \times 1$ ) and  $\xi$  ( $n \times 1$ ) are random vectors of, respectively, dependent and independent variables,  $\alpha$  is a vector ( $m \times 1$ ) represented by the intersections with the axis,  $B$  ( $m \times m$ ) is the matrix of coefficients of the endogenous latent variables representing the effects of other variables  $\eta$  in other variables  $\eta$ ,  $\Gamma$  ( $m \times n$ ) is the matrix of coefficients of the exogenous latent variables, representing the direct effects of the variables  $\xi$  in the variables  $\eta$ ,  $\zeta$  is a vector ( $m \times 1$ ) that indicates the degree of random effects in the equation. We assume  $E(\eta) = 0, E(\xi) = 0, E(\zeta) = 0$ .

The observed variables (that we can measure) are represented by the vectors  $y$  ( $p \times 1$ ), where  $p$  is the number of indexes of  $\xi$ , and  $x$  ( $q \times 1$ ), being  $q$  the number of indicators of  $\eta$ , that are related with the latent variables by equations

$$y = \tau_y + \Lambda_y\eta + \varepsilon, \tag{2}$$

and

$$x = \tau_x + \Lambda_x\xi + \delta, \tag{3}$$

Being  $\varepsilon$  ( $p \times 1$ ) and  $\delta$  ( $q \times 1$ ) the vectors in terms of errors. It is assumed that  $\varepsilon$  is non correlated with  $\eta$ ,  $\xi$  y  $\delta$ ; and that  $\delta$  is not correlated with  $\eta$ ,  $\xi$  and  $\varepsilon$ .  $\Lambda_y$  ( $p \times m$ ) and  $\Lambda_x$  ( $q \times n$ )

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are matrix containing the structural coefficients  $\lambda_{ij}$ , that relate the latent and measured variables (the observed ones), and  $\tau_y$  ( $p \times 1$ ) and  $\tau_x$  ( $q \times 1$ ) are the vectors of the terms of constant intersections.

In other words:

$$\begin{array}{c}
 \begin{bmatrix} \eta_1 \\ \cdot \\ \cdot \\ \cdot \\ \eta_m \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} \eta_1 \\ \cdot \\ \cdot \\ \cdot \\ \eta_m \end{bmatrix} + \begin{bmatrix} \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} \xi_1 \\ \cdot \\ \cdot \\ \cdot \\ \xi_n \end{bmatrix} + \begin{bmatrix} \zeta_1 \\ \cdot \\ \cdot \\ \cdot \\ \zeta_m \end{bmatrix} \\
 \\
 \begin{bmatrix} y_1 \\ \cdot \\ \cdot \\ \cdot \\ y_p \end{bmatrix} = \begin{bmatrix} \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} \eta_1 \\ \cdot \\ \cdot \\ \cdot \\ \eta_m \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \cdot \\ \cdot \\ \cdot \\ \varepsilon_p \end{bmatrix} \\
 \\
 \begin{bmatrix} x_1 \\ \cdot \\ \cdot \\ \cdot \\ x_q \end{bmatrix} = \begin{bmatrix} \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} \xi_1 \\ \cdot \\ \cdot \\ \cdot \\ \xi_n \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \cdot \\ \cdot \\ \cdot \\ \delta_q \end{bmatrix}
 \end{array}$$

$(m \times 1) \quad (m \times m) \quad (m \times 1) \quad (m \times n) \quad (n \times 1) \quad (m \times 1)$   
 $(p \times 1) \quad (p \times m) \quad (m \times 1) \quad (p \times 1)$   
 $(q \times 1) \quad (q \times n) \quad (n \times 1) \quad (q \times 1)$

The main hypothesis of the structural equation system is  $\Sigma = \Sigma(\theta)$ , where  $\Sigma$  is the covariance matrix of the population, and  $\Sigma(\theta)$  is the covariance matrix in the model, written as a function of a vector with different parameters  $\theta$ . The estimations for the parameters are obtained by minimising a function of adjustment:

$$F(\theta) = F(S, \hat{\Sigma}(\theta))$$

Once that the parameters in the model have been estimated, the covariance matrix is compared with the covariance matrix of the data and, in case the difference between both matrixes is statistically acceptable, the structural equation model proposed is recognised as a plausible explanation of the reality.

For obtaining more detailed information to estimate in a more precise way of parameters, we realise a Bayesian multiple imputation, 10 complete groups of data have been created. The sample

was generated by the Markov chain Monte Carlo method, MCMC, by employing a diffuse distribution as a *a priori distribution*. This way, we were able to obtain a sample of 900 data, enough for the estimation.

## Results

In the sample used we have been able to identify three groups of segments containing some common characteristics each one of them. We name them:

C-RD: consultants and researchers

P-D: producers and distributors

LO: Logistic operators

The first segment C-RD shows an academic point of view that offers the opportunity of knowing a high number of cases of study in the industry of mass consumption products.

The segment P-D offers practices where both collaborate a lot, in fact they must collaborate so that the ECR strategies offer final success. So we consider of importance to integrate both from a common point of view in the same sample segment.

The segment LO is the largest segment of responses in our questionnaire. There are two main reasons for this. In the first place, we have collaborated with the main organisation for logistic operators in Spain, LOGICA. In the second place, we have noticed a growing interest of these firms in the last years. We have considered of interest the great participation of these firms in this research paper. They know quite well how the main activities in the logistic area work, activities that they precisely offer as a service catalogue for their customers, manufacturers and distribution channels.

Figure 7 offers the technical specifications:

<b>TECHNICAL FICHE</b>	
<b>UNIVERSE</b>	<b>Spanish organisations practising ECR</b>
<b>ENVIRONMENT</b>	<b>All the nacional territory</b>
<b>DESIGN OF THE SURVEY</b>	<b>The researchers by using group dynamics and in deep interviews</b>
<b>SAMPLE</b>	<b>92 surveys; multichanel strategy: convocatory in the economic press, phone, personal interview</b>
<b>ERROR</b>	<b><math>\approx \pm 3,25\%</math> (p=q=50) (minimised by Markov Chain Montecarlo)</b>
<b>LEVEL OF TRUST</b>	<b>95'5% (2 sigma)</b>
<b>DESIGN OF THE SAMPLE</b>	<b>Quotes; various surveys in a firm</b>
<b>FIELD OF WORK</b>	<b>The researchers</b>
<b>TIME</b>	<b>March 2007</b>
<b>SEGMENTATION</b>	<b>C-DP: 10(10'88%); M-D: 27(29'34%); LO: 55(59'78%)</b>

Figure 7. Technical specifications

The variables of study have been grouped in 28 factors: 8 for HC, 4 for SC, 10 for RC and 6 for SCA. Each dimension groups various elements in the obtained factor structure, being its denomination representative of the group of the defined elements. These dimensions or factors will be the used as measure variables or manifest ones in the model of structural linear equations.

For a more precise estimation of the parameters, we carried out a Bayesian multiple imputations, by generating a new sample by means of the Markov Chain Monte Carlo method, with a priori diffuse distribution. This way, we have a sample of 900 data, quite enough number for the estimation.

We have obtained a global acceptable adjustment of the structural equation model. The results for each latent variable with their factors, the regression standardized weights and their correspondent p-values, are presented in Figure 8.

<b>HUMAN CAPITAL</b>	
	<b>(Estimation, p)</b>
<b>Improvement of individual and work conditions</b>	<b>(0'654, 0'000)</b>
<b>Managerial style</b>	<b>(0'596, 0'000)</b>
<b>Learning improvement</b>	<b>(0'465, 0'000)</b>
<b>Education-training</b>	<b>(0'415, 0'000)</b>
<b>Organisational environment</b>	<b>(0'158, 0'000)</b>
<b>Integration of people in the firm</b>	<b>(-0'233, 0'000)</b>
<b>Promotion, Rewards</b>	
<b>STRUCTURAL CAPITAL</b>	
<b>Data mining</b>	<b>(0'545, 0'000)</b>
<b>Procedures manual</b>	<b>(0'200, 0'000)</b>
<b>Improvement of processes</b>	<b>(0'065, 0'049)</b>
<b>Communities of practice and virtual university</b>	<b>(-0'269, 0'000)</b>
<b>RELATIONAL CAPITAL</b>	
	<b>(Estimation, p)</b>
<b>Customer standards</b>	<b>(0'862, 0'000)</b>
<b>Satisfacción de clientes, GXC</b>	<b>(0'182, 0'000)</b>
<b>Programas de fidelización</b>	<b>(0'100, 0'002)</b>
<b>CRP, CPFR</b>	<b>(-0'272, 0'000)</b>
<b>ASN</b>	<b>(-0'155, 0'000)</b>
<b>SUSTAINABLE COMPETITIVE ADVANTAGES</b>	
<b>Improve of information to SC and consumers</b>	<b>(0'725, 0'000)</b>
<b>Improve of communication to SC</b>	<b>(0'224, 0'000)</b>
<b>Degree of personalisation of the product to providers</b>	<b>(0'134, 0'000)</b>
<b>Information on new products</b>	<b>(-0'214, 0'000)</b>
<b>Innovation and price to final customers</b>	<b>(-0'179, 0'000)</b>

Figure 8. Standard weights and p-value

In relationship with the previous results and with the group of basic hypotheses 1,2, and 3, that it is to say to those that relate to the adoption of practices in the ECR initiative with the generation or increase of the human, structural and relational capital in the organisations; we have verified in our study that there exists a direct relationship amongst the following variables: individual improvement and work conditions, managerial style, improvement of learning skills, training, the management by objectives and the work environment have a direct impact in the increase of HC.

The increase of SC can be obtained by the adoption of data mining techniques, generation of manuals establishing procedures and continuous process improvement.

The increase of RC is directly related with the creation and/or improvement of the standards for customers, their satisfaction, and the management by categories and the loyalty programmes.

Concerning to the group of basic hypotheses 4 to 7, that it is to say with firms that relate the increase of intellectual capital with the generation of sustainable competitive advantages (SCA), we have verified that there is a direct relationship amongst the following variables: the improvement of information to the supply chain and to the consumer, the improvement of the communication to the supply chain and the personalisation of the product to providers.

In our study the theoretical hypotheses 1 and 2 have been verified. This means that ECR is a technique for individual and organisational learning, and the creation of knowledge and this generates sustainable competitive advantages for firms and organisations in the area of efficient consumer response, ECR.

Or, in other words, ECR improves the organisational results by the creation of SCA. In Figure 9 we can appreciate the parameters in the model for structural equations, and in Figure 10, the results containing the expression of the standard coefficient for regression, the standard error, the critical reason and the value of probability or the significance level.

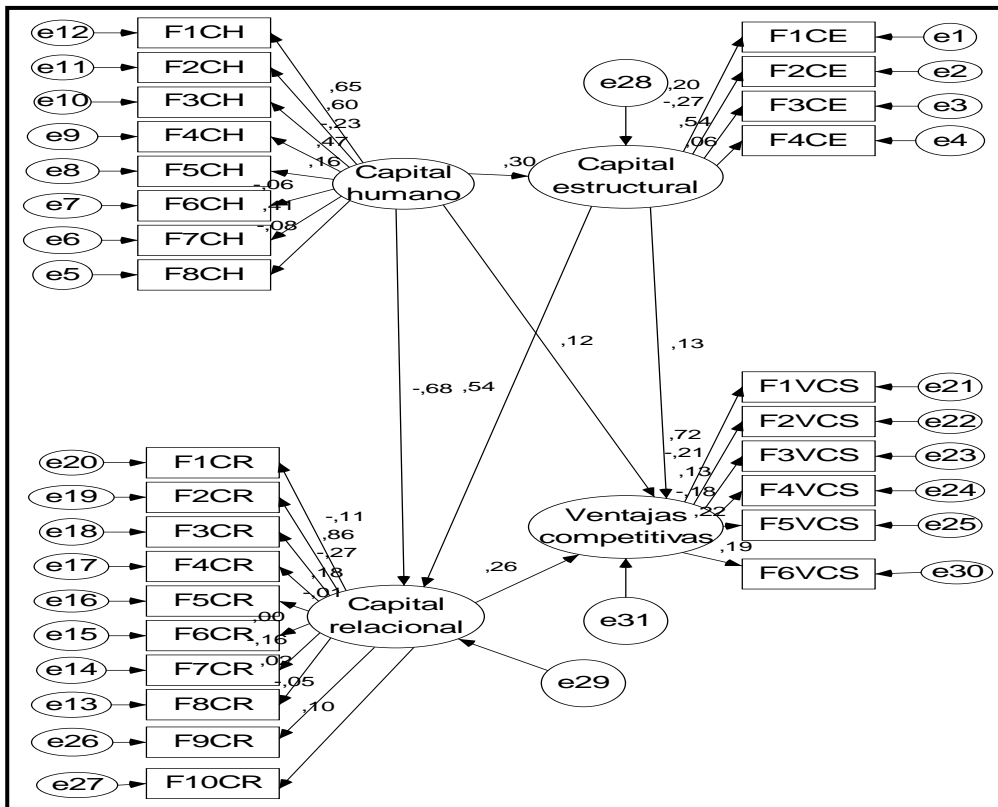


Figure 9. Model for structural equations

RESULTS OF THE MODEL						
			Estimation	S.E.	R. C	P
Structural Capital	<---	Human Capital	,024	,002	9,563	***
Relational Capital	<---	Human Capital	-,332	,011	-28,897	***
Relational Capital	<---	Structural Capital	3,336	,147	22,673	***
Competitive Advantages	<---	Human Capital	,041	,016	2,601	,009
Competitive Advantages	<---	Relational Capital	,184	,033	5,568	***
Competitive Advantages	<---	Structural Capital	,582	,184	3,169	,002
FACTOR1CE	<---	Structural Capital	1,000			
FACTOR2CE	<---	Structural Capital	-,990	,117	-8,457	***
FACTOR3CE	<---	Structural Capital	3,155	,160	19,696	***
FACTOR4CE	<---	Structural Capital	,352	,179	1,968	,049
FACTOR8CH	<---	Human Capital	-,051	,021	-2,399	,016
FACTOR7CH	<---	Human Capital	,447	,032	13,812	***
FACTOR6CH	<---	Human Capital	-,041	,023	-1,807	,071
FACTOR5CH	<---	Human Capital	,118	,024	4,853	***
FACTOR4CH	<---	Human Capital	,184	,012	15,941	***
FACTOR3CH	<---	Human Capital	-,111	,015	-7,256	***
FACTOR2CH	<---	Human Capital	,515	,023	22,519	***
FACTOR1CH	<---	Human Capital	1,000			
FACTOR8CR	<---	Relational Capital	,016	,022	,738	,460
FACTOR7CR	<---	Relational Capital	-,150	,031	-4,765	***
FACTOR6CR	<---	Relational Capital	-,002	,034	-,065	,948
FACTOR5CR	<---	Relational Capital	-,007	,034	-,209	,834
FACTOR4CR	<---	Relational Capital	,100	,018	5,623	***
FACTOR3CR	<---	Relational Capital	-,259	,030	-8,583	***
FACTOR2CR	<---	Relational Capital	1,000			
FACTOR1CR	<---	Relational Capital	-,099	,030	-3,354	***
FACTOR1VCS	<---	Competitive Advantages	1,000			
FACTOR2VCS	<---	Competitive Advantages	-,272	,041	-6,638	***
FACTOR3VCS	<---	Competitive Advantages	,109	,027	4,103	***
FACTOR4VCS	<---	Competitive Advantages	-,256	,046	-5,531	***
FACTOR5VCS	<---	Competitive Advantages	,111	,016	6,982	***
FACTOR9CR	<---	Relational Capital	-,033	,023	-1,412	,158
FACTOR10CR	<---	Relational Capital	,085	,028	3,036	,002
FACTOR6VCS	<---	Competitive Advantages	,132	,022	5,889	***

**Figure 10. Results of the model**

We present some conclusions derived from the global adjustment of the structural equations model.

## Conclusions

The results have been contrasted with the group of experts in the group dynamics and personal interviews. We can add here that we have found a great positive influence of HC and SC, not being positively influenced in the RC (this could be the case that in firms with a high HC degree rivalries phenomenon may appear, conflicts of interest that make more difficult the perception of a good degree in the relationships). However the improvement of HC has a positive impact on the generation of SCA. The increase of SC positively impacts in the RC and in the generation of SCA. At the same time it also impacts in a positive way in the generation of SCA.

As main final conclusion and once we have checked the hypotheses, the adoption of ECR practices generates and/or increases the intellectual capital or knowledge in organisations that has a positive influence in the generation and improvement of sustainable competitive advantages.

As main restrictions to our analysis we can stress the lack of publications (books, doctoral dissertations, articles) on ECR initiatives, especially in the Spanish Market. However as a strong point for our literature review, we had the privilege of working with confidential reports, offered by a group of organisations (AECOC, PROMARCA, ECR-Spain).

In relation with the elements we have include in the model, we must point out that not all the firms are using the same practices and the same “associated concepts”, although they have heard about them. In some cases, with the main objectives of have the surveys completed, we have worked under the analysis “what if”.

The model of structural equations containing latent variables and errors of measure requires a high volume of data. We have solved that limitation by using the following statistical tools: factor analysis in main components and the Markov chain Monte Carlo method. We have considered a model with non reciprocal direct relationships for avoiding a very complex model and promoting a more clear interpretation of the final results.

By considering the just mentioned restrictions and the obtained conclusions, we suggest the following future research topics.

We consider of interest extrapolating the model to other industries. This will allow us to establish comparison of the effectiveness achieved by using ECR practices in different industries.

We also consider of interest deepening the study of most frequent ECR practices, according to the industry and their impact on the firm’s intellectual capital and sustainable competitive advantages.

The identification of new indicators and their convenience for being included in the different parts of the proposed model should be also of interest for future research.

Another interesting derived analysis could be the consideration of the temporal dimension in the model, since the degree of implementation of these practices takes place in the long run.

Finally, we also consider of interest to study the ECR initiatives from the point of view of the existence literature concerning to collaboration and alliance agreements in other environments. Since the ECR initiatives include amongst their main elements the so-called co-operation strategies, apart from other enabling tools and a group of associated concepts that even not being intrinsic to ECR practices, are however considered of a great interest.

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## Appendix List of Variables or Indexes

VISTA DE VARIABLES		
BLOQUE I		
1	I.1	Increase of success IDEAS
2	I.2.a	Improvement of the ATTITUDE for people participation
3	I.2.b	Improvement of the BEHAVIOUR for people participation
4	I.2.c	Improvement of the SKILLS for people participation
5	I.3	Increase of multitask capacity
6	I.4	Increase of task rotation
7	I.5.a	Increase of loyalty and compromise
8	I.5.b	Increase of royalty and involvement
9	I.5.c	Increase of royalty and transformation
10	I.6.a	Increase of training programmes in associate concepts (BPR)
11	I.6.b	Increase of training programmes in associate concepts (ABC)
12	I.6.c	Increase of training programmes in associate concepts (TQM)
13	I.6.d	Increase of training programmes in associate concepts (KAIZEN)
14	I.6.e	Increase of training programmes in associate concepts (MRP/DRP)
15	I.6.f	Increase of training programmes in associate concepts (CIM)
16	I.6.g	Increase of training programmes in associate concepts (TRADE MK)
17	I.6.h	Increase of training programmes in associate concepts (BENCH)
18	I.6.i	Increase of training programmes in associate concepts (JIT)
19	I.6.j	Increase of training programmes in associate concepts (ISI)
20	I.6.k	Increase of training programmes in associate concepts (IT)
21	I.6.l	Increase of training programmes in associate concepts (OUTSOURCING)
22	I.6.m	Increase of training programmes in associate concepts (PARTNER)
23	I.6.n	Increase of training programmes in associate concepts (CONCURRENT ENGINEERING)
24	I.6.o	Increase of training programmes in associate concepts (ILS)
25	I.7.a	Improvement in the labour individual climate (employment security and future)
26	I.7.b	Improvement in the labour individual climate (work conditions)
27	I.7.c	Improvement in the labour individual climate (work environment)
28	I.7.d	Improvement in the labour individual climate (rewards)
29	I.7.e	Improvement in the labour individual climate (Education-training)
30	I.7.f	Improvement in the labour individual climate (Information and communication)
31	I.7.g	Improvement in the labour individual climate (Management by objectives)
32	I.7.h	Improvement in the labour individual climate (work participation)
33	I.7.i	Improvement in the labour individual climate (managerial style)
34	I.7.j	Improvement in the labour individual climate (Promotion)
35	I.7.k	Improvement in the labour individual climate (firm integration)
36	I.8.a	Improvement in the labour group climate (employment security and future)
37	I.8.b	Improvement in the labour group climate (work conditions)

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38	1.8.c	Improvement in the labour group climate (work environment)
39	1.8.d	Improvement in the labour group climate (rewards)
40	1.8.e	Improvement in the labour group climate (Education-training)
41	1.8.f	Improvement in the labour group climate (Information and communication)
42	1.8.g	Improvement in the labour group climate (Management by objectives)
43	1.8.h	Improvement in the labour group climate (work participation)
44	1.8.i	Improvement in the labour group climate (managerial style)
45	1.8.j	Improvement in the labour group climate (Promotion)
46	1.8.k	Improvement in the labour group climate (firm integration )
47	1.9.a	Improvement in learning (physical space)
48	1.9.b	Improvement in learning (virtual space)
49	1.9.c	Improvement in learning (communities of practice)
50	1.9.d	Improvement in learning ( <i>Peer assist techniques</i> )
51	1.9.e	Improvement in learning (war rooms)
52	1.9.f	Improvement in learning (lessons learned )
53	1.9.g	Improvement in learning (virtual community)
54	1.9.h	Improvement in learning (virtual university)
55	1.9.i	Improvement in learning (individual initiative)
<b>BLOQUE II</b>		
56	II.10.a	Improvement in the customer systems (DATA WAREHOUSE)
57	II.10.b	Improvement in the customer systems (DATA MINING)
58	II.10.c	Improvement in the customer systems (CRM)
59	II.11.a	Improvement in the organisation systems (EDI)
60	II.11.b	Improvement in the organisation systems (XML)
61	II.11.c	Improvement in the organisation systems (INTERNET/EXTRANET)
62	II.12	Improvement in the organisation systems (Improvement and/or creation of procedures manuals)
63	II.13	Improvement and / or adoption of best practices
64	II.14	Improvement in processes efficiency
65	II.15	Improvement in the equipments
66	II.16.a	Efficiency in the corporate university ( physical space)
67	II.16.b	Efficiency in the corporate university (virtual spaces)
68	II.16.c	Efficiency in the corporate university (Communities of practice)
69	II.16.d	Efficiency in the corporate university ( <i>Peer assist techniques</i> )
70	II.16.e	Efficiency in the corporate university (war frameworks)
71	II.16.f	Efficiency in the corporate university (Lessons learned)
72	II.16.g	Efficiency in the corporate university (virtual communities)
73	II.16.h	Efficiency in the corporate university (virtual university)
74	II.17	Efficiency in the corporate university (improve in marketing new products)
<b>BLOQUE III</b>		
75	III.18.a	Organisational knowledge and influence in customers (customers DBMS)
76	III.18.b	Organisational knowledge and influence in customers (knowing of new customers)
77	III.18.c	Organisational knowledge and influence in customers (Profile identification)
78	III.18.d	Organisational knowledge and influence in customers (loyalty programmes)
79	III.18.e	Organisational knowledge and influence in customers ( <i>up-selling programmes</i> )
80	III.18.f	Organisational knowledge and influence in customers ( <i>cross-selling programmes</i> )
81	III.19.a	CUSTOMER SATISFACTION (satisfaction programmes )
82	III.19.b	CUSTOMER SATISFACTION (identification of standards programmes)
83	III.19.c	CUSTOMER SATISFACTION (service improvement programmes)
84	III.20.a	Collaboration agreements (AFM)

85	III.20.b	Collaboration agreements (OER)
86	III.20.c	Collaboration agreements (CRP)
87	III.20.d	Collaboration agreements (CPFR)
88	III.20.e	Collaboration agreements (ASN)
89	III.20.f	Collaboration agreements (CATEGORY MANAGEMENT)
90	III.20.g	Collaboration agreements (MULTICOLLECTION)
91	III.20.h	Collaboration agreements ( <i>CROSS-DOCKING</i> )
92	III.21.a	Participation in practices ECR (AFM)
93	III.21.b	Participation in practices ECR (OER)
94	III.21.c	Participation in practices ECR (CRP)
95	III.21.d	Participation in practices ECR (CPFR)
96	III.21.e	Participation in practices ECR (ASN)
97	III.21.f	Participation in practices ECR (CATEGORY MANAGEMENT)
98	III.21.g	Participation in practices ECR (MULTICOLLECTION)
99	III.21.h	Participation in practices ECR ( <i>CROSS-DOCKING</i> )
100	III.22.a	<i>STAKEHOLDERS</i> satisfaction (Providers)
101	III.22.b	<i>STAKEHOLDERS</i> satisfaction (Customers)
102	III.22.c	<i>STAKEHOLDERS</i> satisfaction (Stakeholders)
103	III.22.d	<i>STAKEHOLDERS</i> satisfaction (Society/Public Opinion)
104	III.23.a	Increase in the use of EPI (To consumers)
105	III.23.b	Increase in the use of EPI (To providers)
106	III.23.c	Increase in the use of EPI (To selling points)
107	III.24.a	EPI customer satisfaction (Consumers)
108	III.24.b	EPI customer satisfaction (Providers)
109	III.24.c	EPI customer satisfaction (Selling points)
110	III.25.a	Efficiency of CRM-Cooperative (General)
111	III.25.b	Efficiency of CRM-Cooperative (SFA)
112	III.26.a	B2B practices efficiency
113	III.26.b	B2C practices efficiency
<b>BLOQUE IV</b>		
114	IV.27.a	Importance of the product information to SC (in design)
115	IV.27.b	Importance of the product information to SC (in innovation)
116	IV.27.c	Importance of the product information to SC (in new products)
117	IV.28.a	Importance of the product information to Consumer (in design)
118	IV.28.b	Importance of the product information to Consumer (in innovation)
119	IV.28.c	Importance of the product information to Consumer (in new products)
120	IV.29.a	Difference between the information on product offered and expected to SC (in design)
121	IV.29.b	Difference between the information on product offered and expected to SC (in innovation)
122	IV.29.c	Difference between the information on product offered and expected to SC (in new products)
123	IV.30.a	Difference between the information on product offered and expected to consumer (in design)
124	IV.30.b	Difference between the information on product offered and expected to consumer (in innovation)
125	IV.30.c	Difference between the information on product offered and expected to consumer (in new products)
126	IV.31.a	Improve of the product information to SC (in design)
127	IV.31.b	Improve of the product information to SC (in innovation)
128	IV.31.c	Improve of the product information to SC (in new products)
129	IV.32.a	Improve of the product information to consumer (in design)
130	IV.32.b	Improve of the product information to consumer (in innovation)
131	IV.32.c	Improve of the product information to consumer (in new products)
132	IV.33.a	Improvement of the PERSONALISATION OF PRODUCT OR SERVICE (TO PROVIDERS)

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133	IV.33.b	Improvement of the PERSONALISATION OF PRODUCT OR SERVICE (TO CUSTOMERS)
<b>BLOQUE V</b>		
134	V.34.a	Improve for CUSTOMERS (Price)
135	V.34.b	Improve for CUSTOMERS (Portfolio)
136	V.34.c	Improve for CUSTOMERS (Promotions)
137	V.34.d	Improve for CUSTOMERS (EPI)
<b>BLOQUE VI</b>		
138	VI.35	COMPETITIVE ADVANTAGES in DISTRIBUTION by EFFICIENT AGREEMENTS
139	VI.36	COMPETITIVE ADVANTAGES in DISTRIBUTION by COMMUNICATION AGREEMENTS
<b>BLOQUE VII</b>		
140	VII.37.a	COMPETITIVE ADVANTAGES in PROVIDERS by ECR practices (AFM)
141	VII.37.b	COMPETITIVE ADVANTAGES in PROVIDERS by ECR practices (OER)
142	VII.37.c	COMPETITIVE ADVANTAGES in PROVIDERS by ECR practices (CRP)
143	VII.37.d	COMPETITIVE ADVANTAGES in PROVIDERS by ECR practices (CPFR)
144	VII.37.e	COMPETITIVE ADVANTAGES in PROVIDERS by ECR practices (ASN)
145	VII.37.f	COMPETITIVE ADVANTAGES in PROVIDERS by ECR practices (GESTIÓN POR CATEGORÍAS)
<b>BLOQUE VIII</b>		
146	VIII.38	Interest in promoting an ELECTRONIC MARKET
147	VIII.39	Some other ECRSGA ?
<b>BLOQUE IX</b>		
148	IX.40.a	<i>Conceptos asociados</i> como FACILITADORES ECR (BPR)
149	IX.40.b	<i>Conceptos asociados</i> como FACILITADORES ECR (ABC)
150	IX.40.c	<i>Conceptos asociados</i> como FACILITADORES ECR (TQM)
151	IX.40.d	<i>Conceptos asociados</i> como FACILITADORES ECR (KAIZEN)
152	IX.40.e	<i>Conceptos asociados</i> como FACILITADORES ECR (MRP)
153	IX.40.f	<i>Conceptos asociados</i> como FACILITADORES ECR (DRP)
154	IX.40.g	<i>Conceptos asociados</i> como FACILITADORES ECR (JIT)
155	IX.40.h	<i>Conceptos asociados</i> como FACILITADORES ECR (TRADE MK)
156	IX.40.i	<i>Conceptos asociados</i> como FACILITADORES ECR (BENCH)
157	IX.40.j	<i>Conceptos asociados</i> como FACILITADORES ECR (SISTEMAS DE INFORMACIÓN)
158	IX.40.k	<i>Conceptos asociados</i> como FACILITADORES ECR (NUEVAS TECNOLOGÍAS)
159	IX.40.l	<i>Conceptos asociados</i> como FACILITADORES ECR (OUTSOURCING)
160	IX.40.m	<i>Conceptos asociados</i> como FACILITADORES ECR (PARTNERSHIP SOURCING)
161	IX.40.n	<i>Conceptos asociados</i> como FACILITADORES ECR (INGENIERÍA CONCURRENTE)
162	IX.40.o	<i>Conceptos asociados</i> como FACILITADORES ECR (ILS)
163	IX.41.a	ECR CRITICAL SUCCESS FACTORS (Managerial Compromise)
164	IX.41.b	ECR CRITICAL SUCCESS FACTORS (Leadership)
165	IX.41.c	ECR CRITICAL SUCCESS FACTORS (Multi task team)
166	IX.41.d	ECR CRITICAL SUCCESS FACTORS (Critical mass needed)
167	IX.41.e	ECR CRITICAL SUCCESS FACTORS (participant's compromise)
168	IX.41.f	ECR CRITICAL SUCCESS FACTORS (information and communication systems)
169	IX.41.g	ECR CRITICAL SUCCESS FACTORS (New technologies)
170	IX.41.h	ECR CRITICAL SUCCESS FACTORS (Individual learning capacity)
171	IX.41.i	ECR CRITICAL SUCCESS FACTORS (Collective learning capacity)
172	IX.41.j	ECR CRITICAL SUCCESS FACTORS (Organisational capacity with process orientation)
173	IX.41.k	ECR CRITICAL SUCCESS FACTORS (Training programs)
174	IX.41.l	ECR CRITICAL SUCCESS FACTORS (Actions for improvement)
175	IX.41.m	ECR CRITICAL SUCCESS FACTORS (Labour climate)
176	IX.41.n	ECR CRITICAL SUCCESS FACTORS (personal initiative)

## Biographies



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