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Sub-Saharan African Countries' Dependence on the External Inflation: Empirical Evidence Using Copulas

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Abstract

The purpose of this study is to estimate the dependence between the inflation, given by the Consumer Price Index (CPI), in part of the Sub-Saharan African (SSA) countries with the CPI observed in the Euro Monetary Zone (EMZ) countries. To achieve this goal, we adopted the empirical methodology of Copulas, which was used in the analysis of the CPI, in bivariate models context. The results were controlled by the countries which adopted fixed and flexible exchange rate regimes. They suggest that the CPI in the sampled countries which adopted fixed exchange rate regimes, as Sao Tome and Principe, Benin, the countries of the West African Economic and the Monetary Union (WAEMU), Burkina Faso, Ivory Coast and Togo had more significant dependence relationship with the Euro. On the other hand, the countries which adopted flexible exchange rate regimes as Cape Verde, Burkina Faso, Guinea-Bissau, Mali, Senegal and Togo presented dependence on upper tail of the distribution, i.e., for the periods of increasing in the CPI. Maybe, it means that those countries had inelastic demands for tradable goods coming from the EMZ countries. We conclude that the imported inflation is an important issue to be considered by the policy makers of developing countries such as the studied, mainly for those which adopted fixed regimes, eventually change to flexible exchange regimes.

Keywords: inflation, dependence, Sub-Saharan African countries, European Monetary Zone, Copulas

1. Introduction

With the financial liberalization and the increasing integration among countries and economical blocs, the financial crises that occurred in the last decades, characterized by strong production decreases, consumption, and capital flows, increased. This has generated, specially from economically fragile countries, greater attention in the designing of the monetary and exchange rate policies (Fornaro, 2015). In this research, we investigated the price dependence of a sample of the Sub-Saharan African (SSA) countries in regard to the Euro, considering their exchange rate policy.

According to Toulaboe and Terry (2013) the interest of the countries on the exchange rate regimes lies in its importance for the economic performance, with an emphasis on inflation, the Consumer Price Index (CPI), and its impacts on the growth of activities and other macroeconomic variables. The aforementioned authors highlighted that many industrialized countries adopted the Inflation Targeting Regime (IT), as a tool to ensure price stability, opting for flexible exchange rate regime to increase their policies freedom degrees. However, for some small developing countries, that had a recent history of colonization and closer trade partnerships, the exchange rate regime to control the CPI is more delicate.

The literature, as Friedman (1953), Quirk (1994), Obstfeld and Rogoff (1995), Husain, Mody and Rogoff (2005) and Toulaboe and Terry (2013), pointed out the importance to measure the determinants and effects of the adoption of a policy with a fixed exchange rate regime. Amongst the benefits of this policy, the greater discipline and transparency of the policy makers, the reduction of the costs of transactions and of the inflation expectations, as well, as the consequent macroeconomic stability, can be emphasized. Still, some small open economies with a relative degree of openness, when adopting the fixed exchange rate regime, tend to import the inflation of its main trade partners (Jalles, 2010).

In the countries of the Latin America (LA), consonant to Rodriguez (2016), the action and reputation of the public institutions are determinant aspects on the choice of the exchange rate regime. Among such countries, those with

democratic institutions and stable political contexts are associated to flexible exchange rate regimes, while the others tend to adopt fixed regimes. Chiu and Willett (2009) argue that regardless of the regime, if the political institutions are weak, the probabilities of occurring an exchange rate crisis increase, and that the adoption of a fixed regime without more solid institutions, may be another source of instabilities. In the same direction, Carmignani, Colombo and Trivelli (2008) expose that the choice of the exchange rate regime is sensitive to the political instabilities.

Based in this context, we estimated the relations of dependence of the CPI of selected SSA countries in relation to the CPI observed in the countries of the European Monetary Zone (EMZ). Thus, using the pairs of stochastic processes, we controlled the results by their exchange rate regimes. Precisely, countries of the Central African Economic and Monetary Community (CEMAC), the West African Economic and Monetary Union (WAEMU), Cape Verde and Sao Tome and Principe were sampled. They were selected because such countries from the CEMAC and the WAEMU benefit from an Exchange Rate Cooperation Agreement with France, while Cape Verde benefits from an agreement with Portugal, since 1998.

With the establishment of the EMZ, since January 1st 1999, the Euro starts to be rated in the currency of each participating country, at a fixed exchange rate, allowing the access of these countries to all of the Euro space. We also report that in Sao Tome and Principe, the Exchange Rate Cooperation Agreement came into effect in January 1st 2010. Therefore, based on the process of dependence of the CPI resulted by the estimated Copulas, it will be possible for these countries, possibly to review their exchange rate policies, as well as their agreements.

We used a model to study the relations between the CPI dynamics of the sampled countries that capture the changes in the joint distribution function of the pairs of inflation processes. This way, we waived the use of the models with estimators conditioned to the average, correlation measures, common trends and cointegration, or the analysis of the Impulse Response Functions (IRFs). Instead, we adopt the Copula model, proposed by Sklar (1959), which has been widely used in the analysis of the CPI dynamics, as described in Zhang and Jiao (2012), Moreira, Chaiboonsri and Chaitip (2013), Silva (2014) and Antunes (2015).

The use of the linear correlation to verify how much the CPI of the studied countries are dependent on the imported inflation of the countries of the EMZ, would possibly (i) ignore the presence of a nonlinear dependence (ii) estimate it conditioned to the average, i.e., a localization measure could not reveal information about the tails' behavior of the CPI distributions. Furthermore, to use such approaches, we need to check the probabilities density functions of the variables, if they are homoscedastic, if they are correct specified in the model, as well, as if there is normality of the residues.

In this perspective, the use of the methodology of Copulas lead to some advances, if we compare to the other methods, previously mentioned. For instance, there is no need of any hypothesis about the distribution of the variables, additionally, it could capture the presence of nonlinear associations, without any prior information about these relations. With this effort, our main contribution is providing empirical evidence of inflation dependence for the selected SSA countries, in order to evaluate the exchange rate policy for each of them.

For the reduced dependencies between the CPI observed among selected SSA countries and the registered in the EMZ, it is possible that a change from the fixed regime linked to the Euro to a flexible regime, could improve the efficiency of the economic policies. Alternatively, for more elastic dependencies observed for those countries in which the regime is flexible, perhaps a change to a fixed regime can be more appropriate, in terms of the inflation control. This strategy will allow consider the countries, assuming as a control variable the type of exchange practiced in each case, seeking to better refinements of the findings of the study.

This paper is divided in five sections, besides this brief introduction. In the second section, the theoretical relations regarding the determinants of the CPI with emphasis on the imported inflation, will be presented. In the third section, the empirical methodology of Copulas is detailed. The fourth section will point out the sample planning and processing. In the fifth section, the obtained results will be displayed. At last, in the sixth section, the key findings are discussed, and in the seventh, conclusions are addressed.

2. Sub-Saharan African Countries, Trade and Imported Inflation

The determinants of the CPI of goods and imported products by the African countries have been widely studied. Blavy (2004), Moriyama (2008), Olubusoye and Oyaromade (2008), Klein and Kyei (2009), Ndanshau (2010), Carvalho, Massala and Santos (2012), and Durevall and Sj (2012) analyzed the cases of Angola, Ethiopia, Nigeria, Kenya, Sudan and Tanzania. Regarding Cape Verde, there are Delgado and Santos (2006), Jalles (2010) and Oliveira, Silva and Lima (2014), whose analyzed the determinants of inflation with attention to the imported causes. They assume Portugal's CPI as a proxy, because since Cape Verde's independence, Portugal is its main economic partner. The results found in the researches aforementioned denote that the CPI of Portugal can explain the CPI of Cape Verde.

For the countries of the WAEMU, Toe and Lien (2007) and Toe (2011) used the CPI observed in France and other countries from the Eurozone, as a proxy to the external inflation, to explain domestic prices dynamics. They found that such variables contribute to explain the CPI of the countries members of this region. Kinda (2011) sought to verify the sources of inflation in Chad and found that increases in the external prices would lead to the acceleration in the domestic prices. In the case of Sao tome and Principe, no studies were found regarding the external inflation as the source of the domestic prices variation.

According to Saleem *et al.* (2014) the intensification of the financial and trade relations among small economies and the rest of the world, lead the internal prices to respond more intensely to the variation of the external prices. In this sense, Dornbusch (2001) and Husain *et al.* (2005) emphasized that in the case of small developing countries, lower CPI can be associated to fixed exchange rate regimes. Moreover, Fischer (1981), Smal (1998), Guerron-Quintana (2011) and Araújo (2015) point that high CPI lead to the malfunctioning of several markets, reducing the level of social welfare in the form of income concentration, making the formation of expectations difficult, decreasing the level of investments, causing disturbances in the Balance of Payments, among other problems.

Sissoko and Dibooglu (2006) argue that regimes with a less flexible exchange rate would be more vulnerable to external crises, given a less elastic reaction of the policy maker, in order to reduce the effects of external shocks, allowing the exchange rate to depreciate. Thus, the costs would be greater for countries more integrated, such as the case of economic blocs of the EMZ and the WAEMU, for example. Further, countries engaged in trade expansion objectives with their partners, without totally losing their fiscal and monetary policy activism, may consider the fixed exchange regime as an alternative to full monetary integration. In terms of the SSA countries, there are important characteristics considered in this research, exposed by periods in Table 1:

Table 1. Characteristics of the SSA countries

Country	1991-1995	1996-2000	2001-2005	2006-2010	2011-2014	2011-2014
GDP per capita (US dollars)						
Benin	369.39		376.74	491.45		849.15
B. Faso	294.79		245.21	322.54		696.62
C. Verde	1115.04		1365.50	1838.26		3615.88
I. Coast	804.53		781.50	829.32		1315.45
Mali	385.85		343.77	420.40		880.00
Niger	247.48		186.78	213.93		446.66
Senegal	636.19		525.34	629.71		1056.29
Togo	389.60		336.77	329.35		607.28
CPI (%)						
Benin	12.29		3.81	2.83		2.34
B. Faso	6.72		2.54	3.02		1.71
C. Verde	7.72		4.18	1.06		2.07
I. Coast	9.60		3.36	3.22		2.31
Mali	6.19		1.58	2.44		2.16
Niger	8.33		2.69	2.61		1.19
Senegal	7.54		1.44	1.53		1.11
Togo	10.57		2.76	2.65		2.04
Public Debt (% GDP)						
Benin	-		-	38.44		28.25
B. Faso	-		-	45.80		28.85
C. Verde	-		81.09	82.58		95.43
I. Coast	-		107.59	84.43		53.65
Mali	-		-	49.28		26.62
Niger	-		85.25	89.77		28.68
Senegal	-		-	57.37		46.17
Togo	-		-	110.52		51.78
Degree of Economic Opening (DEO)						
Benin	58.33		59.10	49.93		65.31
B. Faso	34.35		36.95	33.33		63.56
C. Verde	74.86		82.37	99.59		98.49
I. Coast	63.68		75.85	81.44		85.43
Mali	51.18		53.03	57.22		57.02
Niger	37.40		42.52	43.32		62.95
Senegal	59.15		62.17	67.14		75.29
Togo	65.84		74.81	93.10		100.00

Source: Authors' elaboration.

The Table 1 report that Cape Verde is the country with higher GDP per capita of US\$3,615.88 per year, almost three times of the observed in Ivory Coast, the second place in order of magnitude. Cape Verde is also the country with higher degree of economic opening, just near 100%, which considering the average for the countries of the WAEMU, is around 75% for the period of 2011 to 2014. Otherwise, is also possible to observe that Cape Verde figure with the higher public debt as a ratio of the GDP (95.43%). Not by coincidence, Cape Verde also holds higher standards of inflation. As general, the path higher public debts are accompanied by high CPI.

On the other hand, as described by Fischer (1981), the costs of inflation control depend on its sources, either of the institutional structure, how expectations are formed, if inertial behavior is observed, for example, or arise on the supply side of the economy, due to seasonalities patterns of some goods and services. Additionally, the anti-inflationary benefit depends on the stability, credibility and reputation of the monetary authority. Toulaboe and Terry (2013) point that these conditions are less costly in economies with solid institutions. In this direction, studies about the determinants of the CPI and its control have been evolving to add to the internal factors, the external ones, which started to be incorporated in the analysis of the inflationary dynamics.

Based on the model of Harberger (1963), which considers the monetary base and the output as determinants factors of inflation, Hanson (1985), incorporated the costs of import inflation, in order to verify how the price variations of the imported goods affect the CPI, process that is called imported inflation. In the same way, Kim (2008) developed a model for an open economy, in which the CPI can derive from three main sources: the monetary, the wages and the imported inflation. The imported inflation, our main research subject, resulting from changes in the exchange rate and from external prices. In other words, the CPI resulted of the transmission of import prices in foreign currency. Kim (2008) developed a model by considering that the general price level (p_t) is given by a weighted average of the tradable goods (p_t^t) and of the non-tradable goods (p_t^n). For better comprehension of the model:

$$p_t = \theta p_t^t + (1 - \theta) p_t^n \quad (1)$$

with $0 < \theta < 1$. The price of the tradable goods is determined by the global market, and can be represented by:

$$p_t^t = \varphi e_t + k p_t^f \quad (2)$$

in which e_t and p_t^f are, respectively, the exchange rate and the external prices, which are the determinant factors of the imported inflation. By the equation (2) the prices of the tradable goods increase because of the depreciation of the exchange rate, or when the prices of the imported goods increase. Regarding the prices of non-tradable goods, the model assumes that they are determined in the domestic monetary market, shifting the demand function of the economy. The equation (3) illustrates this relation:

$$p_t^t = \eta [m_t^d - (m_t^s - p_t)] \quad (3)$$

where η is a factor that shows the relation between the global demand of economy and the demand for non-tradable goods. According to the previous equation, the prices are defined by money market equilibrium condition, in which the real supply and demand for money ($m_t^s - p_t$) and ($m_t^d - p_t^n$) respectively, must be equal. In this model the demand for non-tradable goods are a function of wages, goods and the interest rates. Consequently, this model (i) incorporates the monetary inflation that occur when the supply of money is higher than the real output, as well, as (ii) the wage inflation that derives from the increases of wages, what implies in raising the demand for goods and on the unitary costs of production, which, ceteris paribus, translates into a rise the CPI.

However, here we considering that in the WAEMU the variables money supply, interest rates and by consequence, the wages, are stable. This means that the CPI is given mainly by the imported goods. In this sense, the parameter η is one of the channels of the studied economies to external shocks. We can identify two distinct models of literature that study the impact of the imported goods on the CPI. There are models such as Gali and Monacelli (2005), that consider the imported goods as consumer goods, and there are the models developed by McCallum and Nelson (2000), that consider the importation as production inputs, with the imported goods having an indirect effect on the CPI.

We highlight that the relation between domestic and external inflation originate from trade flows and factors between borders, which motivates different models concerning the CPI and the exchange rate regime relations. They distinguish giving to some indicators, in terms of its participations on the global trade and its degrees of development. As stated to Poirson (2001), when there is a dominant trade partner, a fixed exchange rate regime is adopted. In opposite, when the economy aims to diversify the production and exportation, it must adopt a flexible regime.

Facing the presented facts, this research aims to estimate the dependencies between p_t^t and p_t^f in the equation (2), however more than estimate the elasticities, we proposed to control the sample for the type of exchange rate policy e_t adopted in each country. As a result, was possible to identify which exchange rate policy is the most appropriate for each country, in agreement to the CPI. This empirical evidence consists of a robust measure function, which, as mentioned, considers information on the entire joint distribution of the studied CPI. Otherwise, for the cases of lower dependencies between these prices, the exchange policy could be revised to a flexible regime. Our contribution seems to be interesting, even than comparing with the approach of the CPI as a stable parameter (η) (Kim, 2008), by using structural modeling of linear relationships, which parameters are conditioned to average of the CPI observed.

3. Methodology

In order to verify the dependence between the CPI of the selected countries, in relation to the observed in the Eurozone, we used the Copula model. It allows to estimate the joint distribution between two or more random variables, as a function of its marginals. According to Nelsen (2006), the Copulas are functions used to describe dependence of multivariate joint distribution, which can be written in terms of its own univariate marginal distribution functions. The application of Copulas is based on the Sklar (1959) theorem. Formally, it exposed that if H is a joint distribution function with marginals F and G , there is a Copula C , given that x and y belong to R . Thus, we can write:

$$H(x,y)=C(F(x), G(y)) \quad (4)$$

Therefore, the estimation of Copulas, in substitution of estimate η by using linear models, consists in finding a parametric Copula that better represents the bivariate probability distribution function H . Given that the functional form of $F(x)$ and $G(x)$ are unknown, the procedure of pseudo-observations is to estimate a diversity of parametric bivariate Copulas, in order to define which of them better characterize the relation of the CPI dependence of the selected SSA countries', with the observed in the countries of the Eurozone.

More than create independent multivariate probability distribution functions of the format of the marginal distributions, through the theory of Copulas, it is possible to estimate the dependence of the variables. Commonly, the linear correlation is also used for such purpose. Although, this method is not indicated when there is no normality of the distribution of the observations, or when asymmetry or distributions with heavy tails are detected, as well, as when the dependence follows a nonlinear dynamic.

Embrechts, McNeil and Straumann (2002) emphasize that a correlation of two variables equal to zero do not mean independence, in case both of them are not normally distributed. Hence, given the diverse statistical characteristics from the used data, we estimate different Copulas, seeking for better fit of the different functional forms. There is a considerable diversity of Copulas that present specific dependence structure, among which we can highlight the Archimedean, the elliptical and the extreme-value. Amid the characteristics of an Archimedean Copula, there is the possibility of assuming the asymmetric tail dependence, which makes it widely attractive to applications in the estimation of losses in the financial markets, as investigated in Zhang and Jiao (2012). With similar purpose, we also have the Copulas of Frank, Clayton, Gumbel, Ali-Mikhail-Haq (AMH) and Joe.

The elliptical Copula have many properties as the multivariate Gaussian distribution, that fits the full modeling multivariate extremes and other forms of non-normal dependencies. We can also report the Gaussian and the t -student's Copula. Finally, extreme-value Copula have as a main attribute the possibility of modeling the extreme-value dependence, i.e., the cases of concentration of the observations in the distributions' tails. This way, they are useful to modeling the financial markets events. In this category there are Galambos, Husler-Reiss, Tawn and t -Extreme Value (T-EV) Copulas. The Table 2 denote the differences of the Copulas used.

Table 2. Parametric Copulas

Clayton	$C(u_1, u_2; \theta) = (u_1^{-\theta} + u_2^{-\theta} - 1)^{-1/\theta}$
Frank	$C(u_1, u_2; \theta) = -\theta^{-1} \log \left\{ 1 + \frac{(e^{-\theta u_1} - 1)(e^{-\theta u_2} - 1)}{e^{-\theta} - 1} \right\}$
Gumbel	$C(u_1, u_2; \theta) = \exp \left(-((-\log u_1)^\theta + (-\log u_2)^\theta)^{1/\theta} \right)$
AMH	$C(u_1, u_2; \theta) = \frac{u_1 u_2}{1 - \theta(1 - u_1)(1 - u_2)}$
Joe	$C(u_1, u_2; \theta) = 1 - [(1 - u_1)^\theta + (1 - u_2)^\theta - (1 - u_1)^\theta(1 - u_2)^\theta]^{1/\theta}$
Gaussian	$C(u_1, u_2; \theta) = \int_{-\infty}^{\Phi^{-1}(u_1)} \int_{-\infty}^{\Phi^{-1}(u_2)} \frac{1}{2\pi(1 - \theta^2)^{1/2}} \times \left\{ \frac{-(s^2 - 2\theta st + t^2)}{2(1 - \theta^2)} \right\} ds dt$
	$C(u_1, u_2; \theta, v) = \int_{-\infty}^{t_v^{-1}(u_1)} \int_{-\infty}^{t_v^{-1}(u_2)} \frac{1}{2\pi(1 - \theta^2)^{1/2}} \left\{ 1 + \frac{(s^2 - 2\theta st + t^2)}{v(1 - \theta^2)} \right\}^{-(v+2)/2}$
T-student	
Galambos	$C(u_1, u_2; \theta) = u_1 u_2 \exp \left(((-\log u_1)^{-\theta} + (-\log u_2)^{-\theta})^{-1/\theta} \right)$
Husler-Reiss	$C(u_1, u_2; \theta) = \exp \left\{ -\tilde{u}_1 \Phi \left(\theta^{-1} + \frac{1}{2} \theta \ln \left(\frac{\tilde{u}_2}{\tilde{u}_1} \right) \right) - \tilde{u}_2 \Phi \left(\theta^{-1} + \frac{1}{2} \theta \ln \left(\frac{\tilde{u}_1}{\tilde{u}_2} \right) \right) \right\}$
Tawn	$C(u_1, u_2; \theta) = u_1 u_2 \exp \left\{ -\theta \frac{\log u_1 \log u_2}{\log(u_1 u_2)} \right\}$
	$C(u_1, u_2; \theta, v) = \exp \left(\log(u_1 u_2) A_{\theta, v} \left(\frac{\log(u_1)}{\log(u_1 u_2)} \right) \right),$
	where:
T-EV	$A_{\theta, v}(w) = w t_{v+1} \left(\frac{\left(\frac{w}{1-w} \right)^{1/v} - \theta}{\sqrt{1 - \theta^2}} \sqrt{v+1} \right) + (1-w) t_{v+1} \left(\frac{\left(\frac{1-w}{w} \right)^{1/v} - \theta}{\sqrt{1 - \theta^2}} \sqrt{v+1} \right)$
Plackett	$C(u_1, u_2; \theta) = \frac{[1 + (\theta - 1)(u_1 + u_2)] - \sqrt{[1 + (\theta - 1)(u_1 + u_2)]^2 - 4u_1 u_2 \theta(\theta - 1)}}{2(\theta - 1)}$

Source: Authors' elaboration.

The models of Copulas given by the Spearman's Rho and Kendall's Tau are the most popular. As stated by Nelsen (2006), both are measures based on the positions or rankings of the variables and not on its effective values. This way, with the objective of modeling the dependence of the inferior and superior tails of the respective distribution function of the variables, we estimated the Tail Index. The functional forms can be seen in the Table 3:

Table 3. Dependence Measures

Spearman's Rho	Kendall's Tau	Tail Index Inferior	Tail Index Superior
$\rho_{X,Y} = 12 \iint_{I^2} C(u, v) dudv - 3.$	$\tau_{X,Y} = 4 \iint_{I^2} C(u, v) dC(u, v) - 1.$	$\lambda_L = \lim_{v \rightarrow 0^+} \frac{C(v, v)}{v}$	$\lambda_U = \lim_{v \rightarrow 1^-} \frac{S(v, v)}{1 - v}$

Source: Authors' elaboration from Nelsen (2006).

The Spearman's Rho and the Kendall's Tau are nonparametric measures of dependence that consider the degree of general association between the variables, which vary between [-1, 1], while the Tail Index consider the concentration of dependence in the inferior and superior tails, which vary between [0, 1]. However, before the application of these tests, we must estimate the test of independence of Genest and Remillard (2004). It assumes as the null hypothesis that the variables present independence between themselves. Formally, the statistic of the test is given by:

$$T_{A,n}^S = \frac{1}{n} \sum_{i=1}^{n-p+1} \sum_{k=1}^{n-p+1} \prod_{j \in A} \left\{ \frac{2n+1}{6n} + \frac{R_{i+j-1}(R_{i+j-1}-1)}{2n(n+1)} + \frac{R_{k+j-1}(R_{k+j-1}-1)}{2n(n+1)} - \frac{\max(R_{i+j-1}, R_{k+j-1})}{n+1} \right\} \quad (5)$$

It is common after the Copula estimation to verify its fit, in order to avoid wrong considerations about the relations of dependence. Genest, Remillard and Beaudoin (2009) developed an adjustment test named as Goodness-of-fit, which consists in comparing the parametric Copulas with the empirical ones, under the null hypothesis that the chosen one is appropriate to model the relation of dependence. The Goodness-of-fit test is based on the following empirical process:

$$C_n(u) = \sqrt{N(C_n - C_{\theta_n}(u))} \quad u \in [0,1]^d \quad (6)$$

where C_{θ_n} represents the parametric Copula and C_n the empirical one, defined by:

$$C_n(u) = \frac{1}{n} \sum_{i=1}^n 1(U_{i1} \leq u_1, \dots, U_{id} \leq u_d) \quad (7)$$

The statistic of the Goodness-of-fit test is given by:

$$S_n = \int_{[0,1]^d} C_n(u)^2 dC_n(u) \quad (8)$$

4. Sample Design and Data Processing

For this study, we selected the CPI observed in the countries of the Eurozone and the SSA countries, which adopted fixed exchange rate regimes with the Euro, as well as some countries that have flexible exchange rate regimes. They were selected and organized as illustrated in the Table 4. For all of the sampled countries, the data is regarding the period until December 2015.

Table 4. Countries characteristics and data sources

Country	Source	Starting periods	Fixed Regime
C. Verde	Bank of Cape Verde	Jan/98	Yes
S. T. Principe	Banco de Sao Tome and Principe	Jan/09	Yes
Benin	Banque Centrale des Etats de l'Afrique de l'Ouest	Jan/98	Yes
B. Faso	Banque Centrale des Etats de l'Afrique de l'Ouest	Jan/98	Yes
I. Coast	Banque Centrale des Etats de l'Afrique de l'Ouest	Jan/98	Yes
G. Bissau	Banque Centrale des Etats de l'Afrique de l'Ouest	Jul/02	Yes
Mali	Banque Centrale des Etats de l'Afrique de l'Ouest	Jan/98	Yes
Niger	Banque Centrale des Etats de l'Afrique de l'Ouest	Jan/98	Yes
Senegal	Banque Centrale des Etats de l'Afrique de l'Ouest	Jan/98	Yes
Togo	Banque Centrale des Etats de l'Afrique de l'Ouest	Jan/98	Yes
Chad	Institut National de la Statistique, des Etudes Economiques et Demographiques	fev/07	Yes
Rwanda	National Institute of Statistics of Rwanda	Jan/98	No
Ghana	Ghana Statistical Service	Jan/98	No
Mauritius	Statistics Mauritius	Jan/98	No
Malawi	Reserve Bank of Malawi	Jan/01	No
South Africa	South African Reserve Bank	Jan/02	No
Nigeria	Central Bank of Nigeria	mar/02	No
Seychelles	National Bureau of Statistics	Jan/07	No
EMZ	European Central Bank	Jan/92	-

Source: Authors' elaboration.

As mentioned, in the search for more robust estimations of parametric Copulas we controlled the results for the exchange rate regimes (fixed and flexible) and for the rule periods of international agreements in the selected SSA countries. Therefore, the time series used were also organized in three different subsamples, considering the (a) monthly frequency, (b) quarterly frequency and (c) annualized frequency. All of them include the period after January 1999, which mark the dates in which the countries adopted its exchange rate regimes. In this sense, it is possible that are differences in the time series data used in the estimations of the models (a) to (c), regard to the number of observations. We also report in the Table 5 that in unitary root tests (Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), Kwiatkowski, Phillips, Schmidt and Shin (KPSS)), the stationarity was not rejected in most part of the CPI series, considering the confidence level of 5%, i.e., they are I(0).

Table 5. Estimated unitary root tests for the CPI for the countries

Fixed Regimes												
	EMZ	Benin	B. Faso	C. Verde	Chad	G. Bissau	I. Coast	Mali	Niger	STP	Senegal	Togo
(a) Monthly Sample												
ADF	-4.73*	-6.61*	-7.34*	-6.16*	-5.77*	-7.03*	-8.26*	-8.82*	-7.41*	-4.36**	-7.35*	-6.09*
PP	-148.28*	-189.20*	-199.68*	-178.52*	-84.73*	-140.09*	-157.97*	-134.63*	-138.65*	-55.71*	-134.70*	-153.93*
KPS S	0.26*	0.06*	0.05*	0.15*	0.10*	0.14*	0.08*	0.03*	0.03*	1.63	0.04*	0.04*
(b) Quarterly Sample												
ADF	-3.27**	-4.30*	-4.63*	-3.63**	-1.62	-2.95	-4.70*	-3.49	-3.87**	-6.72*	-3.47	-4.15*
PP	-103.76*	-66.48*	-52.42*	-45.23*	-55.09*	-33.05*	-60.11*	-53.41*	-45.55*	0.69	-43.15*	-43.67*
KPS S	0.45	0.11*	0.05*	0.14*	0.43**	0.11*	0.12*	0.05*	0.03*	-28.05*	0.04*	0.06*
(c) Annualized Sample												
ADF	-3.32**	-3.67**	-4.44*	-4.003*	-2.13	-2.83	-4.37*	-3.70**	-4.47*	-3.32**	-3.34**	-4.99*
PP	-18.08**	-31.87*	-21.25*	-17.25	-13.53	-19.39**	-35.09*	-17	-19.2**	-1574	-17.96**	-24.86*
KPS S	0.906	0.27*	0.20*	0.27*	0.56	0.35*	0.30*	0.23*	0.17*	3.18	0.33*	0.20*
Flexible Regimes												
	Ghana	Malawi	Mauritius	Nigeria	Rwanda	Seychelles	S.Africa					
(a) Monthly Sample												
ADF	-5.95*	-5.59*	-4.86*	-137.62*	-4.40*	-3.77**	-4.11*					
PP	-220.34*	-203.74*	-146.91*	-6.40*	-118.35*	-93.12*	-96.11*					
KPS S	0.05*	0.03*	0.44**	0.13*	0.22*	0.61**	0.19*					
(b) Quarterly Sample												
ADF	-4.57*	4.35*	-2.40	-3.88**	-4.15*	-2.3	-3.17*					
PP	-41.82*	-52.38*	-50.61*	-41.64*	-37.72*	-18.91**	-20.26*					
KPS S	0.55*	0.05*	0.56**	0.16*	0.22*	0.52**	0.15*					
(c) Annualized Sample												
ADF	-4.52*	-3.57**	-2.54	-4.17**	-4.18*	-2.22	-3.89**					
PP	-13.29	-26.11*	-14.04	-21.45*	-13.40	-6.37	-13.02					
KPS S	1.39	0.35*	0.94	0.80	0.72	1.45	0.84					

Note: * 1% of significance; ** 5% of significance; *** 10% of significance.

Source: Authors' elaboration.

Also, the marginal functions of the variables were not filtered or modeled, in order not to change the autocorrelation and volatility structures, behaviors that we want to capture. Hence, the arguments of the bivariate Copulas with residues i.i.d. are less affected by any bias. Our purpose was also to understand the volatility of the dependence relations, since their patterns reveal important information of the supply side and of the demand side of the studied economies.

The descriptive statistics can be found in the Table 12 and Table 13, located in Appendix A. By analyzing such data, we notice that the CPI observed in the countries of the EMZ indicates a lower monthly average, if compared with the observed in the other studied countries, under different conditions. Alternatively, Sao Tome and Principe appears as the country with the greatest inflationary problem in whole period, with the CPI average of 0.72% per month. The countries of the WAEMU, Benin, Ivory Coast and Togo present the higher average of the CPI. Through the extreme values of the CPI, we observe that the monthly data demonstrate a greater kurtosis

among countries.

Consequently, the distributions are heavy-tailed, which are evidence high volatility of the CPI in these countries. We also can verify that the extreme negative values of the monthly inflation of the EMZ countries were more frequent. It was highlighted by the predominant negative asymmetry in the distribution observations. Finally, Jarque-Bera's statistics denote that in the majority of the cases, except for Senegal and Guinea-Bissau, the null hypothesis of normality was rejected, considering the significance level of 1%. This result reinforces the need of use methodologies that are not limited to normal distributions, linear relationships, or estimations conditioned to the average of the CPI observed.

According to the Table 12, we verify that the most significant differences between the subsamples of the quarterly (b) and monthly (a) frequency data were concentrated in their distributions. The quarterly CPI data were less asymmetric than the registered for the monthly subsamples. Through Jarque Bera's test we can see that the normality hypothesis of the distribution was not rejected when adopted the significance level of 5%, except for Ivory Coast. For the annualized CPI data (c), Jarque Bera's test suggested that only for Cape Verde, Ivory Coast, Mali, Senegal and Sao Tome and Principe it was not possible to reject the null hypothesis of normal distribution.

In contrast, the descriptive statistics of the CPI observed in the subsample of the countries with flexible exchange rate regimes are presented in the Table 13. The CPI in these countries were higher than the in the EMZ countries, as well as regarding the subsample of the countries that follow a fixed exchange rate regime. Among them, Ghana and Malawi evidence the highest inflationary average among studied countries. The distribution of the monthly data demonstrates positive asymmetry, which point out that the positive values of the CPI were more often, except for the case of the CPI of the EMZ countries.

The monthly CPI frequency data (a) for all of the studied countries, except for Malawi and South Africa, are heavy-tailed, which reveal the CPI volatility. Jarque Bera's test expose that only for these countries it is not possible to reject the null hypothesis of normality, considering the significance level of 1%. For the quarterly subsample (b), the non-normality of series was verified in the CPI of Rwanda, South Africa, Nigeria and Seychelles. Also, it was not possible to reject the normality hypothesis of the distribution of the annualized CPI data in South Africa's case.

5. Results

Before the tests of which Copulas best fits the CPI data, it is necessary to verify the presence of independence among them. This way, the independence test of Genest and Remillard (2004) was estimated, under the null hypothesis that the variables present a relation of independence between themselves. The statistics of this test are displayed in the Table 6.

Table 6. Test of independence

Country	(a) Monthly	(a-1) One lag	(b) Quarterly	(c) Annualized
Fixed Regime				
C. Verde	0.039	0.078**	0.038	0.334*
S. T. Principe	0.021	0.028	0.106*	0.482*
Benin	0.029	0.374*	0.179*	0.847*
B. Faso	0.019	0.155*	0.121*	0.745*
I. Coast	0.044	0.153*	0.075**	0.793*
G. Bissau	0.024	0.020	0.035	
Mali	0.031	0.032	0.039	0.628*
Niger	0.023	0.089**	0.058***	0.502*
Senegal	0.037	0.093*	0.081**	0.711*
Togo	0.044	0.179*	0.056***	0.293*
Chad	0.067**	0.019	0.030	0.086*
Flexible Regime				
Rwanda	0.052	0.029	0.025	0.326*
Ghana	0.030	0.171*	0.06**	0.136*
Malawi	0.056**	0.144*	0.070**	0.165*
South Africa	0.075**	0.107*	0.034	0.167*
Nigeria	0.023	0.012	0.014	0.131*
Mauritius	0.067**	0.108*	0.038	0.520*
Seychelles	0.022	0.024	0.014	0.114*

Note: * 1% of significance; ** 5% of significance; *** 10% of significance.

Source: Authors' elaboration.

The obtained results considering a significance level of 5% for the monthly subsamples indicate that the hypothesis of independence cannot be rejected, except for Sao Tome and Principe, for the sample that includes the total period, and Chad, in the period after ACC. Hence, the same test was performed considering the CPI of the EMZ countries with one lag, denoted by $(a(-1))$. This functional form intended to represent the average time spent in exportation and importation operations in these countries, as reported. In this case, considering the significance level of 5%, the results point out that the null independence hypothesis was rejected, except for Sao Tome and Principe, Guinea-Bissau, Mali and Chad. For the quarterly data cases (b), only for Cape Verde, Guinea-Bissau, Mali and Chad such hypothesis was not rejected. Lastly, we verified that, when we consider the annualized CPI (c), the null independence hypothesis of the CPI was rejected in all of the cases.

For the countries with flexible exchange regimes, the results of the independence test suggest that for the monthly subsample (a), the independence hypothesis between the series was rejected, except for Malawi, Mauritius and South Africa. Considering the monthly frequency with one lag $(a(-1))$, we verified that besides these three countries, the CPI in Ghana started to have a possible relation of dependence with the observed in the EMZ countries. For the quarterly frequency (b), we notice that the independence hypothesis was not verified for Malawi and Ghana. Finally, in the light of the test for the annualized subsample (c), the results displayed the rejection of the null independence hypothesis. Since the independence hypothesis prevailed for both types of exchange rate regimes of the countries when the monthly frequency (a) was used, the estimations presented in this research were realized using the monthly frequency with one lag $(a(-1))$, using the quarterly frequency subsample (b), and the annualized subsample (c). We also estimated the parameters of dependence considering the monthly frequency (a), and in both types of exchange rate regimes, the results were statistically insignificant.

Furthermore, the log-likelihood was the criteria to determine which Copula functional form had the best fit for the CPI data. In the Table 7 there is the information regarding the countries which adopted the fixed exchange rate regimes. The estimation results display the predominance of the Frank Copula for the monthly subsample with one lag $(a(-1))$ (Burkina Faso, Mali and Togo) and the Gaussian (Guinea-Bissau, Niger and Chad), followed by the AMH (Benin and Senegal). For the quarterly frequency subsample (b), the Copulas of Clayton (Sao Tome and Principe, Senegal and Chad), the Hustler-Reiss (Burkina Faso, Mali e Togo), the Gaussian (Cape Verde and Ivory Coast) and the t -Student Copula (Guinea-Bissau and Senegal) were that provided the best fits with regard to the CPI of the EMZ countries. For the annualized CPI (c), we report the Copula of Hustler-Reiss (Cape Verde, Burkina Faso and Guinea-Bissau), the Joe (Mali and Niger) and the Gaussian (Benin e Togo) evidenced the best fits among other Copulas.

Table 7. Log-likelihood of estimated Copulas for the countries with fixed regimes

Country	Frank	Clayton	Gumbel	AMH	Joe	Gaussian	T-student	Galamhos	Hustler-Reiss	Tawn	T-EV	Plackett
(a-1)) One Lag Sample												
C. Verde	2.18	1.48	NA	1.66	NA	0.91	1.30	NA	NA	NA	0.00	2.31
S. T. Principe	0.01	0.00	0.57	0.01	0.38	0.25	0.23	0.74	0.77	0.29	0.65	0.01
Benin	17.16	17.97	7.81	20.23	2.18	15.65	15.58	8.53	8.88	5.67	7.80	16.16
B. Faso	6.98	2.86	4.09	6.23	2.69	6.68	6.58	4.92	5.32	2.49	4.17	6.27
I. Coast	5.81	2.30	5.67	5.32	4.86	5.94	5.87	6.14	6.32	4.54	5.74	5.27
G. Bissau	0.72	1.36	0.36	0.77	0.06	1.37	1.30	0.89	1.03	NA	0.53	0.72
Mali	0.74	0.09	0.20	0.73	0.08	0.63	0.59	0.43	0.50	0.04	0.26	0.70
Niger	3.80	3.81	1.48	4.02	0.31	4.65	4.56	2.31	2.61	0.37	1.67	3.45
Senegal	3.11	NA	NA	3.64	NA	1.73	1.73	NA	NA	NA	NA	3.04
Togo	8.20	4.69	4.36	7.60	2.29	7.56	7.47	5.07	5.39	2.69	4.43	7.57
Chad	0.21	0.11	0.06	0.20	0.01	0.25	0.24	0.19	0.22	NA	0.11	0.19
(b) Quarterly Sample												
C. Verde	0.00	0.16	NA	0.00	NA	0.23	0.22	NA	NA	NA	0.98	0.00
S. T. Principe	3.05	6.36	1.74	5.59	0.38	3.34	4.00	1.69	1.67	1.67	1.71	3.38
Benin	8.71	7.93	6.79	8.14	4.59	8.41	8.39	6.65	6.53	6.54	6.70	8.18
B. Faso	5.16	2.54	5.88	3.85	5.71	5.86	5.80	6.50	6.86	4.91	5.99	4.76
I. Coast	2.83	1.33	2.37	2.51	2.01	2.89	2.83	2.65	2.79	1.78	2.41	2.48
G. Bissau	0.45	0.91	0.71	0.40	0.55	0.60	1.86	0.55	0.49	0.90	0.68	0.51
Mali	0.24	0.02	0.15	0.22	0.13	0.32	0.29	0.32	0.37	0.00	0.21	0.22
Niger	1.34	1.83	0.91	1.40	0.43	1.81	1.78	1.16	1.27	0.50	0.96	1.24
Senegal	1.47	NA	NA	NA	NA	0.19	3.35	NA	NA	NA	NA	1.70
Togo	1.68	0.42	1.47	1.44	1.40	1.79	1.74	1.78	1.88	0.80	1.57	1.42
Chad	0.18	0.21	NA	0.15	NA	0.13	0.16	NA	NA	NA	NA	0.18
(c) Annualized Sample												
C. Verde	13.25	5.75	16.08	10.30	15.50	14.67	14.59	16.92	17.26	14.12	16.23	12.45
S. T. Principe	30.31	24.99	22.02	NA	14.43	28.28	28.22	22.14	22.12	NA	21.78	27.54
Benin	51.1	38.8	47.1	NA	36.00	53.30	53.20	48.10	48.70	NA	46.80	48.50
B. Faso	38.86	16.64	47.54	NA	48.77	40.16	40.13	48.40	48.83	NA	47.55	36.18
I. Coast	46.89	29.66	44.65	NA	36.92	43.43	45.36	43.78	41.86	NA	44.75	46.92
G. Bissau	38.91	26.31	45.34	NA	41.37	44.87	44.80	46.86	48.68	NA	45.05	38.27
Mali	23.51	3.09	32.53	12.76	39.83	22.93	22.85	33.14	33.58	31.50	32.38	21.34
Niger	25.00	10.44	34.84	17.21	36.93	29.53	29.39	36.04	26.99	34.16	34.84	22.72
Senegal	46.00	53.14	53.31	NA	40.90	58.65	59.01	53.81	53.71	NA	53.18	46.95
Togo	10.76	1.73	13.49	7.64	14.55	20.99	10.91	14.85	15.52	10.46	13.73	9.75
Chad	0.46	1.62	1.24	0.28	2.26	0.50	0.43	1.12	1.47	0.82	1.29	0.42

Source: Authors' elaboration.

The information of the Copulas estimated for the countries with flexible exchange rate regimes are exposed in the Table 8. We can observe that for the monthly subsample with one lag (a(-1)), the Clayton Copula was more indicated to the CPI observed in Nigeria and Seychelles. Otherwise, the Frank Copula registered the best fit for Ghana and South Africa. In addition, the AMH, the *t*-Student and the Hustler-Reiss Copulas were the best adjustments to modeling the CPI relations of Malawi, Mauritius and Rwanda, respectively. For the quarterly subsample (b), there is the predominance of the Clayton Copula (Rwanda, Nigeria and Seychelles), followed by the *t*-Student Copula, the Hustler-Reiss (South Africa) and the Frank Copula (Ghana). The Clayton Copula also provide the best fit for the annualized data (c). After the estimation of the models, their specification was verified,

in order to avoid wrong conclusions regarding the relations of dependence of the studied CPI stochastic processes.

Table 8. Log-likelihood of estimated Copulas for the countries with flexible regimes

Country	Frank	Clayton	Gumbel	AMH	Joe	Gaussian	T-student	Galambos	Husler-Reiss	Tawn	T-EV	Plackett
(a-1) One Lag Sample												
Rwanda	0.29	0.31	0.20	0.24	0.27	0.12	0.10	0.35	0.38	0.17	0.23	0.30
Ghana	6.13	2.48	2.14	5.67	0.76	4.16	4.10	2.36	2.40	1.51	2.19	5.82
Malawi	5.41	NA	NA	6.05	NA	4.89	4.82	NA	NA	NA	NA	5.05
South Africa	5.05	4.11	4.97	4.60	3.72	5.42	5.43	4.68	4.55	5.03	4.88	5.08
Nigeria	3.80	0.99	1.69	3.59	0.99	2.67	2.61	2.07	2.18	0.85	1.80	3.57
Mauritius	0.02	0.25	NA	0.02	NA	0.04	0.00	NA	NA	NA	NA	0.02
Seychelles	0.13	0.35	NA	0.11	NA	0.14	0.09	NA	NA	NA	NA	0.12
(b) Quarterly Sample												
Rwanda	0.44	0.21	0.72	0.42	0.75	0.77	0.74	0.96	1.02	0.30	0.81	0.39
Ghana	1.47	0.00	0.96	1.10	1.00	0.87	0.85	1.19	1.28	0.52	1.01	1.42
Malawi	0.22	0.09	NA	0.36	NA	0.18	1.35	NA	NA	NA	NA	0.26
South Africa	2.63	NA	NA	NA	NA	3.74	3.76	NA	NA	NA	NA	2.74
Nigeria	0.17	0.21	0.29	0.12	0.49	0.33	0.31	0.63	0.74	NA	0.41	0.15
Mauritius	0.01	0.03	NA	0.01	NA	0.01	0.00	0.00	0.00	NA	NA	0.00
Seychelles	0.03	0.30	NA	0.02	NA	0.05	0.05	NA	NA	NA	NA	0.03
(c) Annualized Sample												
Rwanda	10.81	6.24	9.05	10.61	6.81	10.59	10.51	9.71	9.86	7.22	9.27	9.65
Ghana	1.94	20.82	NA	1.31	2.20	2.16	NA	NA	NA	NA	NA	1.86
Malawi	32.37	46.26	32.63	NA	20.26	38.96	42.13	31.31	29.19	33.28	32.86	36.15
South Africa	5.05	NA	NA	NA	NA	5.07	5.10	NA	NA	NA	NA	4.80
Nigeria	0.03	3.79	NA	0.01	NA	0.56	0.60	NA	NA	NA	4.69	0.02
Mauritius	1.97	0.50	0.01	2.29	NA	1.17	1.03	0.25	0.33	NA	0.07	1.67
Seychelles	1.61	0.35	1.70	1.05	2.32	1.02	0.98	1.77	1.80	1.47	1.69	1.53

Source: Authors' elaboration.

The goodness-of-fit tests are illustrated in the Table 9. They reveal that among the 36 Copulas estimated for the countries which adopted the fixed exchange rate regimes, only for 3 of them we rejected the null hypothesis, i.e., that the chosen Copula was appropriate to modeling the dependence relations, considering the significance level of 1%. Among the estimations in which the rejection of the null hypothesis occurred, there are the cases of Niger (quarterly subsample (b)), Mali and Chad, both for the annualized subsample (c).

Table 9. Goodness-of-fit test of the estimated Copulas

Country	(a(-1)) One lag	(b) Quarterly	(c) Annualized Regime
Fixed Regime			
C. Verde	0.542	0.659	0.333
S. T. Principe	0.053	0.037	0.035
Benin	0.889	0.015	0.020
B. Faso	0.022	0.031	
I. Coast	0.153	0.015	1.900
G. Bissau	0.015	0.039	0.600
Mali	0.021	0.040	0.630*
Niger	0.022	0.052*	0.500
Senegal	0.274	0.076	0.710
Togo	0.016	0.057	0.290
Chad	0.022	0.050	0.091*
Flexible Regime			
Rwanda	0.031	0.025	0.071*
Ghana	0.027	0.031	0.410
Malawi	0.390	0.067	0.160
South Africa	0.071*	0.360	1.000**
Nigeria	0.013	0.762	0.350*
Mauritius	0.110	0.480	0.045**
Seychelles	0.027	0.413	0.140

Note: * 1% of significance; ** 5% of significance; *** 10% of significance.

Source: Authors' elaboration.

For the estimation of Copula for the countries with flexible exchange regimes, the results demonstrate that among the 21 Copulas estimated, only for 5 of them we rejected the null hypothesis that the chosen Copula was the appropriate to modeling the relation of dependence, considering the significance level of 5%. Among them, there are South Africa, for monthly frequency with one lag (a(-1)), Rwanda, South Africa, Nigeria and Mauritius, all of them with annualized frequency (c). Based on the chosen Copulas, the dependence structures described in the Table 3 were estimated and their results will be illustrated in the Table 10 and Table 11.

Table 10. Estimated dependence for the countries with fixed regimes

Country	Kendall's Tau	Spearman's Rho	Lower Tail Index	Upper Tail Index
(a(-1)) One Lag Sample				
C. Verde	-0.107	-0.159	0.000	0.000
S. T. Principe	0.084	0.126	0.000	0.109
Benin	0.265	0.390	0.000	0.000
B. Faso	0.168	0.251	0.000	0.000
I. Coast	0.147	0.219	0.000	0.189
G. Bissau	0.087	0.131	0.000	0.000
Mali	0.056	0.084	0.000	0.000
Niger	0.141	0.210	0.000	0.000
Senegal	-0.129	-0.193	0.000	0.000
Togo	0.185	0.275	0.000	0.000
Chad	0.094	0.141	0.000	0.000
(b) Quarterly Sample				
C. Verde	0.086	0.129	0.000	0.115
S. T. Principe	0.438	0.610	0.641	0.000
Benin	0.332	0.482	0.000	0.000
B. Faso	0.285	0.414	0.000	0.351
I. Coast	0.203	0.300	0.000	0.000
G. Bissau	0.084	0.125	0.154	0.154
Mali	0.073	0.109	0.000	0.095
Niger	0.143	0.214	0.126	0.000
Senegal	-0.163	-0.24	0.110	0.110
Togo	0.159	0.236	0.000	0.203
Chad	-0.083	-0.124	0.000	0.000
(c) Annualized Sample				
C. Verde	0.244	0.337	0.000	0.304
S. T. Principe	0.568	0.769	0.000	0.000
Benin	0.450	0.632	0.000	0.000
B. Faso	0.411	0.580	0.000	0.580
I. Coast	0.421	0.587	0.000	0.000
G. Bissau	0.477	0.660	0.000	0.556
Mali	0.330	-	0.000	0.557
Niger	0.356	0.510	0.000	0.430
Senegal	0.462	0.646	0.145	0.145
Togo	0.228	0.335	0.000	0.286
Chad	0.121	-	0.000	0.253

Source: Authors' elaboration.

In the Table 10 we can notice that for the monthly frequency subsample with one lag (a(-1)), the results suggest a small dependence between the CPI of the analyzed countries and the CPI of countries from the EMZ. In some cases, such as Cape Verde and Senegal, this measure is negative, and this goes against the priori expectations of this research. The countries which demonstrated the higher dependence were Benin, Togo, Burkina Faso and Ivory Coast. However, when the Copulas are estimated using the quarterly subsample (b), an increase on the level of dependence between the CPI of these countries and the EMZ countries was observed.

On the other hand, an increase on the level of dependence between the CPI of the annualized subsample (c) was observed. Sao Tome and Principe, Guinea-Bissau, Senegal, Benin, Ivory Coast and Burkina Faso were the countries which presented the most expressive measures, and all of them were positive. Chad was the country with the lowest level of dependence among the studied countries. Two factors may explain these results (i) the fact that the CPI is measured only in N'Djamena, the capital of the country, and (ii) due to its constant internal political instabilities, which places the gains obtained by the adoption of a fixed exchange rate at risk. The Tail Index, in contrast, indicate that half of the chosen Copulas were asymmetric, for both, quarterly (b) and annualized (c) subsamples. It is possible to observe that Cape Verde, Burkina Faso, Guinea-Bissau, Mali, Senegal and Togo evidenced certain dependence in the superior tail of the distribution, i.e., for the moments of price increases. It could reflect that those countries had inelastic demands for tradable goods coming from the EMZ countries.

The measures of dependence of the countries with flexible regimes are displayed in the Table 11.

Table 11. Estimated dependence for the countries with flexible regimes

Country	Kendall's Tau	Spearman's Rho	Lower Tail Index	Upper Tail Index
(a) Monthly Sample				
Rwanda	0.037	0.055	0.000	0.048
Ghana	0.162	0.241	0.000	0.000
Malawi	-0.176	-0.263	0.000	0.000
South Africa	0.141	0.210	0.000	0.000
Nigeria	-0.034	-0.052	0.000	0.000
Mauritius	0.152	0.227	0.000	0.000
Sevchelles	-0.046	-0.070	0.000	0.000
(b) Quarterly Sample				
Rwanda	0.140	0.210	0.000	0.000
Ghana	0.116	0.174	0.000	0.000
Malawi	-0.230	-0.35	0.000	0.000
South Africa	0.111	0.165	0.000	0.143
Nigeria	-0.029	-0.043	0.000	0.000
Mauritius	-0.068	-0.101	0.000	0.000
Sevchelles	-0.098	-0.146	0.000	0.000
(c) Annualized Sample				
Rwanda	0.209	0.311	0.000	0.000
Ghana	-0.223	-0.324	0.000	0.000
Malawi	-0.165	-0.245	0.000	0.000
South Africa	0.115	0.171	0.000	0.153
Nigeria	0.108	0.162	0.000	0.000
Mauritius	0.364	0.519	0.546	0.000
Sevchelles	0.132	-	0.000	0.272

Source: Authors' elaboration.

The results for the monthly frequency subsample with one lag (a(-1)) and the quarterly frequency (b) indicated that for Malawi, Nigeria and Sevchelles, the dependence relation is negative, even though the magnitude is small, except for Malawis case, that registered a significant negative dependence relation with the CPI of the EMZ countries. For the annualized frequency subsample (c), the negative measures of dependence were observed in Ghana and Malawi. We can highlight Rwanda, South Africa and Mauritius for presenting the higher levels of dependence with the CPI with regard to the EMZ countries.

We emphasize that these empirical evidences could not be obtained using other models, such the Vector Autoregressive models (VAR), Vector Error-Correction (VEC), for example, because they establish linear relations, which the estimated parameters are conditioned to the average, else the need of priori knowledge to modeling the systems and relations between the studied variables. And, above all, from the statistical point of view, its estimators require the normal distributions of the residues. In general, we observed that in most cases, for the countries with flexible regimes, there is a small relation of dependence among the CPI. Consequently, we tried to relate the estimated parameters with the Degree of Economic Opening (DEO) of the countries, in order to obtain more information, as denoted in Figure 1.

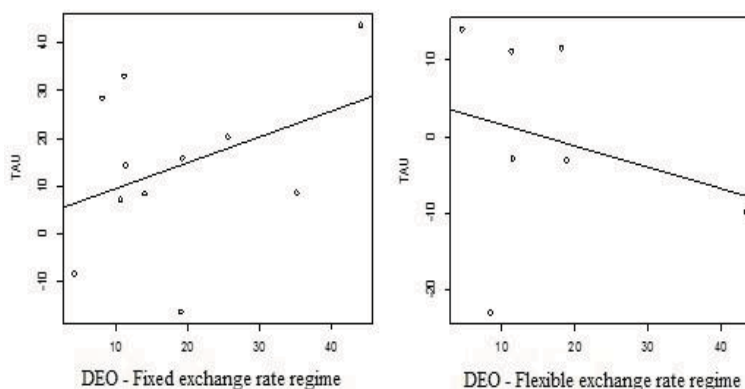


Figure 1. Dispersion between the Degree of Economic Opening (DEO) and the Kendall's Tau

Source: Authors' elaboration.

In the Figure 1 we observe the dispersion between the DEO of the studied countries related to the EMZ, and the Kendall's Tau, estimated by using the quarterly subsample (b). The GAE of each country is given by the average

ratio between trade (the sums of all of its importations and exportations of goods and services) with the EMZ countries, divided by the GDP of each sampled country, during the period of 1999 and 2014. The countries which adopted fixed exchange rate regimes pointed to higher positive relations between the CPI dependence and the GAE, then the countries which adopted flexible regimes.

Furthermore, the data indicated that there were no significant differences regarding the GAE between the exchange regimes in the studied countries. For the fixed regimes, the average of the GAE was 18.5%, while for the countries with flexible regimes, it was 16.6%. Nonetheless, the same relation was not verified when the Kendall's Tau is considered. Also, we did not observe a Kendall's Tau above 0.2 among countries with flexible exchange rate regimes, when we used the quarterly subsample (b) as data. For the annualized frequency subsample (c), no country obtained estimations of dependence above the registered average in the countries which adopted fixed exchange regimes.

6. Key Findings and Discussion

The information produced in our research lead to some key findings, which must be carefully analyzed. First, it is difficult to establish a linear relation among the CPI of the studied countries, according to the equation (2). Secondly, the methodology of Copulas lead to some advances, as well, as the efforts of (i) estimate various functional forms of Copulas to fit our data, and (ii) control the estimations by sample design changing and (iii) the results by the exchange rate regimes adopted by each studied country.

For the general case, the estimated Copulas presented better fits to the annualized subsamples comprehended during the accords to countries which adopted fixed exchange rate regimes. These countries, for instance, revealed in average, positive significant dependences with regard the CPI observed in the EMZ countries. In this sense, as pointed out, the literature, from pioneer studies, such as Friedman, (1953), to more recent empirical researches, such as Husain, Mody and Rogoff (2005) and Toulaboe and Terry (2013), some small open economies with a relative degree of openness could benefit from fixed exchange rate regimes with regard their main trade partners. However, when adopting the fixed exchange rate regime, these types of small developing economies, as exposed by Jalles (2010), tend to import the inflation of its essential trade partners.

On the other hand, considering the costs of the inflation control, we report that for the reduced dependencies between the CPI stochastic processes, it is possible that a change from the fixed regime linked to the Euro to a flexible regime, could improve the efficiency of the economic policies. The DEO and the Kendall's Tau estimations possibly express that for the first group of countries there is a positive relation among trading and imported inflation. Otherwise, for the countries which made option for the flexible exchange rate regimes, the relation aforementioned is considerably smaller and negative.

Additionally, the estimations displayed that there seems to be other factors that influence the CPI dynamics, and, consequently, their impact on the most appropriate policy path for each SSA studied country. We also highlight that these results could improve with the using of the pairs of time series data, regarding the CPI observed in each of the partners of the SSA countries, besides signaling for the existence of other possible relevant new trading partners, as China, for example. Hence, the exchange rate policy is fundamental for the coordination of positive results for the emerging countries, as well, as the selected countries for this study.

As stated to Appleyard, Field and Cobb (2009) one of the intrinsic characteristics of the countries in development is that their economic systems are more rigid and less stimulated in the face of price changes, at least, in the short term. Therefore, the microeconomic aspects, as well as those associated to the domestic policies, have a significant impact in the dynamic of the prices. This makes the decisions about the best exchange rate regime go through a theoretical and empirical analysis, also considering the small dependence of the CPI of the studied economies related to the Euro.

Ensuring the stability of the prices is the main objective of the monetary authorities, facing the costs caused to the economy by high CPI. This fact has stimulated studies about their determinants and some of them incorporate the imported inflation costs, by observing how the variation in the external prices affect the domestic price level of various economies, process named imported inflation, as already mentioned.

A limitation of those kind of research is due the absence of data for the African countries. Much of statistic methods require databases with a minimum of observations, because most of those estimators' precision are asymptotic. This way, modeling specific empirical evidence for the developing countries, especially of the SSA, is difficult and another studies in literature are rare. This decision is linked to another limitation of this research, which emerge of the fact that we do not consider the case of time-varying dependence estimators. To use such techniques, in most part of the cases it is necessary larger databases and with higher frequencies, i.e., with more

observations, to correcting specification and identification of the models.

7. Conclusion

In sense of provide some empirical evidence of the CPI relations, our contribution was to estimate different measures of Copulas, controlling the results by the exchange rate regimes and trade agreements, for each of the studied country, considering the monthly, quarterly and annualized frequencies of the data. In sense of estimate robust measures, we also controlled the estimations by using 1 lag in the transmission of imported inflation. As exposed, it is very difficult to obtain well-structured data from African countries, which definitively could improve the presence of researches about economy policies based on empirical evidence for the use of the policy makers.

We observed that for the countries with flexible regimes, the dependence relation is reduced. Comparatively, we noted that the countries with a fixed regimes pointed to higher relation of dependence. This may suggest that these countries are in the right direction regarding the exchange rate policy, and the reaction functions of the monetary authorities must consider the external prices and the monetary policies in the EMZ. Specifically, Sao Tome and Principe, Guinea-Bissau, Senegal, Benin, Ivory Coast and Burkina Faso reveal more expressive relation of dependence among the analyzed countries. Chad, for instance, presented the low relation of dependence, which could be associated with its institutional instabilities. Burkina Faso, Guinea-Bissau, Mali, Niger, Cape Verde, Togo and Senegal, on the other hand, dependence was registered in the superior tail of the distribution, i.e., for the periods of European prices increasing. Apparently, this means that those countries had inelastic demands for tradable goods coming from the EMZ countries.

Alternatively, even using more robust statistic estimators to capture the relations between the CPI of the studied countries, the Copulas which provide the best fits for each case, also suggest that are different drivers of the supply side and of the demand side for the studied economies, which were possibly could be captured through the CPI time series patterns. Finally, the results indicated that in addition to the external inflation, other factors may help in the decision of which exchange rate regime is the most appropriate for each of studied countries. This way, our results are in line with the last studied that pointed out that there is no rigid path to development. It increases the possibilities for the policy makers, regarding the variables to be considered in the decision-making processes.

We think fixed exchange rate regimes for small economies in development had many benefits, nonetheless also may create vulnerabilities to crisis and external events, because in average, they could not afford high reserves in foreign currencies, as strategy policy adopted by other emerging countries. This has been observed in some developing economies, that after successive crisis during the 1990's, had increased their international reserves to be less vulnerable to short-term instabilities. This is just one example of how is important the development of the institutions of the African countries.

Nevertheless, we reiterate that the choice of which exchange rate regime to adopt is very important for the SSA developing countries. Also, it was possible to observe the importance of the empirical evidence on the decision making processes, which could be considered in other regions of similar economies, such as the countries of the LA, for example. Among the similarities, for the countries of the LA there is also the intention of creating a more advanced commercial and financial synergy, especially with the regard to the Mercosur participants. Thus, we believe that new researches can continue to pursue other empirical evidences about the SSA countries, since the African continent has great economic potential. Also, the Copulas model could be used to estimate the relations of dependence in the countries of LA or other blocs, and provide similar empirical evidence as produce by this study.

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Appendix A

Table 12. Descriptive statistics of the variables of the countries with fixed regimes

	Average	Median	Min.	Max.	Standard	Skewness	Kurtosis	Jarque Bera	N. Obs
(a) Monthly Sample									
EMZ	0.11	0.12	-1.55	1.35	0.54	-0.32	3.86	3.45	72
WAEMU	0.15	0.17	-1.55	1.35	0.40	-0.54	5.40	58.91*	204
Benin	0.21	0.21	-2.62	4.97	1.19	0.62	4.47	31.70*	204
B. Faso	0.19	0.10	-2.73	4.18	1.20	0.39	3.56	7.94**	204
C. Verde	0.15	0.16	-2.16	3.17	0.75	0.37	5.18	45.09*	204
Chad	0.30	0.39	-3.83	8.78	1.79	0.82	6.96	80.92*	107
I. Coast	0.22	0.14	-2.92	6.25	0.88	2.21	17.67	1995.39*	204
G. Bissau	0.12	0.13	-2.43	3.16	0.97	0.00	3.54	2.00	162
Mali	0.19	0.17	-2.59	4.62	1.11	0.27	3.93	9.79*	204
Niger	0.17	0.00	-3.64	5.36	1.25	0.77	4.88	50.07*	204
S. T. Principe	0.72	0.50	-0.30	2.40	0.57	1.26	4.14	22.87*	72
Senegal	0.13	0.00	-3.17	2.85	0.91	-0.11	3.56	3.00	204
Togo	0.22	0.18	-3.21	4.25	1.15	0.01	4.08	9.88*	204
(b) Quarterly Sample									
EMZ	0.35	0.19	-0.87	1.60	0.70	0.25	1.91	1.43	24
WAEMU	0.45	0.39	-0.87	1.64	0.57	0.13	2.56	0.76	68
Benin	0.65	0.65	-2.94	4.65	1.43	0.22	3.56	1.45	68
B. Faso	0.53	0.61	-3.14	5.10	1.74	0.17	2.60	0.77	68
C. Verde	0.46	0.45	-2.58	3.63	1.27	0.25	2.94	0.72	68
Chad	0.90	0.81	-4.66	7.14	3.02	0.18	2.68	0.34	35
I. Coast	0.65	0.62	-2.34	6.76	1.43	1.10	6.78	54.31*	68
G. Bissau	0.42	0.55	-4.67	3.03	1.71	-0.78	3.36	5.66	53
Mali	0.53	0.77	-4.51	5.23	2.21	-0.19	2.53	1.03	68
Niger	0.51	0.61	-4.38	5.20	2.09	0.04	2.42	0.96	68
S. T. Principe	0.72	0.62	0.17	1.63	0.42	0.67	2.43	2.10	24
Senegal	0.41	0.09	-3.77	3.76	1.56	-0.06	2.72	0.25	68
Togo	0.67	0.68	-3.72	4.50	1.70	0.02	3.14	0.06	68
(c) Annualized Sample									
EMZ	1.44	1.59	-0.61	3.03	1.03	-0.13	1.66	5.56**	72
WAEMU	1.81	2.00	-0.64	4.05	0.93	-0.52	2.99	9.14*	204
Benin	2.60	2.25	-3.31	13.53	2.94	0.60	3.29	13.03*	204
B. Faso	2.05	1.33	-3.07	13.98	3.35	1.17	4.40	63.59*	204
C. Verde	2.07	1.98	-4.22	10.22	2.95	0.19	2.42	4.13	204
Chad	4.00	3.13	-5.24	19.60	5.13	0.57	2.89	5.12**	95
I. Coast	2.52	2.20	-3.85	9.12	2.01	0.28	3.26	3.14	204
G. Bissau	2.03	1.97	-7.24	11.30	3.24	0.14	3.62	2.83	150
Mali	2.13	1.72	-6.46	11.45	3.47	0.34	3.08	4.00	204
Niger	1.91	1.31	-4.89	13.46	3.69	1.10	4.31	55.81*	204
S. T. Principe	9.80	10.10	3.96	17.40	3.58	0.24	1.93	4.14	72
Senegal	1.56	1.26	-4.98	7.99	2.38	0.17	3.53	3.28	204
Togo	2.50	2.09	-3.77	14.11	3.17	0.69	3.80	21.71*	204

Note: * 1% of significance; ** 5% of significance; *** 10% of significance.

Source: Authors' elaboration.

Table 13. Descriptive statistics of the variables of the countries with flexible regimes

	Average	Median	Min.	Max.	Standard	Skewness	Kurtosis	J. Bera	N. Obs.
(a) Monthly Sample									
Ghana	1.31	1.29	-2.56	10.88	1.43	1.52	12.44	834.88*	204
Malawi	1.06	0.60	-9.43	11.90	3.31	0.33	2.88	3.33	179
Mauritius	0.40	0.32	-2.45	3.01	0.63	0.79	7.63	203.86*	204
Nigeria	0.90	0.77	-3.46	7.40	1.40	0.66	7.07	127.28*	167
Rwanda	0.48	0.45	-3.94	5.11	1.23	0.08	4.45	18.10*	204
Seychelles	0.58	0.24	-2.33	9.04	1.40	2.82	15.88	882.03*	107
South Africa	0.42	0.33	-1.09	1.69	0.47	0.21	3.74	5.07	167
(b) Quarterly Sample									
Ghana	3.83	3.41	-1.67	10.24	2.64	0.20	2.89	0.47	68
Malawi	3.05	0.31	-5.61	17.56	6.59	0.37	1.75	5.22	59
Mauritius	1.22	1.05	-1.19	4.81	1.17	0.56	3.65	4.80**	68
Nigeria	2.72	2.35	-4.70	10.44	2.41	0.18	5.42	13.77*	55
Rwanda	1.45	1.15	-3.80	7.54	2.27	0.40	3.35	2.13	68
Seychelles	2.01	0.69	-2.10	12.88	3.54	1.73	5.17	24.27*	35
South Africa	1.26	1.32	-2.11	3.31	0.98	-0.34	4.54	6.53**	55
(c) Annualized Sample									
Ghana	16.30	14.90	8.39	41.90	7.38	1.64	5.55	146.18*	204
Malawi	14.40	12.10	3.11	38.00	7.39	0.91	3.16	23.63*	167
Mauritius	5.18	4.80	0.06	12.30	2.63	0.60	3.15	12.44*	204
Nigeria	11.30	10.60	3.00	28.20	4.52	1.24	5.10	68.44*	155
Rwanda	5.45	5.77	-15.70	22.50	7.16	-0.53	3.69	13.72*	204
Seychelles	11.00	4.00	-6.00	63.00	16.34	1.56	4.31	45.85*	95
South Africa	4.95	5.00	-2.00	12.00	2.91	-0.33	3.54	4.80**	155

Note: * 1% of significance; ** 5% of significance; *** 10% of significance.

Source: Authors' elaboration.

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The Capital Structure Choice of European Firms: The Role of Financial System and Institutional Setting

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Abstract

Recent international financial research finds that a firm's capital structure is not only influenced by firm- and industry-specific determinants, but also by country-specific factors. Starting from the last decade's studies on the country effect and addressing some areas of potential development in empirical testing, we test, on a sample of seven apparently similar European countries and more than 800,000 variously sized firms (from the BACH-ESD database) over a ten year period (2000-2009), the direct effects of country characteristics on leverage, as well as their mediating role on the effects of firm- and industry-specific determinants, by using a simultaneous equation model (SEM) never used before by any scholar in this field. The emerging empirical evidence: *i*) highlights the relevance of many institutional, financial, and macroeconomic country characteristics; *ii*) confirms the better ability of banks in selecting, monitoring, and financing small and risky firms; *iii*) shows that the demand-side perspective can better explain some counter-intuitive effects of some determinants on leverage.

Keywords: capital structure, country characteristics, financial systems, institutional setting, European countries, empirical study

1. Introduction

The choice of capital structure is a hot issue in international financial research. Since the Modigliani-Miller (1958) seminal contribution, many theories have been formulated and many empirical studies implemented. However, ample space for further research still remains, since the empirical evidence does not always support the theoretical hypotheses on the determinants of financial leverage, and often stimulates the formulation and testing of new hypotheses.

In this context, the country effect on financial leverage seems to be a good candidate for further analysis. Prior research (e.g., Rajan – Zingales, 1995; Demircug-Kunt – Maksimovic, 1999; Booth et al., 2001; Giannetti, 2003; Hall et al., 2004; Bancel – Mittoo, 2004; Antoniou et al., 2008; de Jong et al., 2008; Aggarwal – Kyaw, 2009; Alves – Ferreira, 2011; Kayo – Kimura, 2011; Fan et al., 2012; Acedo-Ramirez – Ruiz-Cabestre, 2014) finds that both firm- and industry-specific determinants and country-specific factors influence a firm's capital structure. It also evidences that many country characteristics, such as the macroeconomic context, the institutional framework, and the financial system, affect a firm's capital structure. In addition, the most recent studies demonstrate that country-specific factors can affect corporate leverage not only directly, but also indirectly, i.e. through their impact on the effect of non-country determinants (especially, firm-specific variables).

This paper aims at formulating and empirically testing, on a sample of seven apparently similar European countries and more than 800,000 variously sized firms (from the BACH-ESD database) over a ten year period (2000-2009), an explanatory model of both the cross-sectional and the longitudinal variability of corporate leverage, which evidences the direct effects of country characteristics on leverage, as well as their mediating role on the effects of firm- and industry-specific determinants, by using a simultaneous equation model (SEM), never used before by any scholar in this field. In fact, based on the review of some last decade's studies on country effect and the subsequent identification of some areas of potential development in empirical testing (Venanzi, 2017), we try to address some of these areas of criticism in formulating the model and building our empirical analysis. Therefore, in comparison with the previous studies on country effect, our analysis contributes to the scientific debate with the following original features:

- a) we use a set of countries which is generally assumed to be homogeneous, in terms of type of financial system (all bank-based) and institutional origin (all civil law countries). As shown before, these countries significantly differ in both financial and institutional characteristics, although they are generally considered homogeneous in the empirical studies that adopt a broader set of countries; therefore, using general taxonomies in classifying country and explaining the variance of leverage is likely to underestimate the country effect and tells only a part of the story;
- b) we use a large sample of firms, which variously differ in terms of size and industry, including small and non-listed firms, whose financial decisions are more subject to the institutional and financial constraints imposed by their domestic markets (Giannetti, 2003);
- c) we use a broad set of determinants, at firm, industry, and country level, breaking down each level in an ample set of variables;
- d) we estimate an explanatory model of leverage that fits both the cross-sectional and the longitudinal variability of corporate leverage, and therefore avoids the use of average values of dependent and independent variables over time, as some studies do. Furthermore, we ask our explanatory model to be robust over a range of years that includes different phases of the economic cycle: from the “small crisis” of 2002-2003 to the deep recent crisis of 2008-2009, through the expansion of 2006-2007;
- e) we estimate the country’s impact on the capital structure choices in terms of both direct and indirect effects, in a model whose parameters are simultaneously estimated. In fact, adopting a simultaneous equation model (SEM), a statistical methodology never used before in this research field, we measure in the same regression model the direct impact of country, industry and firm-specific determinants on corporate leverage in a multi-year framework, as well as the country’s indirect effects; the latter are expressed in terms of fully or partially mediated effects of the country characteristics on the impact on leverage of the firm- and industry-specific determinants. In doing so, we avoid the potential bias of a double-step estimation of direct and indirect country effects, generally used in previous studies;
- f) we explicitly take into account the Welch (2011) criticism on the measurement of firms’ indebtedness, excluding the non-financial liabilities, that are generally related to the specific firm’s business and industry characteristics, and are not influenced by the determinants of the capital structure choice, when it represents an explicit managerial decision; in the European countries, these non-financial liabilities (for example the provisions arising from labour market contracts or specific regulations) can have a major weight on the total sources of funds, distorting the measurement of financial leverage, when included (Venzani, 2010);
- g) we use a sample of only bank-based countries: this allows us to realistically measure the financial leverage, considering also the short-term bank debt, which represents a very important portion of financial debt, since it often disguises medium-long term debt by means of the tacit renewal mechanism; in bank-based countries, where corporate bonds are very marginally used as a source of funds, considering only the medium-long term debt implies the omission of most financial liabilities;
- h) our sample includes observations at size-class level rather than at firm level. As Myers (1984) and Fisher-Heinkel-Zeckner (1989) claim, transaction costs can explain some temporary deviations of a firm from its optimal capital structure, within an acceptable range of non-adjustment. Therefore, the observed static leverage measures do not approximate the target leverage each year. After verifying the homogeneity of leverage within each size-class, we assume that the size-class averages of the dependent variable can better approximate the yearly target leverage, rather than the values of the individual firms’ observations. Furthermore, especially for the small-size firms, the average leverage in their class better reduces the risk that the observed values of leverage could be biased by financial market/system constraints, and therefore not representative of the target levels chosen by the firms.

The empirical findings highlight the relevance of many institutional, financial, and macroeconomic country characteristics. In addition, they confirm the better ability of banks in selecting, monitoring, and financing small and risky firms and show that the demand-side perspective can better explain some counter-intuitive effects of some determinants on leverage.

The paper is organized as follows. Section 2 builds the general framework of the country characteristics usually included in the explanatory model of leverage, and the theoretical rationale underlying their expected impact on capital structure choice, taking in account the areas of useful improvement of the test design. Section 3 describes data, research design, methodology and variables adopted in our empirical analysis, outlining the tested

hypotheses and the structure of the final model. The results are presented in Section 4 and 5. Section 6 concludes the paper.

2. The Country Effect on the Corporate Debt-Equity Choice

2.1 The Relevant Country Characteristics

Prior research (e.g., Rajan – Zingales, 1995; Demircuc-Kunt – Maksimovic, 1999; Booth et al., 2001; Giannetti, 2003; Hall et al., 2004; Bancel – Mittoo, 2004; Antoniou et al., 2008; de Jong et al., 2008; Aggarwal – Kyaw, 2009; Alves – Ferreira, 2011; Kayo – Kimura, 2011; Fan et al., 2012; Acedo-Ramirez – Ruiz-Cabestre, 2014) finds that a firm's capital structure is not only influenced by firm- and industry-specific determinants, but also by country-specific factors: many country characteristics, such as the macroeconomic context, the institutional framework and the financial system, seem to affect (directly and indirectly) a firm's capital structure.

The main recent studies adopt a causal determinants-leverage explanatory approach, using samples large and variegated in terms of countries considered, that differ for the development stage of the economy (developed and developing countries), type of financial systems (bank- and market-based), and institutional environments (common and civil law countries, and related law and order frameworks). The country determinants are generally associated with firm-specific determinants (very similar across studies), and more rarely with industry-specific variables (Giannetti 2003; Antoniou et al. 2008 and Kayo-Kimura 2011), often omitted or simply included as industry dummies (fixed industry effect), no matter which characteristics they differ for. The country effect is generally measured including many country characteristics (institutional framework, financial system, and macro-economic scenario) as regressors of the leverage. Only a few studies include in the empirical test the country dummies, omitting a more explicit characterization.

The most frequently used country variables are the following:

a) Financial characteristics

This set of variables mainly refers to the development stage of a country's financial system and concerns the availability of a wider spectrum of sources of funds at a lower cost. Banking system development and bond market development positively influence the firm's leverage; stock market development negatively influences the firm's leverage, because a broader supply of funds and a lower information asymmetry between managers and investors decrease the cost of equity, and therefore determine a higher managers' propensity to issue equity to finance investments. However, the stock market turnover enhances creditors' willingness to lend, thanks to better opportunities to monitor the listed firms, or makes banks' funds more available to non-listed firms. Furthermore, we can consider the financial system structure as a determinant of leverage (de Jong et al., 2008; Kayo-Kimura, 2011), because it has direct implications on the sources of funds available to the corporate sector (Antoniou et al. 2008).

The type of financial system can be related to the degree of ownership concentration of companies: firms in market-based countries have a less concentrated ownership structure, while in bank-based countries the concentration is higher. Assuming that, in an agency perspective, debt plays an important disciplinary role against managers' opportunistic behaviour (Jensen 1986), the firm's leverage is assumed to be higher in market-based countries. However, in bank-oriented countries, banks play a significant role in gathering the information and monitoring management; therefore, we expect better access to external borrowing and, thus, higher debt levels.

The more frequently indirect effects tested are the following:

1. the banking system development (or, simply, its orientation) mitigates the effect of bankruptcy costs on leverage, in terms of business risk, size, and tangibility;
2. the banking system development (or, simply, its orientation) mitigates the effect of agency costs on leverage, in terms of tangibility and growth;
3. the two mediation effects above can be performed by the bond market's development;
4. the stock market's development mitigates the effect of agency costs on leverage, in terms of tangibility and growth.

The expected sign of the impact of some determinants of leverage can be different, depending on the prevalence of the supply-side vs. the demand-side perspective. For example, the creditor's rights protection (discussed below) might positively affect leverage because lenders are likely to be more willing to supply financing, but, on the other hand, the impact can be negative if we assume a demand-side perspective: firms will be more reluctant to borrow, fearing higher distress costs.

b) Institutional characteristics

All studies recognize the important role of the country's institutional characteristics in influencing corporate decisions on capital structure, although the impact of these variables, in general, is not so evident. These determinants derive from La Porta et al. (1998) approach, which assumes that the type of legal system (common versus civil law countries) affects both the content of the laws and the quality of their enforcement, and therefore the extent of legal protection of external investors. Since the conflicts of interest between corporate insiders (managers and/or majority shareholders) and external investors (minority shareholders and creditors) are important factors that influence the corporate financial structure (according with the agency approach), the extent to which contracts can be used to mitigate these incentive problems depends on the legal system and enforceability of these contracts. The type of legal system is generally broken into a set of institutional characteristics, such as creditors' right protection, shareholders' right protection (anti-director rights), quality of laws and regulations, and promptness of their enforcement.

The corruption index proxies for the threat of investors' rights expropriation by managers or public officers. Debt is expected to be used relatively more than equity when the public sector is more corrupt, since it is easier to expropriate outside equity holders than debt holders. The enforcement of debt contracts or the presence/absence of an explicit bankruptcy code that regulates the resolution of default (Djankov et al. 2007; Fan et al. 2012) affect the firm's leverage: poorly defined bankruptcy procedures and longer period to enforce a debt contract reduce the lenders' bargaining power against the borrowers, and therefore discourage the use of debt or make it more costly.

c) Macroeconomic characteristics

These country variables are less frequently used than others, or used more often as control variables. Among these variables, inflation rate and inflation rate volatility are the most widely used regressors of leverage. Investors would be less willing to lend if they are not sure about the real returns on their loans, i.e., if they face higher inflationary risk. On the other hand, if interest rates do not appropriately reflect the inflation rate, inflation can be associated with higher debt levels, since the real repayment value of debt declines with inflation. Inflation uncertainty increases the firm's business risk through volatility in the firm's selling prices, costs, and volume of sales; therefore, in a highly inflationary country with high inflation uncertainty, firms will experience high business risk and carry less debt in their capital structure.

As stated by Demircuc-Kunt and Maksimovic (1999), annual growth rate in national GDP is an indicator of the financing needs of firms, that triggers a positive effect on the use of debt. Capital formation can affect corporate leverage both positively and negatively: the accumulation of more retained earnings induces less dependence on debt usage, assuming the POH perspective; however, it could also generate more financial needs and therefore a higher need to use external sources of funds, i.e. more debt.

The tax system in general, and specifically the tax treatment of interest and dividend payments, has been recognized as an important factor influencing capital structure choices since the seminal work of Modigliani and Miller (1958). Some studies (Booth et al. 2001; Fan et al. 2012) include this determinant at the country level, rather than at the firm level. They use the country's statutory tax rate or the relative tax advantage of debt, considering both corporate and personal tax rates according to Miller's (1977) formulation, or, alternatively, the tax treatment of dividend, distinguishing between countries with dividend imputation or tax relief systems, on the one hand, and countries with classical tax systems, that double-tax corporate profits, on the other hand: in the latter, firms are expected to use more debt than in the former.

3. Research Design, Data, and Variables

3.1 Test Design and Data

The empirical test conducted in this paper differs from the international studies about the country effect on the capital structure choice in many aspects, discussed below (following the criticisms highlighted in Venanzi, 2017).

- 1) Firstly, we use a relatively homogeneous set of countries, in terms of type of financial system – all bank-based– and institutional origin: all civil law countries, of French (Belgium, France, Italy, Spain and Portugal) or German derivation (Austria and Germany). The objective is to show that distinguishing countries along these general taxonomies is not appropriate for measuring the country effect on the corporate capital structure choice. These countries differ in both the financial and the institutional variables in a statistically significant way (see Venanzi, 2017), although they are generally considered homogeneous in the empirical studies where an ampler set of countries is adopted. Therefore, the empirical evidence emerging from the studies that use these general taxonomies as country determinants of leverage, underestimates the country effect and tells only a part of the story. Furthermore, considering only countries

operating in the same monetary system (European Union) contributes to focus the country effect measurement on the explanatory variables included in the regression model, limiting the risk that the effect of these macro-context differentials could distort the financial and institutional determinants' impact, especially when a larger sample of countries is used and controlling them is likely to be impossible.

- 2) Secondly, we use a large sample of firms (about 800.000), over a ten-year period (2000-2009). The core set of data derives from the Bank for the Accounts of Companies Harmonized (BACH) and the European Sectoral References Database (ESD) projects (BACH-ESD) (managed by Banque de France). Firms' data are aggregated into three size-classes, defined in terms of turnover: class 1 includes firms with less than 10 million euros of revenues (small firms), class 2 includes those between 10 and 50 million of revenues (medium-sized firms), and class 3 includes those with more than 50 million euros of revenues (large firms). The firms belong to 23 industries of the secondary and tertiary sectors, following the NACE (*Nomenclature statistique des activités économiques dans la Communauté européenne*) classification: 15 manufacturing industries, 3 energy, water supply and construction industries, 3 wholesale and retail trade industries, and 2 service industries (transportation and accommodation, and food services). The objective is to build an explanatory model of capital structure, which could be tested on a diversified set of firms and include a large set of determinants. Furthermore, our explanatory model should be robust over a range of years that includes different phases of the economic cycle: from the "small crisis" of 2002-2003 to the deep recent crisis of 2008-2009, through the expansion of 2006-2007.

Our sample also includes small and non-listed firms: this strengthens the model generalizability and the significance of the results; in many of the countries included in the sample, large listed firms just represent a minor share of their countries' GDP and a small proportion of the existing firms. Tentatively, this allows to better highlight the country effect, that could be obscured by samples only made of listed firms, whose financial decisions are less subject to the institutional and financial constraints imposed by their domestic markets.

Due to the open nature of the sample, the number of firms in each size-class or industry can vary over the years. The BACH-ESD dataset includes data only if the number of firms in each size-class is larger than 5. To strengthen the analysis, the extracted sample excludes all the cases that present serial missing values. Furthermore, to avoid biased results, we built a balanced pattern of data: the number of observations in the sample for each country, industry and year is the same. Therefore, all the industries and countries that showed serial missing data were excluded. The final sample includes 4,830 observations: 690 for each country, 210 for each industry, 483 for each year, and 1,610 for each size-class.

- 3) Thirdly, our sample includes observations at size-class level rather than at firm level. After verifying the homogeneity of leverage within each size-class, the yearly size-class averages of the dependent variable can better approximate the target leverage than the values observed at the individual firms' level. As Myers (1984) and Fisher-Heinkel-Zeckner (1989) claim, transaction costs can explain some temporary deviations of a firm from its optimal capital structure, within an acceptable range of non-adjustment. Therefore, the observed static leverage measures do not approximate the target leverage each year. Furthermore, an open sample over time (in which the sample firms change year by year), while does not permit to test a dynamic adjustment model toward target [the BACH-ESD database also provides data for sliding samples, but the evidence emerging from Leary-Roberts (2005), Lemmon et al. (2008), Flannery-Rangan (2006), Hovakimian et al. (2001) and Hovakimian (2004), shows that the target adjustment process is neither linear nor on a yearly basis], could allow a more robust measure of the target leverage at the size-class level, thanks to an ampler and varying sample. In addition, especially for the small size firms, the average leverage in their class better smooths the risk that the observed values of leverage could be biased by financial market/system constraints and therefore be not representative of the target levels chosen by the firms.

The relative homogeneity of the dependent variable (i.e. the financial leverage) within each size class is tested by measuring how much of the dispersion across firms of a certain country-industry-year combination is attributable to the *within* size class variability. We use the interquartile coefficients for measuring variability¹, weighting them by the number of firms. We obtain an average value of 35% for four of the ratios used in calculating the financial leverage and an average value of 52% for the fifth ratio (long

¹ The BACH-ESD database provides average, median, first and third quartiles for all the ratios.

term debt on total assets ratio) and a median value of about 20%. This means that most part of variability of the financial leverage across firms, in each country-industry-year combination, depends on size.

- 4) Fourthly, we estimate the country's impact on the capital structure choice in terms of both direct and indirect effects in a model whose parameters are simultaneously estimated, including those related to the firm and industry-specific determinants. In fact, adopting a simultaneous equation model (SEM), a statistical methodology never used before in this research field, we simultaneously measure (i.e. in the same regression model) the direct impact of country, industry and firm specific determinants on corporate leverage in a multi-year framework, as well as the country's indirect effects: these are explicated as fully or partially mediated effects that the country characteristics play on the impact on leverage of the firm- and industry- specific determinants. In doing so, we prevent the potential bias that can derive from an approach (used in many studies) that adopts a double step estimation of direct and indirect country effects: this approach *ex ante* assumes that the country indirect effect exists and therefore estimates separate regressions by country (or by other predefined subsamples of countries), hence regressing in a second regression the coefficients of the firm and industry determinants on the country's characteristics. Giannetti (2003) and Kayo-Kimura (2011) use a similar approach, but they use a cross-sectional approach and interaction variables instead of fully or partially mediated effects (see section 3.3 below).

Table 1. Dependent and independent variables

Variable	Measurement
dependent variable	
LEV	financial debts/(financial debts + equity)
Size – specific	
ROA	EBIT/invested capital (net of pension funds and trade credit and financial assets)
TANG	tangible fixed assets/total assets
LIQ1	current assets/total assets
LIQ2	cash & cash equivalents/total assets
OPRISK	fixed costs/total costs
NDTS	depreciation/net turnover
@1 - @2- @3	1 if the observation belongs to the size-class, 0 otherwise. @1 = small (< 10 ml € turnover); @2 = medium (10-50 ml €); @3 = large (> 50 ml €)
Industry – specific	
BUSRISK	interquartile distance of ROS (EBIT/total assets) at industry level
%EBIT	EBIT/net turnover (all size-classes)
HH	$\sum_{i=1}^{100} s_i^2$ (where s_i^2 measures the square of the market share of the firm i , calculated on the total turnover of the BACH sample)
MANUFACT	1 if the observation belongs to NACE sectors C (manufacturing), 0 if belongs to sectors from D to I (services).
Country-specific (time-invariant)	
SHARIGHTS	aggregate score of shareholder rights (by adding one when shareholder rights - such as proxy vote by mail, cumulative voting or proportional representation of minorities, etc... - are guaranteed) ranges from 0 (the weakest) to 6 (the strongest)

Continued	
Variable	Measurement
CREDRIGHTS	aggregate score of creditor rights (by adding one when mechanisms of creditor rights - such as creditors' consent for reorganization, secured creditor ranked first in distribution of liquidation proceeds, etc... - are guaranteed), ranging from 0 (the weakest) to 4 (the strongest)
JUDIC	a qualitative judgment by the country risk rating agency, ranging from 0 (the lower) to 10 (the higher)
LAW	a qualitative judgment by the country risk rating agency, ranging from 0 (the lower) to 10 (the higher)
CORR	an index ranging from 0 to 10 (larger value indicates more severe corruption)
Country-specific (time-variant)	
DLC (and LN_DLC)	number of domestic listed companies (and its log transformation)
STOCKCAP_(1-2)	(1-2 year) average market capitalization of listed companies (% of GDP)
STOCKTURN_(1-2)	(1-2 year) average stocks traded turnover ratio (%) (total value of shares traded/average market capitalization)
BANKPRIVCR_(1-2)	(1-2 year) average domestic credit to private sector by banking sector (% of GDP)
VAR_GDP_(1-2-3)	(1-2-3 year) average annual growth rate of GDP
CAPFORM_(1-2)	(1-2 year) average gross capital formation (% of GDP) (fixed assets investments + net changes in the level of inventories)
INFL	consumer price index (base year = 2005)

Comparing firm-level accounting data across countries is not exempt from comparability limitations: the harmonization in accounting standards and practices pursued by the BACH-ESD dataset is likely to greatly guarantee the comparability of data, since this is considered its main objective and is implemented at an institutional level; in fact, the project involves the Central Banks of the participating countries and was developed in close co-operation with the European of Central Balance Sheet Data Offices.

3.2 The Variables

Table 1 summarizes the dependent and independent variables used in the empirical test (the latter are the most significant measures of leverage determinants, selected among a large set of tested proxies). We briefly discuss them in the following sections.

3.2.1 The Dependent Variable

According to Welch (2011), we measure leverage only referring to the interest-bearing debt, because we want to identify the variables that influence the *explicit* financing choice of a certain corporate capital structure.

We include both short term and long term financial debt, because our sample includes bank-based countries, in which bank short term debt often disguises medium-long term debt, by means of the tacit renewal mechanism, and therefore heavily weights on total financial debt (D_MAT in Table 2 measures the incidence of bank short term loans on total bank loans). The measure adopted for estimating leverage is not neutral, as Table 2 clearly shows. In fact, although financial leverage and total leverage are strongly correlated, we can see that they importantly differ in terms of mean and degree of variability (total leverage is more stable than financial leverage)².

² Note that all the variances are underestimated, since they are calculated on aggregated data, i.e. size-class – industry – year combinations.

Furthermore, the proportion of short term debt is very important (it ranges from one third in Belgium to about two thirds in Italy) and cannot be ignored in analysing the capital structure choice of the European firms. However, the short-term debt component is often omitted to avoid its excessive time variability, since it is more flexible and better suited in matching the unexpected changes of financial needs (Shyam-Sunder and Myers, 1999). In our study, however, using the size-class average rather than the individual firm observation, we smooth this effect, while maintaining the stable component of short term debt.

We use book leverage instead of market leverage because we use a larger sample, including not listed companies.

3.2.2 The Independent Variables

We organize the independent variables in three categories, referring to the three macro-determinants of financial leverage (firm, industry, and country), whose characteristics they approximate. As said above, we limited the use of dummies, preferring to breakdown country, industry, and firm effects through their respective characteristics.

We included the year dummies as time fixed effects: however, as discussed above, in our test design the effect of time is likely to be absorbed by the time-variant determinants considered in the analysis, that belong to the three categories. We prefer to avoid considering time as an independent explanatory determinant such as country- or industry- or firm- specific determinants (as for example in Kayo-Kimura 2011), but explicitly assuming and tentatively explaining the longitudinal pattern of the analysed phenomenon.

Table 2. Leverage measures (%) (2000-2009)

Averages and coefficients of variation are calculated on aggregate data – size class × industry × year –, no matter their case number. TOTLEV measures the total indebtedness (ratio of difference between total assets and capital & reserves to total assets). D_MAT measures the debt maturity (ratio of short term bank debts to bank debts).

country	size class	LEV		TOTLEV		D_MAT	
		average	SD/average	average	SD/average	average	SD/average
AUSTRIA	LARGE	55.18	0.27	65.71	0.18	58.16	0.28
	MEDIUM	54.21	0.21	63.95	0.15	54.76	0.30
	SMALL	68.44	0.18	74.63	0.14	50.14	0.27
BELGIUM	LARGE	50.54	0.25	61.79	0.18	50.89	0.52
	MEDIUM	48.20	0.21	59.47	0.17	45.37	0.44
	SMALL	49.59	0.30	58.19	0.23	33.47	0.45
FRANCE	LARGE	54.83	0.22	67.08	0.17	43.45	0.50
	MEDIUM	52.12	0.17	65.38	0.11	44.55	0.48
	SMALL	50.02	0.19	62.69	0.13	37.93	0.51
GERMANY	LARGE	55.15	0.18	68.81	0.10	45.37	0.39
	MEDIUM	57.93	0.16	68.73	0.11	50.86	0.34
	SMALL	64.40	0.15	73.50	0.10	47.55	0.28
ITALY	LARGE	55.09	0.15	69.46	0.11	57.64	0.27
	MEDIUM	57.19	0.12	70.85	0.08	64.55	0.21
	SMALL	59.19	0.13	71.79	0.10	63.20	0.23
PORTUGAL	LARGE	48.28	0.33	61.44	0.21	53.16	0.51
	MEDIUM	51.80	0.22	64.00	0.14	55.21	0.35
	SMALL	60.21	0.16	69.78	0.11	52.17	0.30
SPAIN	LARGE	44.94	0.21	59.19	0.15	48.54	0.49
	MEDIUM	43.52	0.23	55.03	0.17	55.81	0.31
	SMALL	52.36	0.10	61.65	0.08	48.55	0.29

a) Size class (firm)-specific

As discussed above, our observations are considered at size-class level instead of at firm's level. We include the most common firm-specific determinants considered in the international empirical literature on capital structure choices: we simply measure them as size-class averages, for each country-industry-year combination.

As far as the firm-level determinants of leverage are concerned, three main theoretical approaches are relevant: the trade-off, the agency, and the pecking order hypotheses, the latter being based on both the Myers-Majluf (1984) information asymmetries theory and the Donaldson (1961 and 1984) managerial and stewardship approaches.

These theories, born as developments of Modigliani and Miller's (1958) approach of a perfect market, suggest that, when we include in the analysis market imperfections, several firm characteristics may determine firm's leverage; these theories often propose the same firm determinants, but the expected effects on financial leverage and the related rationales might change, depending on the adopted theoretical lens. We therefore analyse six firm-level determinants of capital structure: profitability, risk, taxes, liquidity, tangibility, and size.

There is no consensus among the various theories on the influence on capital structure of these firm-specific determinants. For brevity, we avoid discussing here the effect on leverage of the above firm-specific determinants and the related rationale according to the different theoretical perspectives: we refer to the well-developed theories on this field.

The firm-specific determinants are included in the analysis both in absolute and in industry-relative terms, the latter being measured as ratios between the size-class value of the variable and the related industry average. By means of these industry-relative variables, we consider the firm's position within its industry; previous studies (MacKay-Phillips 2005) provided evidence that the financial leverage variation arises more within industries rather than between industries: therefore, we assume that the firm-specific determinants affect leverage not only as absolute measures, but rather when compared to their industry average. It is important to note that all calculations are based on data of firms included in the BACH-ESD sample, which does not represent all the participants in each industry.

b) Industry-specific

Many studies on capital structure employ dummy variables to control the industry effect on leverage. We include in our model only the manufacturing dummy (MANUFACT), that distinguishes manufacturing firms from tertiary sector firms. In fact, we prefer to detail the time-variant characteristics of each industry, following the Kayo-Kimura's (2011) approach and previous studies in the strategy field (Simerly-Li, 2000; Ferri-Jones 1979; Dess-Beard 1984; MacKay-Phillips, 2005), that rationalize the industry characteristics influencing leverage.

Specifically, we include munificence, dynamism, business risk, and firms' concentration of an industry.

Munificence is the environment's capacity to support a sustained growth. Industries with high munificence have abundant resources, low levels of competition and, therefore, we can suppose that companies operating in munificent industries tend to have high levels of profitability.

If we extend the predictions regarding the impact of firms' profitability on leverage to an aggregate industry, we cannot expect an *a priori* relationship between industry munificence and leverage. As known, in fact, the pecking order theory recognizes a negative relationship between profitability and leverage, whereas the trade-off theory demonstrates a positive one. Therefore, we try to test both signs of the relationship.

We measure munificence by means of the average industry return on sales (%EBIT).

Dynamism reflects the degree of instability or non-predictable change in an industry (Boyd 1995). Therefore, we assume that firms operating in more dynamic and less predictable environments have lower levels of debt. We measure industry dynamism with the industry cross-sectional dispersion of ROS (BUSRISK), measured as interquartile distance, standardized by the median.

Lastly, we consider the influence of industry concentration on firm leverage using the well-known Herfindahl-Hirschman (HH) index. Previous studies do not show a univocal sign of the relationship between industry concentration and financial leverage. Some studies (MacKay-Phillips 2005; Lyandres 2001) show that firms in concentrated industries cluster around higher leverage levels, whereas firms in competitive industries carry less leverage and are more widely dispersed. On the contrary, Lipson (1993) predicts lower intra-industry dispersion but lower levels of leverage for concentrated industries. However, the degree of concentration also influences the real-side variables and therefore leverage through them. Competitive industries exhibit greater risk levels and more dispersion in risk. Profitability and asset size are both higher for concentrated industries. These findings suggest that concentrated industries are collusive, exhibiting higher and more stable profitability and less dispersion in profitability than competitive industries (MacKay-Phillips 2005). Product-market competition is less aggressive when leading firms have high financial leverage (Phillips 1995; Kovenock-Phillips 1997). Therefore, the HH effect on leverage is uncertain, since it passes through size, profitability, and risk effects. In this paper, the HH index is defined as the sum of the squares of market shares of the largest one hundred firms

within a given industry. The market share of a firm is given by the ratio of its sales to the total sales in the industry.

c) Country-specific

Following the empirical literature on the country effect on leverage, discussed in section 2 above, we detail the country effect including in the regression model *time-invariant* and *time-variant* country-specific determinants. Here we only describe the independent variables used in the empirical test, without repeating the theoretical rationales and the empirical evidence underlying them, previously discussed.

As for the time-invariant characteristics, we follow the approach of La Porta et al. (1998). We measure the degree of protection of shareholders' and creditors' rights, as recently reviewed by Spamann (2010) and Djankov et al. (2007): SHARIGHTS and CREDRIGHTS, respectively. Analogously, we include the variables that measure the quality of laws and regulations and the promptness of their enforcement: since conflicts of interest between corporate insiders (managers and/or majority shareholders) and external investors (minority shareholders and creditors) are important factors that influence the corporate financial structure, the extent to which contracts can be used to mitigate these incentive problems depends on these variables. JUDIC measures the efficiency and integrity of the judicial system, LAW assesses the law and order tradition of a country, CORR (Fan et al. 2012) measures the degree of government corruption. We omit the country dummies, since the time-invariant characteristics better represent country fixed effects.

As for the time-variant characteristics, we measure the development of both the stock market and the bank system, as well as some macroeconomics aspects.

We expect that the more developed and liquid is the equity market, the lower is the information asymmetry between investors and insiders (managers or majority shareholders) and the higher the firms' propensity to issue equity to finance investments, lowering debt levels. We measure the stock market development considering both capitalization (STOCKCAP) and turnover (STOCKTURN) ratios, together with the size of stock exchange list (DLC and its log transformation LN_DLC). However, stock market's liquidity and size positively influence the borrowers' transparency and therefore firms' financial leverage.

A country's orientation to banks as a source of finance affects a firm's capital structure choices (Demirguc-Kunt – Maksimovic, 1999). In some countries, like Germany and Italy, banks do not just provide loans, but play a significant role in information gathering and monitoring. Therefore, a highly developed banking sector favours a better access to external borrowing and, thus, higher debt levels. We measure the banking sector development with the ratio of private credit to total bank credit (BANKPRIVCR).

As discussed above, we omit the classification of countries based on general taxonomies such as civil *versus* common law countries or bank-based *versus* market-based financial systems. In fact, the countries included in our sample significantly differ from each other, although classified as civil law countries and bank-based systems.

Finally, as far as the macroeconomic characteristics are concerned, we include:

- the country economic growth (VAR_GDP) as proxy of the financing needs of firms (Demirguc-Kunt - Maksimovic 1999) at country level: a positive effect of this variable on financial leverage is expected;
- inflation rate (INFL). From a supply-side perspective, in a highly inflationary country, investors will be less willing to lend, since they are not sure about the real returns on their loans; however, from a demand-side perspective, if interest rates do not adequately reflect the high inflation rate, inflation can be associated with higher debt levels because the real repayment value of debt declines with inflation. Inflation uncertainty increases the firm's business risk and will carry less debt in the capital structure;
- capital accumulation (CAPFORM) influences leverage both positively and negatively, depending on whether it refers to financial needs or retained earnings.

Macroeconomic data are obtained from the World Bank and International Monetary Fund websites.

We include for some variables the lagged values, for considering their delayed effects on leverage (the suffix *_1* or *_2* is added to the variable name to show the corresponding lagged values).

3.3 Hypotheses and Methodology

3.3.1 The Tested Hypotheses

We summarize our tested hypotheses in Table 3, articulated by the main categories of determinants: firm-, industry (sector)- and country-specific (F, S, and C hypotheses, respectively). For brevity, we discuss here only

the hypotheses regarding both the direct and indirect country effects, according to the theoretical and empirical framework outlined in section 2 above, while we refer to section 3.2 for the rationales underlying the hypotheses regarding industry-specific effects and to the wide-spread international literature as far as the firm-specific determinants are concerned. However, we discuss here the indirect firm and industry effects, when country determinants mediate them.

In formulating hypotheses, we use D and I to identify, respectively, the direct effect on financial leverage and the indirect one, i.e. the effect of an independent variable mediated by another variable.

In less developed stock markets there is less information about firms for many reasons such as market illiquidity, weaker regulations, and lower corporate governance standards. This implies more information asymmetries among investors and insiders, raising the cost of capital. For this reason, the stock market development, in terms of both size and liquidity, has a negative impact on financial leverage. However, we could assume a positive effect on financial leverage of both liquidity and size of stock exchanges, since the market liquidity and the size of stock exchange improve firms' transparency from the lenders' standpoint and this effect can be enhanced when the country's judicial and law framework is tight.

C-Hypothesis D1: The stock market development has a negative direct effect on leverage.

C-Hypothesis I1: The stock market's liquidity and size (in terms of number of listed firms) have a positive indirect effect on leverage, mediated by the law and judicial environment.

The bank sector development positively influences leverage, since firms have more borrowing options, there are more competition among banks, lower costs of funding and higher bank efficiency on choosing borrowers, reducing the adverse selection.

C-Hypothesis D2: The bank sector development has a positive direct effect on leverage.

The bank market development may also mediate the effects on leverage of some industry characteristics. Specifically, we assume that it mediates the industry dynamism and the concentration effects on leverage. In addition to the expected direct effect (negative for the first factor and both negative and positive for the second), the indirect effect of these two characteristics, mediated by the bank sector development, should be positive. This because in a more developed bank system, banks are more efficient at monitoring, with larger portfolios and better alternatives for diversifying: in this context, a more dynamic industry may be perceived as an opportunity rather than a risk, and more credit will be lent. Analogously, the presence of a more developed bank sector mitigates the negative direct impact on leverage of more competitive industries *versus* more concentrated ones, lessening the perceived risk that competition induces.

S-Hypothesis I2: The industry dynamism, mediated by the bank sector development, has a positive indirect effect on leverage, i.e. the bank sector development mediates the negative effect of industry dynamism on leverage, reducing it.

S-Hypothesis I3: The industry concentration, mediated by the bank sector development, has a negative indirect effect on leverage, i.e. the bank sector development mediates the positive effect of industry concentration on leverage, reducing it.

The degree of protection of investors, both creditors and shareholders, influences the capital structure choices, as discussed before. When we assume a supply-side perspective, we can formulate the following hypotheses:

C-Hypothesis D3_a: The creditors' rights protection has a positive direct effect on leverage.

C-Hypothesis D4_a: The shareholders' rights protection has a negative direct effect on leverage.

However, when we assume a demand-side perspective, better creditors' rights protection means higher cost of distress and bankruptcy for the borrowers, that should be more severely punished if they do not fulfil their debt obligations. In this scenario, firms might ask for less debt, discouraged by higher "actual" default costs. Analogously, when the agent-principal problem is less important, firms might use more debt, since the diversified shareholders' interests in benefiting from tax shields overtakes the risk-reducing perspective of managers/majority shareholders; in addition, as far as closely held companies are concerned, if investors are more protected, control aversion makes the majority shareholders prefer debt to equity.

C-Hypothesis D3_b: The creditors' rights protection has a negative direct effect on leverage.

C-Hypothesis D4_b: The shareholders' rights protection has a positive direct effect on leverage.

When analysing the protection of investors' rights, it is important to consider the mediation effect of the judicial context, that can enforce a tighter or weaker protection by the law system. A better judicial system means faster

sentences, impartial and independent judges, and lower lawsuit costs. Therefore, we assume a positive direct effect on leverage of this variable (quality of the judicial system), assuming the mandatory nature of debt contracts and the residual nature of shareholders’ claims. Furthermore, we assume that the quality of the judicial system moderates the degree of protection of investors’ rights (we call this “actual” investor – shareholder or creditor – protection), enhancing the related direct effects on leverage, discussed above.

C-Hypothesis D5: The quality of the judicial system has a positive direct effect on leverage.

C-Hypothesis I2: The quality of the judicial system enhances the direct effect of creditors’ rights protection on leverage, irrespective of the sign of the relationship.

Table 3. The tested hypotheses

FIRM-SPECIFIC (F-Hypotheses)			
<i>direct effects</i>		<i>indirect effects</i>	
<i>D1_a</i>	Profitability has a positive direct effect on leverage	11	NDTS, mediated by profitability, has a positive indirect effect on leverage
<i>D1_b</i>	Profitability has a negative direct effect on leverage	12	Operating risk, mediated by creditors’ rights protection, has a positive indirect effect on leverage
<i>D2</i>	Non-debt tax shield has a negative direct effect on leverage	13	Asset tangibility, mediated by creditors’ rights protection, has a negative indirect effect on leverage
<i>D3</i>	Tangibility has a positive direct effect on leverage		
<i>D4</i>	Operating risk has a negative direct effect on leverage		
<i>D5</i>	Operating risk has a positive direct effect on leverage		
<i>D6</i>	Liquidity has a negative direct effect on leverage		
<i>D7</i>	Current asset ratio has a positive direct effect on leverage		
<i>D8_a</i>	Firm size has a positive direct effect on leverage		
<i>D8_b</i>	Firm size has a negative direct effect on leverage		
INDUSTRY (SECTOR) – SPECIFIC (S-Hypotheses)			
<i>direct effects</i>		<i>indirect effects</i>	
<i>D1</i>	Industry munificence has a positive direct effect on leverage	11	Industry munificence, mediated by profitability, has a negative indirect effect on leverage
<i>D2</i>	Industry dynamism has a negative direct effect on leverage	12	Industry dynamism, mediated by bank sector development, has a positive indirect effect on leverage
<i>D3_a</i>	Industry concentration has a positive direct effect on leverage	13	Industry concentration, mediated by bank sector development, has a negative indirect effect on leverage
<i>D3_b</i>	Industry concentration has a negative direct effect on leverage		
<i>D4</i>	Manufacturing firms are less leveraged than firms in tertiary industries		
COUNTRY- SPECIFIC (C-Hypotheses)			
<i>direct effects</i>		<i>indirect effects</i>	
<i>D1</i>	Stock market development has a negative direct effect on leverage	11	Stock market’s liquidity and size, mediated by law and judicial environment, have a positive indirect effect on leverage
<i>D2</i>	Bank sector development has a positive direct effect on leverage	12	The quality of the judicial system enhances the direct effect of creditors’ rights protection on leverage
<i>D3_a</i>	Creditors’ rights protection has a positive direct effect on leverage	13	The quality of the judicial system enforces the effect of shareholders’ rights protection on leverage
<i>D3_b</i>	Creditors’ rights protection has a negative direct effect on leverage	14	Both the quality of the judicial system and the investors’ rights protection (creditors or shareholders) jointly mediate the effect of the development of bank sector or stock market, respectively, on leverage
<i>D4_a</i>	Shareholders’ rights protection has a negative direct effect on leverage	15	Corruption lessens the direct effect of shareholders’ rights protection on leverage
<i>D4_b</i>	Shareholders’ rights protection has a positive direct effect on leverage	16	Capital formation, mediated by shareholders’ rights protection, has negative indirect effect on leverage
<i>D5</i>	Judicial system quality has a positive direct effect on leverage	17	Economic growth, mediated by industry munificence, has a negative indirect effect on leverage
<i>D6</i>	Corruption has a positive direct effect on leverage		
<i>D7_a</i>	Inflation has a positive direct effect on leverage		
<i>D7_b</i>	Inflation has a negative direct effect on leverage		
<i>D8</i>	Economic growth has a positive direct effect on leverage		
<i>D9_a</i>	Capital formation has a positive direct effect on leverage		
<i>D9_b</i>	Capital formation has a negative direct effect on leverage		

C-Hypothesis I3: The quality of the judicial system enforces the effect of shareholders’ rights protection on leverage, irrespective of the sign of the relationship.

Moreover, we can expect a joint effect of these two mediating effects (JUDIC, on the one hand, and CREDRIGHTS and SHARIGHTS, on the other hand) on bank sector and stock market development, respectively. We formulate the following hypothesis, which holds in every scenario, irrespective of the sign of the relationship between investor rights protection and leverage, based on the assumed perspective:

C-Hypothesis I4: Both the quality of the judicial system and the investors' rights protection (creditors' or shareholders') jointly mediate the effect of the development of bank sector or stock market, respectively, on leverage.

Similar considerations can be made about the corruption level of a country. Corruption increases the investors' risk: however, since debt obligations are legally binding, it is easier to expropriate equity holders than debt holders, and therefore we expect that the corruption level positively affects leverage and lessens the shareholders' rights protection, increasing its negative influence on leverage or, alternatively, reducing its positive influence.

C-Hypothesis D6: Corruption has a positive direct effect on leverage.

C-Hypothesis I5: Corruption lessens the direct effect of shareholders' rights protection on leverage, enhancing its negative impact or, alternatively, reducing its positive impact.

The protection of creditors' rights is likely to moderate the impact on leverage of some firm-specific determinants. Referring to the above discussion about the rationales of firm-specific determinants of leverage (see section 3.2.2), we assume that a higher creditors' rights protection moderates the negative impact of operating risk and the positive effect of asset tangibility on financial leverage, reducing both. Therefore, when laws and their enforcement give a better protection to lenders, the bank system is likely to offer more credit to firms with poor collateral and volatile returns.

F-Hypothesis I2: The operating risk, mediated by creditors' rights protection, has a positive indirect effect on leverage, that partially compensates its negative direct impact.

F-Hypothesis I3: The asset tangibility, mediated by creditors' rights protection, has a negative indirect effect on leverage, that partially compensates its positive direct impact.

Lastly, we hypothesize the effects of the macro-economic characteristics on leverage, according to the international theoretical and empirical background outlined above (see section 3.2.3), and consider their mediated effects, briefly discussed as follows.

When we consider the positive effect of capital formation on leverage, since it is assumed to proxy the firm's financial needs, we can assume that this effect could be mediated by the degree of shareholders' protection, expecting an indirect mediated effect on leverage, since a higher shareholders' protection favours the choice of equity vs. debt.

C-Hypothesis I6: The capital formation, mediated by shareholders' rights protection, has a negative indirect effect on leverage, that reduces its positive direct effect.

The industry munificence can explain the firm's ability to convert the economic growth of a country into economic returns and therefore retained earnings. To control for this effect, we can hypothesize a mediating effect of industry munificence (i.e. the %EBIT variable) on the positive impact of economic growth on leverage: firms operating in growing and munificent economies need less external funds (i.e. debt) for financing their investments, since they rely on higher retained earnings.

C-Hypothesis I7: Economic growth, mediated by industry munificence, has a negative indirect effect on leverage, that decreases its positive direct effect.

3.3.2 Methodology and Model Structure

There are many econometric models proposed in the academic literature that investigate which country determinants have an impact on the firms' financial structure. These models present several common features, since they are almost exclusively based on the use of panel data models, both with fixed and random effects (Aggarwal-Kyaw, 2009; Alves-Ferreira, 2011; Giannetti, 2003; Fan et al., 2012).

In general, the financial structure of a company is affected by both its typical profile (firm specific) and that of its business (industry specific), as well as by the geographic region in which it operates (country specific).

The way in which these variables show their impact on the firm's financial structure can take different forms: we can have a so-called "direct" effect, explained by a relationship of dependency between two variables, and a so-called "indirect" effect, described by a relationship of dependency among three or more variables. For example, if Y is the response variable, and X1 and X2 are two variables that affect Y, we can reasonably assume

that X_1 , in addition to its impact on Y , could also affect X_2 and, hence, again Y . In the first case, we say that the impact of X_1 on Y is “direct”, while in the second case it is “indirect”.

The use of models based on panel data does not allow the explicit identification of possible indirect effects among the analysed variables, so that in many studies (Hall et al., 2004; Fan et al., 2012; Aggarwal-Kyaw, 2009) the indirect effect is not considered at all. Furthermore, these models force an a-priori choice between estimators with fixed *versus* random effects, exclusively based on the outcome of a test of hypotheses.

Other methods suggested in the literature imply the estimate of the different effects (direct and indirect) with distinct models (de Jong et al., 2008; Giannetti, 2003), or with the inclusion of interaction variables, i.e. variables obtained as a product of the variables assumed to be triggers of indirect effects (Alves-Ferreira, 2011; Antoniou et al., 2008).

In the first case, we first estimate the direct effects, ignoring the others; however, if the latter are significant, their omission causes an incorrect specification of the model, producing biased estimates (Green, 2002). When we use the direct effects estimated with a first model, for estimating the indirect effects with a second model, the bias has an impact also on the estimates obtained in that second phase.

Furthermore, if we estimate the country effect by using separate equations for each country or including country dummy variables in the same equation, we ignore the possible interaction among countries: a comparison among them is only feasible in terms of comparison of coefficients, separately estimated for each country.

In this paper we suggest a model based on a unique sample – in which countries are not identified through the inclusion of dummies – and the country effect is measured estimating the coefficients of both the country variables observed in the various countries (direct effects) and the firm and industry variables, whose effect is mediated by the same country variables (indirect effects).

In this way, the intrinsic characteristics of a single country are explicitly included in the model, so that it is possible to estimate a coefficient for each of them, considering the variability of some characteristics among countries.

As far as the second type of methodology is concerned, using the product among variables as a proxy of the indirect effects, does not allow the identification of a possible endogeneity relationship among exogenous variables (Kline, 2011; Kaplan, 2004). In fact, if we include in the model as a regressor the variable $X_1 * X_2$ for identifying the possible impact of X_1 on Y through X_2 , we ignore the fact that the same X_2 could be dependent on X_1 .

In other terms, this is like ignoring possible causality relationships among regressors, that, as generally known (Hayashi, 2000), produces inconsistent estimates of the model’s parameters.

Another category of models is that of the hierarchical linear models (HLM), used for example by Kayo-Kimura (2011), whose choice is certainly appropriate, since it allows to consider the multilevel nature of the determinants. In fact, these methodologies consider the ways in which the variables interact to produce the distribution of the observed frequencies; at the same time, allow the identification of possible indirect effects of the determinants, through the estimate of the so-called random coefficient models. In relation to this type of models, we should point out that the definition of levels, i.e. the criteria underlying the classification of the observations, is extremely important. For example, the use of time as a first aggregation level of the observed data (like in Kayo-Kimura, 2011) could lead to the consideration of cross-sectional subsets of observations, and therefore to the loss of the information related to the time variability of *all* the determinants involved in the model estimation in the subsequent aggregation levels.

Our methodology is based on simultaneous equation systems (Greene, 2002), that allow the evaluation, within a single model, of the overall set of relationships among all the variables, through the estimate of the variance and co-variance matrix of the entire system of equations.

Hence, the use of this methodology allows the control of both the direct and indirect effects (effect decomposition: Kline, 2011), as well as of the possible endogeneity relationships among regressors, leading to consistent estimates of the parameters. The estimated system can be classified as a so-called Mediation Model (Mathieu-Taylor, 2006), and is based on the analysis of causal sequences starting from the theoretical assumptions about the cause-effect relationships among the variables. This class of models allows the evaluation of the existence, intensity, and direction of the effects. As far as the time variability of the determinants is concerned, we avoided a time (year)-based aggregation of the observations to catch the effect of the time variability for all the three classes of determinants specified in the model.

Our model implies the estimate of the parameters of 8 linear equations. The first one (1) is the equation of interest and explains the effects of the determinants on leverage (LEV), while equations (2) - (8) are estimated only to make explicit their *mediating role* in the model: they cannot be considered as explanatory of the left-hand side variable, i.e. the coefficients estimated in each of these equations are only used to obtain the indirect effects in equation (1).

In other words, the parameters of the equations from (2) to (8) should be interpreted from a *path analysis* perspective (Kline, 2011), in the sense that they are instrumental for showing the indirect effects on leverage of some of the variables considered. If, for example, we are interested in assessing the TANG's effect on LEV, we need to assess both its direct effect – measured through the estimate of β_{21} in equation (1) – and its indirect effect, mediated by CREDRIGHTS, in equation (7). In the second case, the effect will be measured multiplying the coefficients β_{27} and γ_{31} .

The estimate of different equations for catching the indirect effects on LEV allows the identification of *paths*, i.e. the identification of the indirect effects that go through two or more mediating variables. For example, as far as the TANG's effect on LEV is concerned, in addition to the effect mediated by CREDRIGHTS, it is also necessary to consider what is being mediated by JUDIC. In this case, the effect of TANG on LEV will be obtained multiplying the coefficients β_{27} , v_{65} and γ_{51} .

Hence, the overall indirect effect of TANG on LEV could be expressed as follows (see Figure 1):

$$(\beta_{27} * \gamma_{31}) + (\beta_{27} * v_{65} * \gamma_{51}).$$

The following is the final structure of the model:

$$\begin{aligned} LEV_{tjh} = & \alpha_1 + \gamma_{11} ROA_{tjh} + \beta_{11} NDTs_{tjh} + \beta_{21} TANG_{tjh} + \beta_{31} LIQ1_{tjh} + \beta_{41} LIQ2_{tjh} + \beta_{51} OPRISK_{tjh} + \\ & + \psi_{11} BUSRISK_{tjh} + \psi_{21} HH_{tjh} + \\ & + \gamma_{21} BANKPRIVCR_{1t00h} + v_{11} INFL_{t00h} + v_{21} CAPFORM_{1t00h} + v_{31} LN_DLC_{t00h} + v_{41} STOCKTURN_{t00h} + \\ & + \gamma_{31} CREDRIGHTS_{000h} + \gamma_{41} CORR_{000h} + \gamma_{51} JUDIC_{000h} + \\ & + d_{11} @1_{0000} + d_{21} MANUFACT_{0000} + \varepsilon_{1tjh} \end{aligned} \tag{1}$$

$$\begin{aligned} ROA_{tjh} = & \alpha_2 + \psi_{32} \%EBIT_{t0jh} + \beta_{12} NDTs_{tjh} + \\ & + \varepsilon_{2tjh} \end{aligned} \tag{2}$$

$$\begin{aligned} BANKPRIVCR_{t00h} = & \alpha_3 + \psi_{13} BUSRISK_{t0jh} + \psi_{23} HH_{t0jh} + \\ & + \varepsilon_{3tjh} \end{aligned} \tag{3}$$

$$\begin{aligned} \%EBIT_{t0jh} = & \alpha_4 + v_{54} VAR_GDP_{2t00h} + \\ & + \varepsilon_{4tjh} \end{aligned} \tag{4}$$

$$\begin{aligned} JUDIC_{000h} = & \alpha_5 + v_{65} CREDRIGHTS_{000h} + v_{75} SHARIGHTS_{000h} + v_{35} LN_DLC_{t00h} + \\ & + \varepsilon_{5tjh} \end{aligned} \tag{5}$$

$$\begin{aligned} CORR_{000h} = & \alpha_6 + v_{76} SHARIGHTS_{000h} + \\ & + \varepsilon_{6tjh} \end{aligned} \tag{6}$$

$$\begin{aligned} CREDRIGHTS_{000h} = & \alpha_7 + \beta_{27} TANG_{tjh} + \beta_{57} OPRISK_{tjh} + \\ & + \varepsilon_{7tjh} \end{aligned} \tag{7}$$

$$\begin{aligned} SHARIGHTS_{000h} = & \alpha_8 + v_{28} CAPFORM_{1t00h} + v_{48} STOCKTURN_{t00h} + \\ & + \varepsilon_{8tjh} \end{aligned} \tag{8}$$

where t is the time index, i the dimensional class, j the industry sector, and h the country; the indices' coefficients identify, in order, the regressor and the equation in which it appears.

The final structure of the tested model, described above, is the result of a broad testing process of all the hypotheses listed in section 3.3.1, together with the selection of the measured proxies for the various types of determinants, using, as a criterion, the significance of both the proxies and the hypothesized links.

We selected the variables included in each equation thanks to the identification of all the significant paths among them, making sure that every single indirect effect of these variables on LEV would be considered. We firstly investigated the links related to the firm specific variables, and subsequently we formulated further hypotheses on the country and industry determinants' effects.

For each category of explanatory variables, we verified the nature of their possible effect on LEV. We can distinguish four different types of "mediation" of the effect:

- in a first case, the nature of the effect is direct, i.e. it is not mediated by other variables (direct effect)
- in a second case the effect is only indirect (indirect effect), i.e. there is just an effect mediated by one or more variables, but without any direct effect
- in a third case we have a partial mediation, in the sense that we have both a direct and an indirect effect
- finally, we have a full mediation when the exhaustive specification of all the indirect effects makes the previously identified direct effect insignificant.

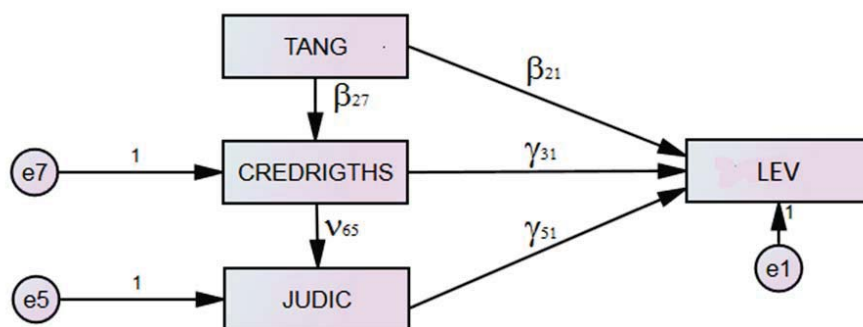


Figure 1. Example of direct and indirect paths

As said above, the 4 types of effects cannot be seen with the simple inclusion of "interactions" among variables in the model, since they prevent from identifying the directions of the causal relationships among the variables.

The mediational models, thanks to their ability to assign a direction to the identified relationships, are therefore the most appropriate tool for hypothesis testing.

The estimate of the unknown parameters of the system of equations was obtained with the "maximum likelihood with complete information" method: the estimates therefore are consistent, efficient, and sufficient.

To assess the model's fitting to the observed data, we used the usual and most popular indicators in the literature, with reference to the SEM models:

1. Akaike Information Criterion (AIC), a test of relative model fit. The preferred model is that with the lowest AIC value. $AIC = 2k - 2\ln L$, where k is the number of parameters in the statistical model, and L is the maximized value of the likelihood of the model;
2. Root Mean Square Error of Approximation (RMSEA). RMSEA values smaller than 0.1 indicate a good fit. A RMSEA value of 0.1 or larger indicates a poor fit.
3. Comparative Fit Index (CFI). In examining baseline comparisons, the CFI largely depends on the average size of the correlations in the data. If the average correlation between variables is relatively low, the CFI will decrease as well. A CFI value of 0.90 or higher is desirable.

4. Results

4.1 The Path Model Graph

In this section we illustrate the main results of the analysis. As already said (see section 3.3), we use a simultaneous estimation approach, *path analysis*, to measure firm, industry, and country effects on capital structure. Path analysis involves the analysis of sets of relationships among variables, so that independent variables in one equation become a dependent variable in another equation (Smith-Smith, 2004).

Figure 2 shows the path structure of the tested model.

In the complete model the correlations between variables were also estimated, but since we are interested on their causal relationships, and to facilitate the interpretation of the graphic model, all the correlations between variables (two-headed arrows) are not displayed, and only causal effects between variables are represented (one-headed arrows). The rectangle in Figure 2 represents the observed variables, while the circles represent the residuals of each equation. All mediation variables become dependent variables when used as mediation terms between two variables. In other words, if one-headed arrow is pointing towards a variable, the latter becomes a new dependent variable, which has as many independent variables as the arrows pointing towards it. For example, SHARIGHTS is a dependent variable influenced by CAPFORM_1 and STOCKTURN_1, and in the meantime it influences CORR (see equations 6 and 8 in § 3.3.2). It is easy to see that the structure is quite complex with several flows of information following different paths, but all converging to financial leverage.

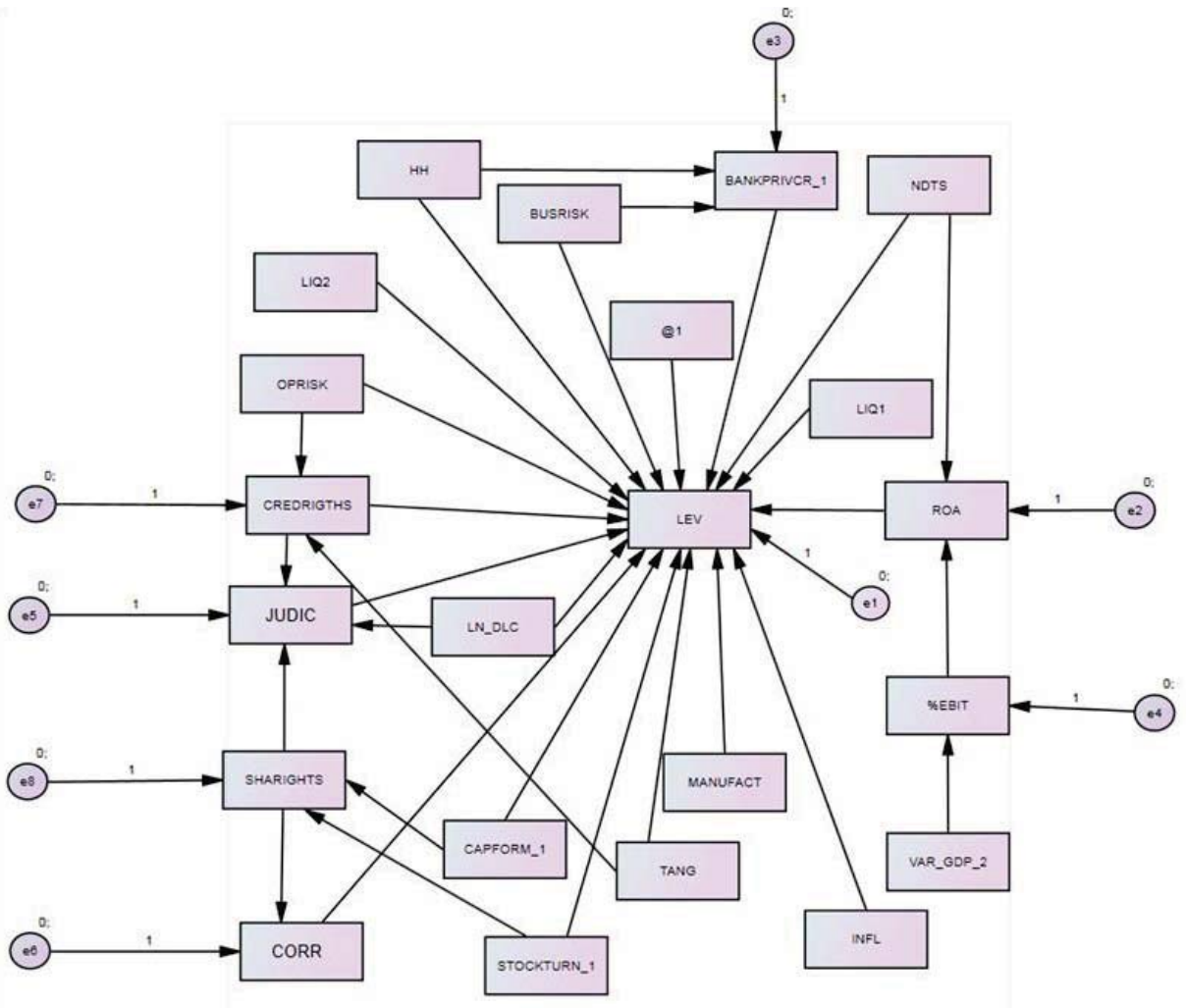


Figure 2. Path model graph

Table 4 presents the results of the model estimation, and Table 5 the information criteria used to evaluate the model fit³. These tests are usually difficult to interpret in terms of quality of the model (poor or good fit), since they take absolute values; to overcome this difficulty, we compare the absolute values obtained from the estimation of the model with the test values corresponding to both the empty and the saturated model. The test value from an empty model (i.e. the model which only includes the intercept) are often used as a lower threshold, because this model does not give any information about the relationships among variables; on the contrary, the saturated model explores all the possible relationships among variables (it includes both correlations and causal

³ For brevity, descriptive statistics of the independent variables are omitted. However, dataset is publicly available: BACH-ESD dataset is free as well as economic data from IMF/World Bank and institutional characteristics of countries (Spamann, 2010); in addition, the relevant level of data disaggregation is the same as in BACH-ESD dataset.

relationships). Table 5 shows that the three fit tests are closer to those of the saturated model compared to those of the empty model. As we said above (section 3.3.2), some thresholds for the CIF and RMSEA tests are widely used. Therefore, we can conclude that the estimated model provides a good representation of the linkages among the considered variables.

4.2 Industry and Size/Firm Effects

As far as the firm and industry direct effects on leverage are concerned, the results achieved in this study are consistent with those of the mainstream literature.

Panel A of Table 4 shows a negative effect between leverage and profitability (ROA) (Giannetti, 2003; de Jong et al., 2008; Alves-Ferreira, 2011). This finding is consistent with the POH and asymmetry information theory (*F-Hypothesis D1_b*). Due to the information asymmetry between investor and management, external funds are more expensive than retained earnings; more profitable firms have less debt in their capital structure because they prefer to finance their new investments with internal funds, that are cheaper than the external ones.

The ratio of current assets to total assets (LIQ1) has a positive effect on leverage: we assume that this ratio measures the proportion of working capital on the investment structure of the firm. Firms with larger current assets increase their short-term liabilities, that better match the investment maturity. On the other hand, liquidity measured as a ratio of cash and cash equivalents to total assets (LIQ2) negatively affects leverage, confirming what we found on the impact of ROA: firms with more funds available need less debt to finance their investments. These results are consistent with our hypotheses (*F-Hypotheses D6* and *D7*).

Conversely, tangibility (TANG) has a positive correlation with leverage, as hypothesized (*F-Hypothesis D3*). This is a widely shared result in the classical literature (Stultz-Johnson, 1985; Giannetti, 2003; de Jong et al., 2008; Aggarwal-Kyaw, 2009, Fan et al., 2012). In case of bankruptcy, tangible assets are more likely to maintain their market value than the intangible ones. Therefore, the risk of lending to firms with higher tangible assets is lower and, hence, lenders will demand a lower risk premium. Furthermore, a firm's opportunity to engage in asset substitution can be reduced by secured debt, which reduces the agency costs and hence the cost of borrowing. Asset tangibility improves the chances to obtain loans because lenders have a better opportunity to recover them in case of default (Jensen-Meckling, 1976).

The present value of bankruptcy costs also depends on the firm's operational risk (OPRISK), that proxies the returns' volatility and increases the probability of incurring in bankruptcy. For this reason, a negative effect on leverage is generally expected (*F-Hypothesis D4*), but we found instead a positive one. We can explain this evidence observing the financial-system orientation of our sample. The negative impact of operational risk on leverage especially holds for firms operating in market-based countries, characterized by more distance between lenders and borrowers. In bank-oriented countries, firms have closer ties with lenders, that reduce the actual cost of failure to service debt (Antoniou et al., 2008). Furthermore, when we consider closely held firms, we can expect that their risk aversion is higher, and therefore using more debt in their financial structure allows them to share the business risk with lenders.

The non-debt tax shield (NDTS) reduces earnings before interest and taxes, lowering the net advantage of the tax shield. Our results show a negative coefficient for this variable, consistent with our hypotheses (*F-Hypothesis D2*). Firms with higher depreciation rates do not need high debt levels to shield their earnings, and therefore tend to have less debt (hence the substitution effect prevails).

The effect of the firm's size is studied using a dummy variable, that splits the sample into two groups: small size firms and medium-large firms (@1). The positive coefficient evidences that small size firms are more leveraged than medium and large ones. This means that the correlation between leverage and size is negative (Rajan-Zingales, 1995). More asymmetric information and smaller and volatile retained earnings in small firms tend to push their financial choices towards debt rather than equity. Furthermore, small firms are often more closely held or family owned and therefore more concerned about losing control (*F-Hypothesis D8_b*).

In testing the model, we introduced the industry-relative firm's characteristics, but we did not find any of them statistically significant. Simultaneously including firm and industry determinants in the explanatory model is likely to absorb both the absolute and the industry-relative effect of the firm's characteristics.

Table 4. SEM estimation: the direct and indirect effects on leverage

The first column shows all the significant explanatory variables, split into firm, industry and country effects. There are reported both the direct (column 2) and indirect (column 3) effects. The multi-path indirect effects are decomposed (greek letters) and the corresponding coefficients of the equation model (§ 3.3.2) are reported. Column 4 indicates the mediation variables. Column 5 shows the total effect on leverage, obtained as sum of direct and indirect effects. Robust standard errors are given in parentheses. *, **, *** indicate that coefficients are significant at the 10%, 5% and 1% levels, respectively.

<i>financial leverage</i>				
<i>explanatory variable</i>	<i>direct effect</i>	<i>indirect effect</i>	<i>mediation variable</i>	<i>total effect</i>
(1)	(2)	(3)	(4)	(5)
PANEL A: Firm-specific effects				
ROA	-0.195 *** (0.018)			-0.195
LIQ1	0.163 *** (0.014)			0.163
LIQ2	-0.881 *** (0.038)			-0.881
TANG	0.095 *** (0.015)	0.027 *** 0.022 *** 0.005 ***	CREDRIGTHS CREDRIGTHS → JUDIC	0.122
OPRISK	0.17 *** (0.021)	-0.012 *** -0.009 -0.003	CREDRIGTHS CREDRIGTHS → JUDIC	0.158
NDTS	-0.588 *** (0.06)	0.159 ***	ROA	-0.429
@1	6.201 *** (0.339)			6.201
PANEL B: Industry-specific effects				
MANUFACT	-9.249 *** (0.325)			-9.249
%EBIT		-0.188 *** $\psi_{32} * \gamma_{11}$	ROA	-0.188
HH	-0.293 *** (0.059)	0.148 *** $\psi_{23} * \gamma_{21}$	BANKPRIVCR_1	-0.145
BUSRISK	0.129 ** (0.069)	0.069 *** $\psi_{13} * \gamma_{21}$	BANKPRIVCR_1	0.198
PANEL C: Country-specific effects				
BANKPRIVCR_1	0.223 *** (0.035)			0.223
STOCKTURN_1	-0.017 *** (0.005)	-0.003 *** -0.0034 *** 0.0002 ***	SHARIGHTS → JUDIC SHARIGHTS → CGRR2	-0.020
LN_DLC	-0.416 * (0.232)	0.168 ***	JUDIC	-0.248
SHARIGHTS		-0.295 *** -0.311 *** 0.016 **	JUDIC CORR	-0.295
CREDRIGTHS	1.804 *** (0.206)	0.412 ***	JUDIC	2.216
JUDIC	0.71 *** (0.270)			0.710
CORR	0.614 ** (0.287)			0.614
INFL	-0.168 *** (0.027)			-0.168
VAR_GDP_2		-0.047 *** $v_{54} * \psi_{32} * \gamma_{11}$	%EBIT → ROA	-0.047
CAPFORM_1	-0.799 *** (0.065)	-0.034 *** -0.0355 *** 0.0018 ***	SHARIGHTS → JUDIC SHARIGHTS → CORR	-0.833

Table 5. The goodness of model fit

MODEL	AIC	BCC	CFI	RMSEA
tested model	5603.865	5605.286	0.907	0.092
saturated model	550	552.752	1	/
empty model	56366.969	56367.41	0	0.229

Panel B of Table 4 shows the results of the industry determinants on leverage. As already said, we used many proxies of the same determinant: since they are mutually correlated, just the proxy that better explains each determinant was selected by the model. In addition, the time-variant industry variables replace in this model the industry dummy variables, mainly used in the international literature.

The first variable is the business risk (BUSRISK), that proxies the dynamism of an industry: we found a positive linkage of this variable with leverage, that contradicts the expected sign (*S-Hypothesis D2*). However, since BUSRISK measures the industry cross-sectional (i.e. among firms) dispersion of ROS, its positive impact on leverage could confirm the better ability of the bank system in selecting borrowers, compared to the equity market. From a different point of view, the perception of higher risk in dynamic sectors could make equity more expensive and orient firms towards debt.

Munificence proxies do not have a statistically significant direct effect on leverage, but an indirect one, which will be discussed at the end of this section.

The Herfindahl–Hirschman (HH) index has a negative impact on leverage. The negative effect is consistent with the previously found evidence that small and risky firms tend to be more leveraged, since a competitive industry includes riskier and smaller firms than a concentrated one (*S-Hypothesis D3_b*).

The coefficient of the manufacturing dummy (MANUFACT) is negative and statistically significant: it implies that firms in tertiary industries (in our sample, trade and services) are more leveraged than manufacturing firms (*S-Hypothesis D4*).

Two indirect effects were found, concerning firm and industry determinants. Firstly, non-debt tax shield (NDTS), when mediated by profitability (ROA), shows a positive coefficient, confirming the existence of an income effect of NDTS (Dammon-Senbet, 1988) (*F-Hypothesis II*). Higher depreciations derive from larger capital expenses (new investments), that generate higher profits. If a firm is profitable, the firm's actual tax charge increases, since it has higher taxable income. However, the substitution effect still prevails, since the total effect of NDTS on leverage is negative, but smaller than the stand-alone direct effect.

Secondly, the industry's munificence (%EBIT) is fully-mediated by the firm's profitability (ROA) and negatively influences leverage: this means that, thanks to the industry's munificence, profitable firms can rely on larger retained earnings and therefore tend to have less debt (*S-Hypothesis II*). The mediated effect obscures the direct effect of industry's munificence on leverage.

Some indirect effects of firm and industry determinants are also found, mediated by country characteristics. We prefer to discuss them in the next section, after the direct country effects.

4.3 Direct and Indirect Country Effects

We discuss here the effects of country determinants on leverage, both as direct determinants of leverage and as mediating variables of other determinants.

Many models were tested. This *step by step* process provided two useful results. First, the adopted methodology highlighted the existence of indirect effects and the type of mediation (full or partial). Second, creating multiple intermediate models permitted to select the best one in terms of goodness of fit, i.e. the final model described in Figure 2. The selection process stopped when the model fit was hardly improvable. Panel C of Table 4 shows the statistically significant coefficients for country variables, even after controlling for a broad range of industry and firm determinants, already discussed above.

The degree of stock market development should reduce the cost of equity and the asymmetry of information, pushing firm to rely more on equity, and lowering their leverage. Both liquidity (STOCKTURN_1) and size (LN_DLC) of the stock market show negative statistically significant coefficients, that confirm the hypothesis (*C-Hypothesis D1*).

Furthermore, the impact of these country variables is mediated by the institutional protection given to the shareholders. The impact on leverage of the mediation between financial and institutional characteristics is statistically significant. The liquidity of the stock market goes through two double mediation paths: firstly, through shareholder rights protection (SHARIGHTS) and judicial effectiveness (JUDIC); secondly, through shareholder rights protection (SHARIGHTS) and corruption (CORR). The two indirect effects have a negative and positive influence on leverage, respectively, but the negative effect still prevails, amplifying the direct effect of STOCKTURN_1 (*C-Hypothesis I3*). The first combined mediation tries to catch the "actual" shareholder rights protection, which represents the combined effect generated by the shareholder right protection (stated by law) and the efficiency and efficacy of the institutional system, called to enforce this right protection. The second

one is the result of the lessening effect of corruption on leverage, even accounting for a better shareholder rights protection, supporting our *C-Hypothesis 15*.

The indirect effect of the stock market size (LN_DLC) on leverage, when mediated by the judicial quality, is positive (according to *C-Hypothesis 11*), lowering the negative total effect. This means that in countries with many listed firms and an effective judicial framework, lenders benefit from a better firms' transparency and hence firms use more debt for financing.

The effect of bank sector development (BANKPRIVCR_1) is positive, consistent with the international evidence (de Jong et al., 2008; Kayo-Kimura, 2011) and our *C-Hypothesis D2*. Furthermore, the bank sector development mediates two industry determinants, generating two indirect effects. The first mediation is between industry dynamism (BUSRISK) and leverage: the indirect effect is positive, which means that a more developed bank sector is more efficient in evaluating and monitoring the borrower's risk and therefore can increase its credit lines; *S-Hypothesis 12* is confirmed: since the direct effect of BUSRISK on leverage is positive, the mediation effect enhances the overall positive effect. The second mediation effect is between industry concentration (HH) and leverage: the coefficient is positive, contrasting our hypothesis (*C-Hypothesis 13*). It should be noted that the total effect of concentration on leverage is negative, i.e. firms in concentrated industries are less leveraged than firms in competitive industries. What we observe is that firms in concentrated industries are more leveraged in countries where the bank sector is more developed than in countries where the bank sector is less developed: this evidence is consistent with the assumption that a more developed bank sector increases the chances of having access to bank credit. It is more difficult to explain the following emerging evidence: firms in competitive industries are less leveraged in countries where the bank sector is more developed than in countries where it is less developed; if we consider the positive impact of risk on financial leverage, found in this study, both at firm and industry level, we can explain this evidence in terms of signalling content of bank debt for risky firms. In countries where the bank sector is more developed, having access to bank credit is more widespread and therefore weakens as a guarantee of reputation for risky firms, i.e. firms operating in more competitive industries.

The degree of creditor protection has a positive correlation with leverage, supporting the supply-side perspective (*C-Hypothesis D3_a*). Countries with higher creditor rights protection (CREDRIGHTS) have more leveraged firms. In addition, the effect of the "actual" creditor rights protection is positive, too: the quality of the judicial system (JUDIC) enhances the positive effect of the creditor protection, pushing lenders to give more credit thanks to the availability of better protection (*C-Hypothesis 12*). The direct effect of shareholder protection (SHARIGHTS) on leverage is negative and significant (*C-Hypothesis D4_a*), but turned statistically insignificant when mediated by judicial system and level of corruption: this shows a full-mediation effect of these variables on leverage. As we see in Figure 2, the final model does not show a direct effect of shareholder rights protection on leverage, but only a negative indirect one (which confirms the *C-Hypothesis 13*): this means that the protection actually (rather than nominally) granted is the factor that better encourages firms to use equity for financing their needs. The indirect effect mediated by the level of corruption (CORR) is positive, confirming the *C-Hypothesis 15*. Higher levels of corruption tend to reduce the benefit of shareholder rights protection when using equity, switching the preference to financial debt. However, the overall indirect effect remains negative.

The "actual" creditor rights protection, i.e. the indirect effect of CREDRIGHTS mediated by JUDIC, also influences two firm's determinants. As shown in Figure 2, this variable mediates the effects of asset tangibility (TANG) and operational risk (OPRISK), on the one hand, and financial leverage, on the other.

The hypotheses (*F-Hypotheses 12* and *13*) formulated for these two indirect effects, assuming a supply-side perspective and the actual protection rather than the nominal one, are both rejected. The presence of a higher protection enhances the effect of providing tangible assets as collateral for increasing bank debt. This means that a demand-side perspective prevails: in countries where the creditor rights are more protected, the cost of debt for the borrowers is higher, due to higher distress and bankruptcy costs (lenders can more efficiently claim the enforcement of their credit contracts); therefore, the borrowers who can offer more tangible assets as collateral are more oriented to use debt, since they reduce these costs.

As far as the operating risk is concerned, we obtain a negative mediating effect of creditor rights protection, that reduces the positive direct effect of firm's risk on leverage. Again, a demand-side perspective prevails: riskier firms tend to share the business risk with banks (the direct effect of OPRISK is positive), for various reasons, discussed above (see section 3.2.2). In countries where creditors are more protected, bankruptcy costs are higher and therefore this risk sharing is less convenient for borrowers.

Moreover, the direct effects of both the quality of judicial system and the corruption level are positive, as expected (*C-Hypotheses D5 and D6*). Therefore, these countries' institutional characteristics have an overall positive effect on leverage through both the direct and the mediating effects.

The last part of Table 4 shows the coefficients of the statistically significant macroeconomic determinants. The 2-year average annual economic growth (*VAR_GDP_2*) is fully mediated, i.e. the direct effect on leverage becomes insignificant when mediated by industry munificence and firm's profitability; the indirect effect is negative, consistent with the POH perspective (*C-Hypothesis I7*). Inflation (*INFL*) has a negative direct effect on leverage, that confirms the supply-side viewpoint (*C-Hypothesis D7_b*). The negative coefficient of lagged capital formation (*CAPFORM_1*) qualifies it as a proxy of retained earnings; furthermore, this effect is enhanced when mediated by shareholder rights protection, generating a negative indirect effect. Hence, the total effect is boosted in countries where high shareholder rights protection reduces the information asymmetry, lessening the advantage of debt with respect to equity: this evidence supports the POH perspective, and our country hypotheses *D9_b* is confirmed.

Finally, the year dummies did not show any statistically significant relationship with leverage: it is likely that macroeconomic and financial time-variant country's characteristics better catch the time fixed effects.

5. Robustness Tests

We check the robustness of our explanatory model on country effect, testing it with different sub-samples, split based on size and time. In particular, we split the entire sample into two sub-samples based on size: a sub-sample of small firms (1.540 observations) and a sample of medium and large firms (3.080 observations); furthermore, we split the entire sample into two sub-samples based on time, in order to separate two different economic phases occurred during the period considered in the entire sample: a sub-sample refers to the small crisis period (2000-2004, with 2.310 observations), while the other sub-sample refers to the subsequent expansion period (2005-2007, with 1.386 observations). We decided to omit the last abnormal two years (2008-2009), characterized by the recent crisis. The objective is to test the general robustness of the explanatory model with different firms' sizes and economic phases. We verify the robustness of the model, comparing the signs and statistical significance of the determinants' effects on financial leverage of each sub-sample to those previously found in the entire sample.

We omit the detailed results for brevity. Summarizing, we obtained that:

- a) most coefficients are statistically significant and their signs and values are similar to those of the entire sample; however, some differences emerge and can be explained, observing the different nature of the sub-samples;
- b) we observe for the small firms, due to their wider information asymmetries, the following differences:
 - the stock market represents a viable alternative for financing investments only in countries where the stock exchange is large (and therefore includes also the small companies)
 - the liquidity of the stock market, instead, is not relevant for them
 - the information asymmetry enhances the importance of collateral for small firms (*TANG*): small firms with tangible assets can use more debt because the marginal reduction of the asymmetry is greater for them compared to larger firms, where the coefficient is less significant and negative
 - for the same reason, small firms in dynamic sectors (*BUSRISK*) could represent an exploitable opportunity for banks, that rely on a better selection and monitoring process of the small firm's performance compared to the stock market. Larger firms can rely on a better reputation and they may not need banks to soften their information asymmetry: this explains why the coefficient is not statistically significant for them
 - a larger coefficient of the ratio of current assets to total assets (*LIQ1*) is found on the small firms' sample, which shows the importance of this determinant. Small firms are likely to be characterized by a larger proportion of current assets, since they operate more often in light industries that are less capital intensive and less sensitive to scale economies. Therefore, the relevance of current assets drives their financial needs, that are often financed by short term loans, to match the maturity structure. In the medium-large firms' sample the effect of this determinant is much lower.
 - the lagged capital formation's coefficient is smaller for the small firms than for the larger ones (*CAPFORM_1*). Capital formation may have a lower impact on small firms because their ability to generate and maintain a stable retained earnings level is lower than in larger firms. Therefore, their

potential retained earnings are a weaker substitute for financial debt. This result is also confirmed by the smaller negative coefficient of profitability (ROA) for small firms.

- as far as the sub-samples based on time periods, we found that the coefficient estimates seem to be robust for different economics phases. All the coefficients in both sub-samples are statistically significant (except for STOCKTURN_1 in the small crisis sample), with the same signs and similar values of the effects of determinants found in the entire sample. This can demonstrate that the significant economic effects are mostly captured by the time-variant country-specific determinants. The indirect country effects are consistent with entire sample, too.

6. Some Conclusions

This paper examines how country characteristics affect capital structure decisions in seven European countries, when size-class and industry specific characteristics are also considered in the explanatory model.

The most important empirical findings emerging from the analysis are summarized as follows:

- the country's characteristics have an important impact on firm's leverage, both directly and indirectly;
- among the country's determinants, those regarding the institutional framework are very influential. We note that it is the *actual* investor protection that influences the capital structure choice, rather than the theoretical one, i.e. that ideally guaranteed by laws. In fact, the quality of the judicial system assures the effectiveness of the investor's protection, allowing for an effective and more rapid enforcement of contracts; the corruption level can vanish this protection, especially of shareholders rights, that are more easily expropriable. We find that the more protected the creditors, the more leveraged the firms; the more protected the shareholders, the less leveraged the firms. Both these findings support the sign expected from the supply-side perspective. However, if we consider the mediating effect of creditor protection on asset tangibility and risk in influencing financial leverage, a demand-side perspective prevails. In fact, in countries where creditors are more protected, the positive effect of asset tangibility on leverage is enhanced: a stronger protection of creditors triggers higher bankruptcy costs, that firms try to contain making use of collateral for guaranteeing their debt; riskier firms in countries where creditors are more protected and bankruptcy costs are higher use less debt to reduce the probability of default;
- the financial system's characteristics of a country also affect the financial leverage. The more developed the bank system, the more leveraged the companies; the more developed the stock market, the less leveraged the firms. It is important to note that the liquidity of the stock market and the size of the stock exchange in terms of number of listed firms are relevant. The latter, however, has a positive indirect effect on leverage, that can be explained in terms of better firms' transparency deriving from being listed;
- as far as the firm- and industry-specific determinants are concerned, our empirical findings importantly support the POH perspective. Firms' profitability and industry's munificence and capital formation increase the retained earnings and therefore lessen the firms' indebtedness. Analogously, both liquid assets availability and economic growth in munificent sectors decrease financial debt. Furthermore, firms are likely to aim at matching the maturity of sources and uses: larger current assets correspond to more debt (probably, short term);
- however, the tax implication of debt is an important determinant at firm level, and we find both the substitution and the income effect of non-debt tax shields;
- we see that small and riskier firms are more leveraged. The positive impact of risk on financial leverage was found at both firm and industry level (the latter measured as a cross-sectional dispersion of ROS among firms). Furthermore, these findings are supported by a negative linkage between industry concentration and financial leverage: more concentrated industries are likely to be characterized by larger firms and more stable competitive pattern among firms. This evidence proves:
 - better selecting and monitoring skills of banks with respect to the equity market; the dispersion of profitability among firms and the potential return volatility (the operating leverage is an *ex ante* measure of operating risk) could represent in this scenario an opportunity rather than a threat for banks; furthermore, the opacity of small and risky firms makes debt less expensive than equity;
 - the prevalence of the demand-side perspective: bank debt is likely to be used by risky firms for sharing risk with creditors and signalling business quality and firm reputation; furthermore, the risk aversion of closely held or entrepreneurial firms makes debt more attractive for financing;

- the macroeconomic characteristics of a country complete the country effect on capital structure choices: inflation reduces the use of debt, as well as the economic growth and the capital formation.

This study presents some limitations. Firstly, it considers a sample of seven European countries and therefore the findings cannot be generalized to different economic, financial, and institutional contexts. Therefore, further research could use an ampler sample, to improve the generalizability of the model. Secondly, the observations are not at firm-year level, but at size-class-industry-year level. As discussed above, this data limitation could overcome some pitfalls of a firm-level analysis, but however it *ex ante* reduces the variability of the analysed sample and therefore the explanatory power of the model. Further research could eliminate this data aggregation and better exploiting the explanatory model here proposed. In this case, however, a dynamic approach of adjustment to the optimal capital structure is likely to be used, since the observed static leverage measures of individual firms do not approximate their target leverage each year.

The empirical findings here obtained highlight the importance of institutional and financial characteristics of the country where borrowing firms and lending intermediates operate, both directly and mediating the impact of other determinants of capital structure. This means that country characteristics should be considered in managerial decisions as well as in formulating guidelines and rules by regulatory institutions: a one-fits-all approach is not workable. Finally, they show that a demand-side perspective (often omitted in economics and finance) better explains firm behaviours in capital structure choice, especially when firms are small and medium-sized (Watson, 2010).

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Managerial Cognition, Strategy and Performance of Foreign SMEs in Romania

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Abstract

Economic downturn can either create opportunities or difficult threats for small and medium sized enterprises. Managerial perceptions act as environmental interpretations and influence the strategies that are implemented during recessions and other difficult situations. In any scenario, they affect organizational performance. This paper investigates the interactions between managerial cognition of an economic recession, the response strategy chosen and the consequences for firm performance amongst foreign SMEs operating in Romania across 12 industries. We consider both managerial and organisational antecedents for organisational performance.

Keywords: threats and opportunities, Romania, SMEs, entrepreneurial cognition, strategic orientations

1. Introduction

The majority of the strategic management literature explains organisational behaviour through organisational variables other than those related to strategic decision-making, while recent views have been increasingly indicating that executive judgment is an important cause of organisational strategic behaviour (Powel et al., 2011). Accordingly, strategic judgment significantly influences the strategic orientation of organisations (Holmes et al., 2011), while the orientation of the strategic decision maker, i.e. the managerial perception of opportunities and threats, influences the choice of organisational strategy (Devers et al., 2008). The strategic management literature traditionally assumes that organisational behaviour and thus strategic orientation is based on several organisational and environmental variables; however, individual decision-making models argue that the managerial perception of risk, opportunities and threats influences strategic decision-making, thus influencing organisational behaviour and performance, causing deviations from what would be expected, based merely on strategic management arguments, i.e. the expected return (Kahneman, 1992).

To start understanding managerial perception and risk orientation, we find ourselves tapping into the field of cognitive science, since the strategic management literature has been lagging behind. It is only recently that the strategic management field has turned its attention to the role of cognitive processes within the strategic management process, i.e. the implications of individual decision-making for strategic management within an organisation, a field which recently has been coined as the 'behaviour strategy field' (Powel et al., 2011). This field highlights the fact that firm-level actions and organisational behaviour are influenced by the cognitive processes of strategic decision-makers (Porac & Thomas, 2002). For individuals in isolation, the implications of risk perception and attitudes to the individual decision-making process have been repeatedly pointed out (Edwards, 1996). However, despite research that draws from cognitive theory to explain organisational behaviour, the link between managerial risk orientation and organisational strategy implications, under conditions of risk, still remains unclear (Homes et al., 2011).

Risk situations, relevant for the relationship between strategic risk attitudes and the choice between organisational strategies, entail conditions of high-stake and complex problem-solving (Powel et al., 2011), situations which are often associated with decision-making during organisational crises (Dutton & Jackson, 1987; Jackson & Dutton, 1988). Especially crisis situations resulting from macro-institutional changes, i.e. economic turbulence affecting the market, are habitually associated with high-stake and complex problem-solving circumstances (Pearson & Clair, 1998). Economic crises are representative of high risk circumstances, where both opportunities and threats can be spotted. An opportunity represents a high chance for likely gain and a small

chance for loss, while a threat is the exact opposite (Jackson & Dutton, 1988). Therefore, the perception of a crisis, in terms of opportunity and threat, is not only found to be salient in strategic literature; it is also used as a suitable indicator of risk framing and perception (Ocasio, 1995; Chattopadhyay et al., 2001).

Crises can devastate unprepared organisations but can strengthen those that are well prepared (Loosemore et al., 2000). During a period of economic downturn, all firms face difficult environmental conditions, because of the decline in demand, the fact that there is less available capital, the increase in unemployment, the reduction of shareholder value and the lower return on investments and the ambiguity of cause and means of resolution (Kunc & Bhandari, 2011; Pearson & Clair, 1998; Vaaler & McNamara, 2004). In such contexts, the adaptations organisations make to environmental changes are strongly influenced by the interpretations of decision-makers (Chattopadhyay et al., 2001). Because changes in the environment are often ambiguous, managers' perceptions become increasingly important in executing certain types of strategies. Such perceptions may influence the managers' responses (making them risk-averse or risk-seeking) to environmental changes and, consequently, may influence future organisational actions (Chattopadhyay et al., 2001).

Such interpretations of the environment by managers can be categorised either into threats or opportunities (Dutton and Jackson, 1987). Past research has shown that this categorisation of the environment could affect the performance of organisations. Dutton and Jackson (1987) confirm that categorising and labelling an issue as a threat vs. an opportunity can have significant effects on the responses and performance of firms (Kreiser and Davis, 2010). To this labelling, a third perception is added here; namely, the perception of a moderate volatile market (McKee et al., 1989).

Within such contexts, there is no single way for firms to react; therefore, no single success formula can be identified. Organisational behaviour, business strategy and performance vary in terms of resources and capabilities, managerial perceptions of the threats faced, availability of opportunities and the wider organisational, market and institutional contexts. Although considerable theory has been developed, little is known about the actual organisational response strategies (Dutton and Jackson, 1987; Staw et al., 1981; in Ashmos et al., 1997).

This paper aims to study the interrelations between managerial perception, organisational response strategy and performance during economic recession. Empirical evidence has been gathered from foreign SMEs in Romania. Numerous empirical tests of the strategy-performance relationship appear in the relevant literature; however, many of these studies have only taken under consideration mature and stable industries (Parnell et al., 1993; Kitching et al., 2009). Little attention has been paid to the strategic and performance implications of managerial perceptions of an economic crisis in the context of emerging economies. International business scholars have argued that emerging economies represent the place and source for future theory testing, revelations and exploration (Gauselmann et al., 2011; Uhlenbruck & De Castro, 2000; Oviatt & Mcdougal, 1997). Additionally, these fast growing emerging markets offer a diversity of strategic goals and opportunities for foreign firms (Baack & Boggs, 2008). At the time of our data collection (Spring 2014), as a former communist Eastern European country, Romania was classified as an emerging economy (WEO, 2014).

2. Managerial Risk Perception and Response Strategies

Risk perception indicates an expectation of the future (Jackson & Dutton, 1988), while risk attitudes are used to determine the most likely choice in a specific situation, describing systematic biases in rational decision-making behaviour (Tversky & Kahneman, 1979). Risk perception and attitudes contain information indicating the magnitude of either risk-seeking or risk-averseness behaviour, becoming suitable for accurate predictions of decision-making behaviour under risk circumstances (Pennings & Smidts, 2000). However, it is assumed (Ocasio, 1995) and has been argued (Chattopadhyay et al., 2001) that risk perception can be accurately used to indicate risk attitudes, which in turn could then be used to better understand the influence of risk perception on organisational behaviour.

Various studies have investigated the organisation-environment adaptation cycle. A main division can be made between individual-level responses and company-level responses. The typology of different strategy types (prospectors, analysers, defenders and reactors) is based on the dynamic process of adjusting to a high pace of environmental changes and uncertainty (Miles & Snow, 1978), taking into account the trade-off between external and internal strategic factors. Other theories, such as Prospect Theory and Threat-Rigidity Theory, focus more on the individual level. Although these theories show contradictory attitudes about the notion of economic crises, both categorise perceptions in the face of a crisis into threats or opportunities (Chattopadhyay et al., 2001; Thomas et al., 1993). These categorisations made by individuals are important because managers will enact their environment consistently with their psychological set (Smart & Vertinsky, 1984). The way managers perceive a

crisis has consequences, in terms of determining strategic responses; thus, the level of individual tolerance for ambiguity and uncertainty becomes a critical factor in determining organisational responses to environmental stimuli (Dutton & Jackson, 1987, in; Ashmos et al., 1997; Smart & Vertinsky, 1984).

2.1 Perceiving Threats: Threat-Rigidity Theory

A threat is an event that has impending negative or harmful consequences for the entity (Staw et al., 1981; in Barnett et al., 2000). In order to understand managers' responses to threats, the threat-rigidity theory has been developed (Staw et al., 1981). Staw et al. (1981) mention several examples of companies in which individuals, groups and organisations act rigidly in the context of threatening situations. A threat may thus lead to a restriction of information and a constriction in control.

A restriction of information is characterised by a narrowing of the field of attention, a simplification of information codes, or a reduction in the number of channels used (Staw et al., 1981). A constriction of information means that the power within an organisation shifts to higher levels in the hierarchy. There are several levels at which the threat-rigidity theory applies; namely, the individual, the group and the organisational level. The focus here lies on the individual level, because organisational actions often involve the function of the welfare of individual managers (Staw et al., 1981). Individual managers who perceive the environment as a threat—like a crisis situation—possibly face limited control over the situation and the risk of negative results (Chattopadhyay et al., 2001, p. 939). As a reaction to such threats, managers can end up executing a greater level of organisational control. Also, other reactions to threats, such as cost cutting or budget tightening (Thomas et al., 1993), as well as an intensification of efficiency concerns (Staw et al., 1981) are possible. All these can be seen as risk-averse behaviours.

The threat-rigidity theory assumes that managers take risk-averse decisions in the face of a threatening environment, in this case a crisis situation. Instead of focusing on new markets and / or products, the company focuses on current resources, trying to make them more efficient. This is called exploitation (Kitching et al., 2009).

The threat-rigidity theory can be related to the strategy typology of Miles and Snow (1978), containing respectively a Reactor, a Defender, a Prospector and an Analyser. This study uses the Miles and Snow strategy typology, in order to distinguish the different strategy types among small- and medium sized companies. It was first published in 1978 and has been used later on by many other authors too (Hambrick, 1979; Snow & Hambrick, 1980; Meyer, 1982; McDaniel & Kolari, 1987; Ruckert & Walker, 1987; Zahra, 1987; Conant et al., 1990; in: Parnell et al., 1993, p. 30). The reason for choosing this typology is because it has proven its potential during the last decades, it is suitable for SMEs and it takes into account the adaptive capabilities of companies, by including a rank order from Reactor to Prospector Strategies.

Snow and Hribiniak (1980) state that organisations that use a Reactor strategy are often forced into this strategy because managers are not able to develop capabilities to deal with environmental changes. This can be related to the threat-rigidity hypothesis, because managers who perceive a crisis situation as threatening could be risk-averse and could react to the situation by means of a so-called Reactive Strategy. Managers only act when something happens in the environment. Miles and Snow (1978) have also identified the strategy type of a Defender. By means of this strategy, the organisation wants to secure and maintain its position in the market, by offering higher quality, superior service, or lower prices to protect their domain, rather than to move aggressively (Segev, 1987). The focus lies on securing market position, offering better customer service and keeping low prices (Gruber-Muecke & Hofer, 2015). Based on this line of argument, our first hypothesis can be formulated:

Hypothesis 1: The managerial perception of the crisis environment as a threat positively relates to a Defender Strategy or Reactor Strategy.

2.2 Perceiving Opportunities: Prospect Theory

The Prospect Theory contradicts the threat-rigidity hypothesis (Chattopadhyay et al., 2001). According to the Prospect Theory, decision-makers will take greater risks in response to threats, rather than in response to opportunities (Dutton & Jackson, 1987). Prospect Theory is based on the assumption that the probabilities of outcomes are known. This contradicts the Threat-Rigidity Hypothesis, which can be linked to uncertainty and in which managers are assumed to be risk-averse.

According to the Prospect Theory, responses to issues labelled as opportunities should be comparable to responses to problems framed as potential gain situations (Dutton & Jackson, 1987). When a manager perceives the environment as threatening, he or she will not preserve the status quo but will take action accordingly. This contradicts the Threat-Rigidity Hypothesis, which states that managers react conservatively in response to a

crisis. According to Prospect Theory, individuals who are in unfavourable circumstances tend to become risk-seeking, because they feel they have little to lose (Chattopadhyay et al., 2001). Thus, decision-makers will end up taking greater risks in response to threats, for example in response to a crisis (Dutton & Jackson, 1987). According to this idea, managers who face a crisis environment, and thus face unfavourable circumstances, will be more willing to take risks, as a remedy to the crisis.

This argumentation can be linked to Miles and Snow's Prospector Strategy (1978). This is the most aggressive strategy, whereas a firm actively seeks new market opportunities and new product developments. Therefore, these kinds of firms are also called 'industry designers'. They respond very quickly to changes in the market, sometimes without even investigating potential risks. This resembles the concept of exploration, which is characterised by looking for new sources of competitive advantage (Kitching et al., 2009). When managers perceive a volatile market as positive, opportunities for the organisation tend to increase, because managers think there is a chance for market growth (McKee et al., 1989). Therefore, the following hypothesis can be formulated:

Hypothesis 2: The managerial perception of the crisis environment as an opportunity positively relates to a Prospector Strategy.

2.3 Perceiving Both Sides: Exploration and Exploitation

An organisation can execute a balancing strategy between exploration and exploitation. Miles and Snow's Analyser Strategy (1978) would suit most in this situation. This strategy is characterised by the maintenance of a stable domain, in which an organisation can operate with relative efficiency, also though attempting to identify (through market scanning and research) any emerging opportunities (McKee et al., 1989). The Analyser, as the name suggests, thus conducts profound market analysis before taking actions.

Often, the organisation is second-in to new product markets, learning from its predecessors. When a manager faces a crisis and takes greater risks compared to a non-crisis situation, he can use the Analyser Strategy if he does not want to take too much risk but still wants to take advantage of the crisis situation. McKee et al. (1989) have empirically investigated the fact that Analysers financially outperform other strategy types, when the market is mildly volatile. To see whether this also accounts for a relatively neutral perception of the market, the following hypothesis is formulated:

Hypothesis 3: Managers who perceive a crisis environment neither as a threat nor as an opportunity are more likely to choose an Analyser Strategy.

3. Strategy and Organisational Performance during a Crisis

Geroski and Gregg (1997) argue that an organisation's pre-recession performance is no reliable measure of within- or post-recession performance. Firms with relatively poor performance before the recession might have excellent results after that period, while firms that operated well before could be worse off after the crisis. Some firms are able to adapt to recession conditions in superior ways, leading to improved performance. If companies are not able to innovate or display flexibility, relying solely on existing ideas, there can end up being fewer opportunities for exploration and ambidexterity. Performance during crisis maps organisational characteristics, such as business size or sector, in differentiated ways (Kitching et al., 2009). Regardless of whether an industry is flourishing or not, there are always differences that could be identified between high performers and low performers. The authors argue that 'outcomes cannot simply be read off from organizational characteristics' (p. 54); it is also about how businesses behave under certain conditions, thus the specific organisational strategy that is undertaken is an important antecedent, associated with performance during crisis (Tang and Hull, 2011).

In the relevant literature, different process characteristics of strategies have been identified. The typology of Miles and Snow (1978) can be seen as an ordinal set of the extent to which firms in these categories develop adaptive capability to respond to the market (McKee et al., 1989). Moreover, considerable empirical support has been found for this typology (Conant et al., 1990; Hambrick, 1979, 1983; McDaniel & Kolari, 1987; Meyer, 1982; Ruekert & Walker, 1987; Snow & Hambrick, 1980; Zahra, 1987; in Parnell et al., 1993).

The Prospector is the most aggressive strategy, in which the firm actively seeks new market opportunities and new product developments. The company responds very quickly to market changes, sometimes without even investigating the risks. Due to its external orientation, the Prospector tends to maintain and accept the inherent costs in developing extensive capabilities, necessary for responding to market changes (Miles & Snow, 1978; Uddin et al., 2014).

The Defender, is almost the opposite of the Prospector, because the firm intentionally reduces the adaptive capability and the associated cuts (McKee et al., 1989). The organisation selects a narrow and stable market so that it can focus on efficiency. Besides, the organisation is risk averse, in order to maintain its position in the

market. By doing this, it can keep advertising expenditures low and the firm can focus on a limited product offering. Defenders display high labour division, high formalisation and a high centralisation structure (Parnell et al., 1993). The disadvantage is that the organisation can fail to notice market changes, leading to rigidity as a result (Keels et al., 1998).

The third strategy mentioned by Miles and Snow (1978) refers to the Analyser. Firms using this strategy maintain a stable domain, in order to operate with relative efficiency, while attempting to identify (through market scanning and research) any emerging opportunities. Firms choose this strategy because they are less risk-averse compared to Defenders and Reactors, but not so risk loving as Prospectors. Therefore, they are often second-in to new product markets, awaiting the advantage of learning from the pioneers. Analysers exert tight control over their current operations, but lose control of new ones. The Analyser often accomplishes above-average advantages, because of the ability to imitate Prospectors, while maintaining efficiency (Parnell et al., 1993).

Finally, the Reactor is characterised by a lack of adaptive capability, because of failing find a fit or rationale in terms of market changes. As McKee et al. (1989) note, a Reactor does not have a clearly articulated strategy, lacks linkages between strategy, structure and processes and tends to hold on to the status quo, despite changes in the environment. It can be seen as the least effective strategy, when reacting to a crisis, because the organisation has no direction or focus in mind (Gruber-Muecke & Hofer, 2015).

When looking at the relationship between type of strategy and performance of a firm, many studies conclude that superior performance can typically be found in Prospectors, Analysers and Defenders, while Reactors tend to perform poorly (Parnell et al., 1993). However, it must be noted that all this research was done in stable industries and not within highly volatile industries. Performance for Reactor companies was significantly lower than for non-reactors. Furthermore, O'Regan et al. (2006) found that Prospectors display superior performance, when compared to the other types. Based on these findings, we formulate the following hypotheses:

Hypothesis 4: During an economic crisis, Prospector SMEs will outperform the Defender, Analyser and Reactor SMEs.

Hypothesis 5: During an economic crisis, the Defender Strategy positively influences organisational performance.

Hypothesis 6: An Analyser Strategy positively influences organisational performance during an economic crisis.

Hypothesis 7: During a crisis, Reactor SMEs will show the lowest performance compared to Prospector, Defender and Analyser SMEs.

4. Methodology

4.1 Sample and Data

As the concept of organisation strategy focuses on the organisation, the unit of analysis is the organisation itself. In large organisations, it is difficult to discover the relationship between perception of an individual manager and the strategy the organisation on the whole adopts. Smaller firms are better able to adapt quickly to a crisis environment, when compared to larger firms, due to their greater flexibility that can help them adjust. Shama (1993) reported that managers in small, rapidly growing companies are more likely to report experiencing less of a negative impact by a crisis, when compared to managers of larger companies. On the other hand, smaller firms do not have the necessary resource-base to be able to quickly adapt. Kitching et al. (2009) mention that large companies have a wider range of strategic choices, available to them on the basis of their superior resources in terms of scanning the environment for potential opportunities, developing various capabilities and adopting a flexible approach in order to withstand difficult times. Thus, we are inclined to argue that smaller firms tend to suffer more than larger firms during a crisis. However, small firms could have an advantage, based on their ability to switch quickly.

Since international business scholars maintain that emerging economies represent the source of future theory testing, revelations and exploration (Gauselmann et al., 2011; Uhlenbruck & De Castro, 2000; Oviatt & McDougal, 1997). Additionally, the fast growing, emerging markets offer a diversity of strategic goal opportunities for FI.

At the time of data collection (Spring 2012), as a former communist Eastern European country, Romania was classified as an emerging economy (WEO, 2014). The growth of its GDP increased rapidly from 19,578 in 1992 to 122,696 in 2006 (both in millions of US dollars) (WEO, 2014). This study uses data from foreign SMEs operating in the service industry in Romania.

The data for this study were gathered using a (postal and email) questionnaire survey, conducted among the strategic decision-makers (managing directors or owners) of SMEs, in the summer of 2013. In order to refine the final survey, we initially conducted a number of interviews with the respondents; we also pre-tested the survey on a sample of 40 respondents. The final study sample of 1410 foreign SMEs operating in Romania across 12 industries (see Figure 1) represents 40% of the population group of 3770 SMEs. Furthermore, the data was analysed by means of multinomial logistic regressions.

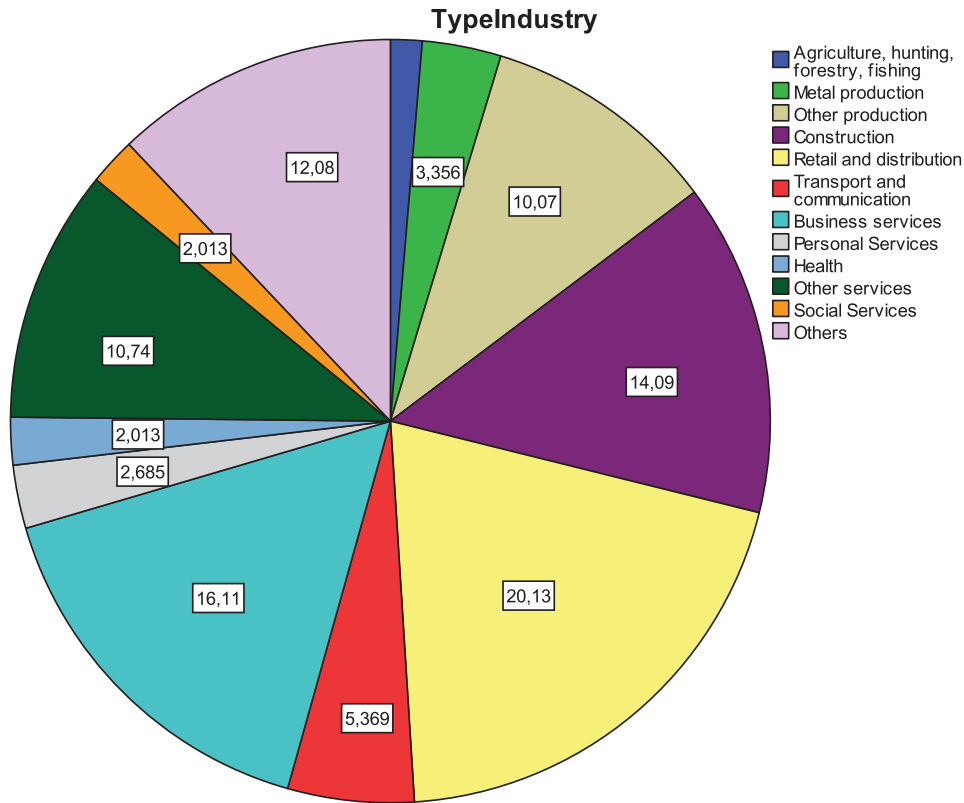


Figure 1. Industry representativeness of sample foreign SMEs in Romania

4.2 Variable Measurement

Table 1 presents the operationalisation of the main variables in the study.

Table 1. Operationalization of main variables

Construct	Dimension	Indicators
Perceived organisational performance (O'Regan, 2006; Venkatraman and Ramanujam, 1986)	Perceived performance	financial Return on total assets (after tax) compared to similar companies in the industry Return on total sales (after tax) compared to similar companies in the industry Sales growth compared to similar companies in the industry
		non-financial Employee satisfaction Local community responsibility Environmental responsibility
	Threat	Perception of losses Negative attitude Little control of the situation
	Managerial Perception (Dutton and Jackson, 1987)	Opportunity
Neither threat, nor opportunity		Indifferent between gains or losses Neutral attitude Indifferent about controlling the situation
Defenders		Narrow and carefully focused Prominence in 'their' product market(s) Domain dominated and cautious/strong organisational monitoring Cautious penetration and advances in productivity Cost-efficiencies Focal, core technology / basic expertise Standardisation, maintenance programmes Centralised and formal / financially anchored
Prospectors		Continuously expanding Active initiation of change Market and Environmentally oriented / aggressive search Product market development and diversification Problem and opportunity finding / campaign (programme) perspective
Response Strategy (Miles and Snow, 1978; Conant et al., 1990)	Analysers	Product and/or market centred Segmented and carefully adjusted Calculated followers of change Competitive oriented and thorough Assertive penetration and careful product market development Incrementalism and synergism Comprehensive with incremental changes Staff dominated / matrix oriented Multiple methods / careful risk calculations
	Reactors	Uneven and transient Opportunistic thrusts and coping postures Sporadic and issue dominated Project development and completion Ability to experiment Trouble-Crisis oriented and disjointed shooters Tight formal authority / loose operating design Avoid problems / handle problems / remain solvent

4.3 Control Variables

The covariate company size is measured independently as the number of employees.

The covariate company age is an interval variable, measuring the number of operating years of the SME.

5. Empirical Results

The multicollinearity of the data was assessed by means of the Variance Inflation Factors (VIFs) and Tolerance values. The values of the VIFs and the Tolerance values are respectively 1.000 and 1.000. Both values are not higher than 10 or lower than 0.1, revealing the fact that multicollinearity is not a problem (Field, 2010).

Table 2 presents an overview of the managerial perception and the response strategy chosen: 31% of respondents

experience the crisis as a threat, while 69% of respondents view the crisis as an opportunity. This indicates that more than two thirds of the entrepreneurs have a risk-open attitude in times of an economic crisis, when it comes to thinking about the opportunities for their companies. Because more respondents view the crisis as an opportunity, the chances of accepting the hypothesis regarding threat perception and Defender Strategy decrease.

Secondly, among the total working sample, 86,8% was male while only 13,2% was female. From this we can assume that more men than women manage SMEs in Romania. When comparing these numbers to national figures, 3 out of 10 managers of SMEs are female [http://www.anr.gov.ro/, accessed on December 18, 2013].

Third, it is striking that most respondents (42,4%) fall in the age category of 41 -50 years. Given that the majority of respondents are male and most of them fall in this age category, this is something that could 'colour' the results and should be taken into account.

Table 2. Overview data

		N	Marginal Percentage
Response Strategy	Prospector	200	14,2%
	Defender	430	30,5%
	Analysers	480	34,0%
	Reactor	300	21,3%
Perception	Threat	350	24,8%
	Opportunity	1060	75,2%
Valid		1410	100,0%
Missing		0	
Total		1410	
Subpopulation		20	

Defender: As perception changes from threat to opportunity, the change in the odds of choosing a Defender Strategy, compared to a Prospector Strategy, is 2,456. In other words, the chance that a manager views a crisis as a threat, choosing a Defender Strategy, compared to choosing a Prospector Strategy, is $1 / 2,456 = 0,41$ more likely than when a manager sees a crisis as an opportunity.

Analysers: As perception changes from threat to opportunity, the change in the odds of choosing an Analyser Strategy, compared to a Prospector Strategy, is 1,685. This means that the odds for a manager to view a crisis as a threat, choosing an Analyser Strategy, when compared with choosing a Prospector Strategy, are $1 / 1,685 = 0,60$ times more likely than when a manager sees a crisis as an opportunity.

Reactor: As perception changes from threat to opportunity, the change in the odds of choosing a Reactor Strategy, compared to a Prospector Strategy, is 2,061. This means that the odds that a manager views the crisis as a threat, choosing a Reactor Strategy, compared with choosing a Prospector Strategy, are $1 / 2,061 = 0,49$ times more likely than when a manager sees a crisis as an opportunity.

The empirical results testing the above hypotheses concerning managerial perception and the choice for a response strategy are presented in Table 3. Hypothesis 1 states that the more a manager of an SME perceives an economic crisis as threatening, the more he or she will choose a Defender Strategy. The results in table 3 below indicate that no significant relationship exists, as the Wald Statistic is not significant. Consequently, hypothesis 1 is rejected.

Secondly, hypothesis 2a claims that the more a manager of an SME perceives an economic crisis as an opportunity, the more likely he or she will be to choose a Prospector Strategy. When looking at the results in table 3 below, no such effects were found. Therefore, this hypothesis is also rejected.

Third, hypothesis 2b states that the more a manager of an SME perceives an economic crisis as an opportunity, the less likely he or she will be to choose a Reactor Strategy. Table 3 indicates that the Wald Statistic, indicating whether the predictor is making a significant contribution to the outcome, is not significant. Hence, hypothesis 2b is also rejected.

Finally, hypothesis 1 claims that the more a manager of an SME perceives an economic crisis as an opportunity, the more likely he or she will be to choose an Analyser Strategy. Table 3 below shows no significant relationship; therefore, this hypothesis is also rejected.

Table 3. Summary of model 1

		95% Confidence	
interval for Odds Ratio		Lower	Upper
	β (SE)	Wald	Odds Ratio
Upper			
Defender vs. Prospector			
Intercept	.57 (.30)**	3.50	
Managerial perception	.90 (.71)	1.61	2.50
Analysers vs. Prospector			
Intercept	.78 (.29)*	7.0*	
Managerial perception	.52 (.71)	.53	1.69
Reactor vs. Prospector			
Intercept	.26 (.32)	.64	
Perception	.72 (.75)	.93	2.06

Note: R² = .014 (Cox & Snell), .015 (Nagelkerke). Model χ^2 (3) = 1.947, p > .05. * p < .05, ** p < .10.

The second part of the model examines the effects of the four strategy types on organisational performance. By means of table 4, the hypotheses will be accepted or rejected accordingly. Table 4 presents the summary of the outcomes without covariates, while table 12 includes them.

Table 4. Summary of model 2 without covariates

	β (SE)	Sig.	95% Confidence Interval	
			Lower	Upper
a. Dependent variable: Return on Assets (ROA)				
			.40	
Intercept		1.85 (.11)	.00*	1.62 2.10
Independent variable: Response Strategy				
Prospector	.06 (.18)	.74	-.30	.42
Defender	.15 (.15)	.32	-.15	.45
Analysers	-.08 (.15)	.61	-.36	.21
Reactor	Reference category			
b. Dependent variable: Return on Sales (ROS)				
			.85	.85
Intercept		1.82 (.12)	.00*	1.6 2.06
Independent variable: Response Strategy				
Prospector	.05 (.19)	.81	-.33	.42
Defender	.14 (.16)	.40	-.18	.45
Analysers	.05 (.15)	.75	-.25	.35
Reactor	Reference category			
c. Dependent variable: Total Sales Growth				
			.31	.31
Intercept		1.82 (.12)	.00*	1.57 2.06
Independent variable: Response Strategy				
Prospector	-.23 (.20)	.25	-.61	.16
Defender	.11 (.17)	.50	-.21	.44
Analysers	.07 (.16)	.66	-.24	.38
Reactor	Reference category			

a. R² = 0.020, b. R² = .005, c. R² = .024.

a. Model (3) = .979, p > .05, b. Model (3) = .262, p > .05, c. Model (3) = .616 > p .05.

Note: * p < .05.

Table 4 presents the results of the relationships between response strategies and organisational performance. The main model is not significant, because the significant values are respectively .40, .85 and .31, which are all greater than the p-value of .05.

In order to accept or reject these hypotheses, each one will be discussed separately. Hypothesis 4 states that the Prospector Strategy will outperform the Defender, Analyser and Reactor SMEs during an economic crisis. Table 4 displays that there is no significant relationship between a Prospector Strategy and ROA, ROS and Total Sales Growth, with respectively significant values of .74, .81 and .25, which are greater than the p-value of .05. Two B-values of the Prospector Strategy show a positive value (respectively .06 and .05) for Return on Assets and Return on Sales. This means that as the Prospector Strategy increases with one unit, while the ROA or ROS increases with .06 and .05. So, the Prospector Strategy does have a positive influence on organisational performance; therefore, hypothesis 4 is accepted.

Secondly, Hypothesis 5 claims that the Defender Strategy positively influences organisational performance during an economic crisis. Table 4 indicates that no effects are found, with significance levels of respectively .32, .40 and .50 for ROA, ROS and Total Sales Growth. When looking at the B-values in table 4, one sees that they all are positive. This means that as a Defender Strategy increases with one unit (so one Defender company more), ROA, ROS and Total Sales Growth increase as well, with respectively .15, .14 and .11. Therefore, hypothesis 5 is accepted.

Third, Hypothesis 6 stresses that the Analyser Strategy positively influences organisational performance during an economic crisis. Again, no results were found, as no significant relationships were discovered in the model. Table 4 shows one negative B-value and two positive B-values, but also here, the positive values do not have enough power to be significant.

Finally, Hypothesis 7 states that the Reactor Strategy negatively influences organisational performance during an economic crisis, when compared to the other strategy types. When looking at the results in table 4, the overall model is not significant, meaning that no significant differences exist between the strategies on the dependent variable, which is organisational performance. Thus, this hypothesis is not accepted as well. Because this strategy was the reference category in the parameter estimates, nothing can be said about the B-values, as these were set on 0.

Other Interesting Results

Table 5 below shows that the main model is significant for Return on Sales and Total Sales Growth, with respectively significant values of $.06 < p < .10$ and $.01 < p < .05$. When looking in more detail at these relationships, some striking aspects need to be mentioned in terms of both Return on Sales and Total Sales Growth.

The covariates Company Size and Company Age do have a significant influence on Return on Sales, with respective values of $.002 < p < .05$ and $.007 < p < .05$. This means that Company Age and Size do matter when analysing the relationship between response strategies and organisational performance. The B-value for Size (-.10) shows a negative sign, meaning that as Company Size changes with one unit, the change in Return on Sales is -.10. This means that Company Size negatively influences Return on Sales. The B-value for Company Age shows a positive value with .15. This means that as the age of a company changes with one unit, Return on Sales increases with .15. Thus, the older a company is, the more experience it has and thus the higher the Return on Sales.

Total Sales Growth is significant as well in the main model. When looking at the covariates, one sees that Company Size and Company Age cause this significance, with values of respectively $.09 < p < .10$ and $.001 < p < .05$. Thus, again Company Size and Company Age are important when analysing the second model. The B-value for Company Size is -.06, meaning that as this variable changes with one unit, the change in Total Sales Growth is -.06. This means that Company Size negatively influences Total Sales Growth. The B-value for Company Age is .19, indicating that as the age of a company increases with one unit, the change in Total Sales Growth is .19. Thus, the older the company is, the higher the Total Sales Growth. In times of an economic crisis this could indicate that older, more established companies are more robust and have built some reserves in order to cope with crises.

Table 5. Summary of model 2, including covariates Company Size, Company Age and Type of Industry

	B(SE)	Sig.	95% Confidence Interval	
			Lower	Upper
a. Dependent variable:				
Return on Assets (ROA)				
Intercept	1.74 (.21)	.00*	1.33	2.16
Independent variable: Response Strategy				
Prospector	.08 (.18)	.68	-.28	.43
Defender	.15 (.15)	.33	-.15	.45
Analysar	-.06 (.15)	.68	-.35	.23
Reactor	Reference category			
Size	-.04 (.03)	.23	-.102	.03
Company Age	.09 (.05)	.10	-.02	.19
Type of industry	-.01 (.02)	.70	-.04	.03
b. Dependent variable:				
Return on Sales (ROS)				
Intercept	1.62 (.22)	.00*	1.20	2.01
Independent variable: Response Strategy				
Prospector	.07 (.19)	.70	-.29	.44
Defender	.12 (.16)	.45	-.19	.42
Analysar	.10 (.15)	.50	-.19	.40
Reactor	Reference category			
Size	-.102 (.03)	.002*	-.17	-.04
Company Age	.15 (.05)	.007*	.04	.25
Type of industry	.003 (.02)	.86	-.03	.04
c. Dependent variable:				
Total Sales Growth				
Intercept	1.2 (.22)	.00*	.80	1.67
Independent variable: Response Strategy				
Prospector	-.24 (.19)	.22	-.61	.14
Defender	.08 (.16)	.61	-.23	.40
Analysar	.01 (.15)	.52	-.21	.40
Reactor	Reference category			
Size	-.06 (.03)	.09**	-.12	.01
Company Age	.19 (.06)	.001*	.09	.30
Type of industry	.03 (.02)	.12	-.01	.07

a. R² = 0.041, b. R² = .081, c. R² = .109.

a. Model (6) = 1.036, p > .05, b. Model (6) = 2.11, p < .10, c. Model (6) = .01 < p < .05.

Note: * p < .05 ** p < .10

The contrast matrix in table 6 below presents some more information about the differences between strategies in organisational performance, when including the three covariates. Two significant effects are found when including the covariates in the model, with a confidence level interval of 90% or a p-value of .10. First of all, the differences between the Defender Strategy and the Prospector Strategy turned out to be significant, with a value of .08 < p < .10. To discover which of the four strategies scores better on Total Sales Growth, a profile plot has been made. This shows that a Defender scores significantly higher on Total Sales Growth when compared with a Prospector. Secondly, the difference between the Analysar and the Prospector Strategy also shows a significant effect, with a value of .06 < p < .10. This means also that an Analysar Strategy scores significantly better in terms of Total Sales Growth, when compared to a Prospector Strategy and when taking into account the covariates Size, Company Age and Type of Industry.

Table 6. Contrast results (K Matrix) with Prospector Strategy as reference category. ** $p < .10$.

Independent variable Response Strategy	Dependent variables		
	ROA	ROS	Total Sales Growth
Defender vs. Prospector			
Sig.	.67	.80	.08**
Lower Bound	-.21	-.25	.02
Upper Bound	.36	.34	.62
Analyser vs. Prospector			
Sig.	-.41	.86	.06**
Lower Bound	-.42	-.25	.04
Upper Bound	.14	.31	.63
Reactor vs. Prospector			
Sig.	.68	.70	.22
Lower Bound	-.38	-.38	-.08
Upper Bound	.22	.23	.55

6. Discussion and Conclusions

The aim of this study was to discover what influence the perception of an economic crisis of SMEs in Romania has on their choice of a strategy type and also in terms of organisational performance. Our results indicate that 69% of the respondents' view economic crises as an opportunity, as opposed to 31% of respondents who are not so positive concerning the crisis and see it as a threat for their company. When you compare these results with the International Business Report (IBR) of Grant Thornton, they are quite in line with that institute's findings. Grant Thornton found that foreign entrepreneurs started to have more confidence in the economy during the third quarter of 2012, compared to the second quarter of 2012. Even though there was an increase in their economic confidence, however, entrepreneurs remained predominantly negative.

When looking at the results of this study, one sees that, first of all, most of the companies fall into the category of Analyser, with a number of 53 out of 151 ($\approx 35\%$). It seems that most managers would like to invest in times of economic crisis, but they are careful and do not want to take too much risk by focusing on only one market. This separation of a stable market focus on the one hand and a changing market focus on the other hand is most popular among the SMEs of this study. This means that in stable markets, companies operate routinely and efficiently by means of already established procedures. In changing markets, managers tend to look towards competitors sharply for new ideas, in order to adapt quickly when they turn out to be successful (Miles and Snow, 2003).

Secondly, after the Analyser Strategy, the Defender Strategy follows, with 43 out of 151 companies ($\approx 28\%$). This means that 28% of SMEs' managers do not tend to search outside their domains for new opportunities (Miles & Snow, 2003). They stay where they are and wait for better times to come, while in the meantime trying to increase the efficiency of their company's operations.

Third, results concerning the Reactor Strategy show that approximately 22% of the companies perceive change and uncertainty in their organisational environments but are unable to respond effectively (Miles & Snow, 2003). Finally, 22 out of 151 companies ($\approx 15\%$) are Prospectors. These companies continuously search for market opportunities and regularly experiment with responses to emerging market trends (Miles & Snow, 2003). Because of this low number, it seems that managers of SMEs are reluctant when it comes to new investments and experimenting with new products / services. They tend to use other strategies, more than the Prospector Strategy.

Company size negatively affects ROS and Total Sales Growth, while the age of a company positively affects ROS and Total Sales Growth. Within these significant models, the Defender and Analyser Strategies score better than the Prospector Strategy in times of an economic crisis.

When looking at the first part of the model, it has been concluded that managerial perception does not determine a certain strategy response. This contradicts part of the previous findings in the relevant literature. Thomas et al. (1993) have found that there is a positive and significant relationship between the interpretation-action linkages. They found that the perception of controllability (an indicator of the dimension opportunity in this study) is a predictor of a product-service change. When comparing it with this study, no significant relationship between the

Opportunity Perception and the Prospector Strategy (which focuses on change) has been found. As an explanation for this, there might be additional factors that affect the choice of a certain strategy type. Examples include the industry structure (Porter, 1985; Nadkarni et al., 2008), the financial possibilities of the company and the resources and capacities of the company to react quickly to the environment. Nadkarni et al. (2008) state that managerial cognition is not enough when it comes to predicting a company's strategic actions.

The findings of this study show that no best performing strategy can be discovered among Prospectors, Defenders, Analysers and Reactors. This contradicts the theory concerning action and outcome in several ways.

First of all, O'Regan et al. (2006) state that the majority of high performing firms are "Prospector" type firms. This is not the case in the findings of this study, because no differences were found between the four strategy types of Miles and Snow (1978) when it comes to organisational performance.

The Analyser Strategy is the most common strategy in this study; 35% of companies follow an Analyser Strategy. Although no significant relationship exists between the Analyser Strategy and organisational performance, our respondents probably use the Analyser Strategy as this works best for them during an economic crisis.

Finally, it is interesting to note here that Miles and Snow (1978) stated initially that each strategy should perform equally. Our results correspond with their findings.

This research focuses on the current perceptions of owners / managers during a crisis, at one moment in time. This also refers to the strategy the company applies; it is measured at one moment in time. This gives only a 'snapshot' of a company's strategy, because it is possible that an SME's strategy can change quickly. When looking at the first part of the model, one could argue that there might be a gap between thinking (perceiving the world around you) and doing (acting upon this world). De Wit and Meyer (2004) state that a balance should be kept between what the organisation might do in terms of environmental opportunity. When a manager of an SME views a crisis as an opportunity, it is possible that this does not lead immediately to the execution of another strategy. It takes time to implement a certain strategy; time is needed between thinking and executing a certain action.

When looking at the action part only—executing a response strategy—some interesting aspects will be mentioned in order to arrive at a more comprehensive view of reality. In this study, the Miles and Snow typology (1978) has been used as a measure of strategic action. The literature offers an interesting insight into the use of typologies and, specifically,

According to Ghemawat (1993), the companies that emerge the strongest from a downturn are those that use this time of uncertainty to their advantage. They manage to improve their market position through targeted investment in their core business, either by adding capacity or capability. They also avoid diversification, as it dilutes focus when it comes to strengthening the core business. By being proactive and remaining focused on their core business, such companies can outperform hesitant and struggling competitors. Navarro (2005) argues that firms that aggressively ramp up investments during a recession may emerge in the next expansion with the lowest capacity available to satisfy pent up demand. Firms may also achieve product innovations that will allow them to grab market share from competitors, once the recovery takes place.

Recent research into the crisis response strategies of organisations has created some theoretical foundations for analysing the relation between risk preferences and strategic decision-making on a corporate level, with the main goal being to supplement existing rational analytical models (Holmes et al., 2011). Evidence indicates that there is a relation between risk perception in the context of opportunity and threat and the type of strategic responses to a crisis. These relations are to some extent in line with the arguments of PT. However, to what extent risk perceptions, as used by individual decision-making models, influence the choice in crisis response strategies is unknown (Chattopadhyay et al., 2001). He hereby provides empirical evidence with complex cognitive implications for the organisational actor, strategy, and performance. Moreover, Kitching et al. (2009) note that firm size is only one determinant of performance under recession conditions. Factors like industry and geography have an impact as well (Phongpetra & Johri, 2011).

This study contributes to a body of research on the effects of response strategies during economic crises on firm performance (Gruber-Muecke & Hofer, 2015; Uddin et al., 2014). The aim of this research is to give an insight in terms of what successful response strategies can firms adopt during an economic crisis. Many studies have focused on the survival of firms during recessions (Bibeault, 1982; Bigelow & Chan, 1992; Kitching et al., 2009; Lin et al., 2008; Patheo & Szabo, 2010; Pearce & Michael, 2006). However, those studies examined the effects of strategies used during previous recessions, less radical and far reaching, similarly to the global economic crisis that started in September 2008. This economic crisis has a distinct character (Allen, 2009) and is of such

magnitude that its survival requires an individual analysis.

Previous studies also didn't take into account the distinction between performance during a crisis and afterwards. Obviously, no crisis lasts forever and the effects of a strategy on performance after a crisis are also important to consider. Therefore, an important issue is to get a better understanding of how to respond strategically in order to maintain or improve firm performance during a crisis and afterwards. This study contributes to the development of knowledge about response strategies during a crisis and the effects on firm performance, by indicating that solely investing in core business, marketing and innovation during an economic crisis seem to have a positive effect on firm performance during a crisis and afterwards (Enderwick, 2009).

Most executives, even of multinationals, are not used to tackling the complex set of internal and external issues that are thrown up by a crisis (Booth, 1993; Kreiser and Davis, 2010). For example, Hoffman (1989) has suggested that 'an increasing number of general managers are having to cope with crisis and decline, yet they have little experience or management theory upon which to draw'. Although a few years old, these quotes remain meaningful today. Therefore, it is relevant to develop an understanding of response strategies that can help firms manage their way through such crises. Results of this study indicate that in order for firm performance to improve during and after a crisis, firms need to innovate and invest in core business and marketing. Innovation seems to have a positive effect on market share and investing in core business and marketing indicates good results on profitability and sales during a crisis. Innovation may be especially effective during a recession, since during a downturn, competitors are usually relatively quiet. A successful introduction of a new product can infuse a firm with a boost of new revenues (McCarthy & Sutcliff, 2002), causing its market share to grow, compared to non-innovating businesses. So firms that are proactive in marketing and remaining focused on the core business through investing can outperform sedentary companies during a crisis. Their position in the marketplace can thus be protected. Furthermore, investment in core business and marketing also seems to be the most appropriate strategy to choose in order to keep up sales after a crisis. A recession does not last forever, so managers need to prepare for the growth that inevitably follows a recession, in order to keep up revenues. A lack of investment often leaves firms unable to meet the demand generated by an economic recovery, competitors emerging to fill the void.

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Hypothesis Testing for the Questionnaire Investigation on Tourists' Behavior

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Abstract

Tourists from abroad are increasing rapidly in Japan. Kawazu town in Izu Peninsula is famous for its cherry trees. In the cherry blossom season, many tourists visit this town. The Kawazu Cherry Blossom Festival was carried out in February 2015. Our research investigation was performed during that period. In this paper, a questionnaire investigation is executed in order to clarify tourists' behavior, and to seek the possibility of developing regional collaboration among local government, tourism related industry and visitors. Hypothesis testing was executed based on that. We have set 10 Null hypotheses. In the hypothesis testing, 6 cases out of 10 null hypotheses were rejected and the majority of hypotheses were insisted clearly. We have obtained fruitful results.

Keywords: tourism, Izu Peninsula, Kawazu Cherry Tree, hypothesis testing

1. Introduction

In recent years in Japan, the national and local governments have been trying to attract foreign tourists by using strategic approaches and developing tourist facilities, with the aim of promoting regional exchange and generating economic benefits. Particular aims of local government are to overcome the common problems of an aging population and declining birthrate through tourism-generated income and to stimulate the local society through regional exchange and migration. However, in order to take measures that will increase tourism, it is necessary to understand the attraction of particular regions in Japan, as well as the resources they offer to tourists. Moreover, it is necessary to have a picture of the tourists that might want to visit such regions.

Although it is useful to have an understanding of an issue at a given time and under specific social conditions, it is difficult to analyze chronological changes or cross-regional trends statistically. It is standard practice to design a survey such that it permits examination of the statistics for a given region over time, but in order to investigate solutions to problems shared across regions it is necessary to carefully examine the critical basic data as well as appropriate methods of data collection.

To try to obtain such data, preceding studies on tourist destinations that have statistically analyzed trends in tourist behavior will now be reviewed. Yoshida et al. designed and conducted a visitor survey on the spot, which used a questionnaire to investigate the activities of visitors to the Ueno district in Taito ward, Tokyo. Doi et al. analyzed the image of the Izu Peninsula as a tourist destination in their 2003 study "Questionnaire Survey on the Izu Peninsula." Kano conducted tourist behavior studies in Atami city in 2008, 2009, 2014 and in other years.

Kawazu town in Izu Peninsula is famous for its cherry trees. In the cherry blossom season, many tourists visit this town. In this paper, a questionnaire investigation was executed in Kawazu town in February 2015, which was conducted to coincide with events on the Izu Peninsula featuring flowers; the Kawazu Sakura Festival (Feb-Mar), and ways that regions can collaborate to carry out surveys of tourist behavior was also performed.

This survey of tourist behavior was carried out in February 2015, during the Kawazu Cherry Blossom Festival. Given the geographical peculiarities of Kawazu town and its relative lack of accommodation facilities, some of the survey personnel were located also at Izukyu-Inatori Station and Izukyu-Shimoda Station. On the first day of the survey, the weather was good, while on the second it was raining. The 25th Kawazu Cherry Blossom Festival

was held from February 10 to March 10, 2015. It was attended by 801,330 people, which was an increase of 9% over the previous year. On the first day of the survey, 30-50% of the flowers were in bloom, and the nighttime illuminations lit up on the evening of the 21st. According to the figures of the Kawazu town Tourist Association, there were 30,590 visitors on the 21st and 20,913 visitors on the 22nd. During the Kawazu Cherry Blossom Festival, around 150 stores were offering food & drink or souvenirs on the road with the row of cherry trees linked to Kawazu Station. A number of events were held during the festival, including the “Semi Gourmet” and “Izu no Odoriko Photography Event.”

In this paper, a questionnaire investigation is executed in order to clarify tourists’ behavior, and to seek the possibility of developing regional collaboration among local government, tourism related industry and visitors. Hypothesis testing was executed based on that. We have made 10 Null hypotheses based upon these and hypothesis testing is executed. Some interesting results were obtained.

The rest of the paper is organized as follows. Outline of questionnaire investigation is stated in section 2. Hypothesis Testing is carried out in section 3, which is followed by the Remarks of section 4.

2. Outline and Basic Statistical Results of the Questionnaire Research

2.1 Outline of the Questionnaire Research

We make a questionnaire investigation on tourists’ behavior who has visited Izu Peninsula and is studied mainly at Kawazu town in Shizuoka Prefecture. Kawazu town is famous for its cherry trees. The outline of questionnaire research is as follows. Questionnaire sheet is attached in Appendix.

- (1) Scope of investigation : Tourists who have visited Kawazu town in Shizuoka Prefecture, Japan
- (2) Period : February 21,22/ 2015
- (3) Method : Local site, Dispatch sheet, Self writing
- (4) Collection : Number of distribution 500
Number of collection 478(collection rate 95.6%)
Valid answer 478

2.2 Basic Statistical Results

Now, we show the main summary results by single variable.

(1) Basic characteristics of answerers

Q1 Address		
	Frequency	%
vicinity	163	64.7
distance	89	35.3
Total	252	100.0

Q2 Sex		
	Frequency	%
Male	99	40.2
Female	147	59.8
Total	246	100.0

Q3 Age		
	Frequency	%
10-19	6	2.9
20-29	35	17.1
30-39	33	16.1
40-49	32	15.6
50-59	38	18.5
60-69	44	21.5
70-	17	8.3
Total	205	100.0

Q4 Occupation		
	Frequency	%
Independents	9	4.2
Office worker	118	55.1
Student	10	4.7
Housewife	35	16.4
No job	34	15.9
Miscellaneous	8	3.7
Total	214	100.0

Q5 Fellow travelers

	Frequency	%
Solo trip	6	2.4
Couple	85	33.7
Family	89	35.3
Male's small group	10	4.0
Female's small group	25	9.9
Male and female's small group	21	8.3
Group (More than 7)	14	5.6
Miscellaneous	2	0.8
Total	252	100.0

(2) Summary results for the items used in Hypothesis Testing

Q6A Visiting frequency to Izu Peninsula and Kawazu Cherry Tree : Izu Peninsula

	Frequency	%
First time	37	14.6
Second times	23	9.1
Third times	24	9.5
Fourth times	14	5.5
Fifth-Nine times	53	20.9
More than ten times	102	40.3
Total	253	100.0

Q6B Visiting frequency to Izu Peninsula and Kawazu Cherry Tree : Kawazu Cherry Tree

	Frequency	%
First time	118	49.0
Second times	38	15.8
Third times	32	13.3
Fourth times	17	7.1
Fifth-Nine times	19	7.9
More than ten times	17	7.1
Total	241	100.0

Q7 Means of transportation to Izu Peninsula

	Frequency	%
JR, Izu-kyuko train	151	60.6
Sightseeing bus	19	7.6
Private automobile	71	28.5
Miscellaneous	8	3.2
Total	249	100.0

Q9 Main occasion to visit to Izu Peninsula : ①Poster

	Frequency	%
Yes	26	10.5
No	221	89.5
Total	247	100.0

Q9 Main occasion to visit to Izu Peninsula : ⑩Felt good at the previous visit

	Frequency	%
Yes	62	25.1
No	185	74.9
Total	247	100.0

Q10 What is an objective to visit Izu Peninsula? :

①Hot spring

	Frequency	%
Yes	109	44.1
No	138	55.9
Total	247	100.0

Q10 What is an objective to visit Izu Peninsula? :

③Dish, sense of taste

	Frequency	%
Yes	75	30.4
No	172	69.6
Total	247	100.0

Q10 What is an objective to visit Izu Peninsula? :

⑤Stroll around town, Eating tour

	Frequency	%
Yes	19	7.7
No	228	92.3
Total	247	100.0

Q10 What is an objective to visit Izu Peninsula? :

⑦Convenience of traffic

	Frequency	%
Yes	14	5.7
No	233	94.3
Total	247	100.0

Q11 Staying time in Izu Peninsula

	Frequency	%
One-day trip	49	19.3
2 days stay	167	65.7
3 days stay	35	13.8
More than 4 days	3	1.2
Total	254	100.0

Q14-1 Select items in each theme concerning the attractiveness of southern part of Izu Peninsula. : Sea bathing

	Frequency	%
Yes	61	32.4
No	127	67.6
Total	188	100.0

Q16(3) How about the expenditure or budget of the following items in Izu Peninsula? : Souvenir, Shopping

	Frequency	%
~1,000	25	11.8
1,001~2,000	34	16.1
2,001~3,000	47	22.3
3,001~5,000	46	21.8
5,001~	59	28.0
Total	211	100.0

3. Hypothesis Testing

Hereinafter we make hypothesis testing based upon the questionnaire investigation data.

3.1 Setting Hypothesis

We set the following 10 themes before setting Null Hypothesis.

A-1) Those who are young have the image of Izu Peninsula as “sea bathing”.

A-2) Those who live far away (Chugoku, Remote part of Kanto area) often use sightseeing bus.

A-3) Those who live far away have many souvenir budget (more than 5000 Japanese Yen).

A-4) Those who are couple often visit Izu Peninsula (more than 5 times).

A-5) Those who live nearby (Shizuoka, Kanagawa, Tokyo) often visit Izu Peninsula by private automobile.

A-6) Those who felt good at the previous visit to Izu Peninsula consists mainly by repeaters.

A-7) Those who felt good at the previous visit to Kawazu Town consists mainly by repeaters.

A-8) Those who visit for the purpose of hot spring often come for more than 2 days.

A-9) Those who visit Izu Peninsula by one-day trip consist mainly by the people who live nearby (Shizuoka, Kanagawa, Tokyo).

A-10) Those who visit Izu Peninsula by the occasion of “Poster” often use JR or Izu-Kyuko train.

Now, we set the following 10 Null hypotheses.

B-1) There is not so much difference whether “those who are young have the image of Izu Peninsula as “sea bathing”” or not.

B-2) There is not so much difference whether “those who live far away (Chugoku, Remote part of Kanto area) often use sightseeing bus” or not.

B-3) There is not so much difference whether “those who live far away have many souvenir budget (more than 5000 Japanese Yen)” or not.

B-4) There is not so much difference whether “those who are couple often visit Izu Peninsula (more than 5 times)” or not.

B-5) There is not so much difference whether “those who live nearby (Shizuoka, Kanagawa, Tokyo) often visit Izu Peninsula by private automobile” or not.

B-6) There is not so much difference whether “those who felt good at the previous visit to Izu Peninsula consists mainly by repeaters” or not.

B-7) There is not so much difference whether “those who felt good at the previous visit to Kawazu Town consists mainly by repeaters” or not.

B-8) There is not so much difference whether “those who visit for the purpose of hot spring often come for more than 2 days” or not.

B-9) There is not so much difference whether “those who visit Izu Peninsula by one-day trip consist mainly by the people who live nearby (Shizuoka, Kanagawa, Tokyo)” or not.

B-10) There is not so much difference whether “those who visit Izu Peninsula by the occasion of “Poster” often use JR or Izu-Kyuko train” or not.

3.2 Hypothesis Testing

χ^2 hypothesis testing is executed in order to clarify tourists' behavior. χ^2 hypothesis testing is to clarify the difference between the expected value and the observed data, which is shown in Eq.(1).

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i} \tag{1}$$

Where O_i is an observed data and E_i is an expected value. The results of statistical hypothesis testing are as follows.

Null Hypothesis B-1) There is not so much difference whether “those who are young have the image of Izu Peninsula as “sea bathing”” or not.

Summary table concerning Null Hypothesis B-1) is exhibited in Table 1.

Table 1. Summary table for Null Hypothesis B-1)

Q3 Age		Q14-1 Select items in each theme concerning the attractiveness of southern part of Izu Peninsula.		
		Yes	No	Total
Under 39	Frequency	26	34	60
	%	43.3	56.7	100.0
Over 40	Frequency	28	72	100
	%	28.0	72.0	100.0
Total	Frequency	54	106	160
	%	33.8	66.3	100.0

significance probability 0.047

The null hypothesis is rejected with 5% significance level. It can be said that those who are young have the image of Izu Peninsula as “sea bathing”. (Rejection region is over 6.6349 for 1% significance level, 3.841 for 5% significance level, 3.537 for 6% significance level and 2.874 for 9% significance level by 1 degree of freedom.)

Null Hypothesis B-2): There is not so much difference whether “those who live far away (Chugoku, Remote part of Kanto area) often use sightseeing bus” or not.

Summary table concerning Null Hypothesis B-2) is exhibited in Table 2.

Table 2. Summary table for Null Hypothesis B-2)

Q1 Address		Q7 Means of transportation to IZU Peninsula : Sightseeing bus		
		Yes	No	Total
vicinity	Frequency	14	144	158
	%	8.9	91.1	100.0
distance	Frequency	5	84	89
	%	5.6	94.4	100.0
Total	Frequency	19	228	247
	%	7.7	92.3	100.0

significance probability 0.359

The null hypothesis is not rejected. It can be said that there is not so much difference whether “those who live far away (Chugoku, Remote part of Kanto area) often use sightseeing bus” or not.

Null Hypothesis B-3): There is not so much difference whether “those who live far away have many souvenir budget (more than 5000 Japanese Yen)” or not.

Summary table concerning Null Hypothesis B-3) is exhibited in Table 3.

Table 3. Summary table for Null Hypothesis B-3)

Q1 Address		Q16(3) How about the expenditure or budget of the following items in Izu Peninsula? : Souvenir, Shopping		
		Under 5000 yen	Over 5001 yen	Total
vicinity	Frequency	105	31	136
	%	77.2	22.8	100.0
distance	Frequency	45	28	73
	%	61.6	38.4	100.0
Total	Frequency	150	59	209
	%	71.8	28.2	100.0

significance probability 0.017

The null hypothesis is rejected with 2% significance level. It can be said that those who live far away have many souvenir budget (more than 5000 Japanese Yen).

Null Hypothesis B-4): There is not so much difference whether “those who are couple often visit Izu Peninsula (more than 5 times)” or not.

Summary table concerning Null Hypothesis B-4) is exhibited in Table 4.

Table 4. Summary table for Null Hypothesis B-4)

Q5 Fellow travelers		Q6A Visiting frequency to Izu Peninsula and Kawazu Cherry Tree : Izu Peninsula		
		Under 4 times	Over 5 times	Total
Couple	Frequency	31	57	88
	%	35.2	64.8	100.0
Others	Frequency	67	96	163
	%	41.1	58.9	100.0
Total	Frequency	98	153	251
	%	39.0	61.0	100.0

significance probability 0.122

The null hypothesis is not rejected. It can be said that there is not so much difference whether “those who are couple often visit Izu Peninsula (more than 5 times)” or not.

Null Hypothesis B-5): There is not so much difference whether “those who live nearby (Shizuoka, Kanagawa, Tokyo) often visit Izu Peninsula by private automobile” or not.

Summary table concerning Null Hypothesis B-5) is exhibited in Table 5.

Table 5. Summary table for Null Hypothesis B-5)

Q1 Address		Q7 Means of transportation to IZU Peninsula : ③Private automobile		
		Yes	No	Total
vicinity	Frequency	48	110	158
	%	30.4	69.6	100.0
distance	Frequency	23	66	89
	%	25.8	74.2	100.0
Total	Frequency	71	176	247
	%	28.7	71.3	100.0

significance probability 0.449

The null hypothesis is not rejected. It can be said that there is not so much difference whether “those who live nearby (Shizuoka, Kanagawa, Tokyo) often visit Izu Peninsula by private automobile” or not.

Null Hypothesis B-6): There is not so much difference whether “those who felt good at the previous visit to Izu Peninsula consists mainly by repeaters” or not.

Summary table concerning Null Hypothesis B-6) is exhibited in Table 6.

Table 6. Summary table for Null Hypothesis B-6)

Q9 Main occasion to visit to Izu Peninsula : Felt good at the previous visit		Q6A Visiting frequency to Izu Peninsula and Kawazu Cherry Tree : Izu Peninsula		
		Under 4 times	Over 5 times	Total
Yes	Frequency	11	51	62
	%	17.7	82.3	100.0
No	Frequency	87	97	184
	%	47.3	52.7	100.0
Total	Frequency	98	148	246
	%	39.8	60.2	100.0

significance probability 0.000

The null hypothesis is rejected with 1% significance level. It can be said that those who felt good at the previous visit to Kawazu Town consists mainly by repeaters.

Null Hypothesis B-7): There is not so much difference whether “those who felt good at the previous visit to Kawazu Town consists mainly by repeaters” or not.

Summary table concerning Null Hypothesis B-7) is exhibited in Table 7.

Table 7. Summary table for Null Hypothesis B-7)

Q9 Main occasion to visit to Izu Peninsula : Felt good at the previous visit		Q6B Visiting frequency to Izu Peninsula and Kawazu Cherry Tree : Kawazu Cherry Tree		
		Under 4 times	Over 5 times	Total
Yes	Frequency	42	17	59
	%	71.2	28.8	100.0
No	Frequency	163	16	179
	%	91.1	8.9	100.0
Total	Frequency	205	33	238
	%	86.1	13.9	100.0

significance probability 0.000

The null hypothesis is rejected with 1% significance level. It can be said that those who felt good at the previous visit to Kawazu Town consists mainly by repeaters.

Null Hypothesis B-8): There is not so much difference whether “those who visit for the purpose of hot spring often come for more than 2 days” or not.

Summary table concerning Null Hypothesis B-8) is exhibited in Table 8.

Table 8. Summary table for Null Hypothesis B-8)

Q10 What is an objective to visit Izu Peninsula? : ①Hot spring		Q11 Staying time in Izu Peninsula		
		One-day trip	Over 2 days stay	Total
Yes	Frequency	6	103	109
	%	5.5	94.5	100.0
No	Frequency	42	96	138
	%	30.4	69.6	100.0
Total	Frequency	48	199	247
	%	19.4	80.6	100.0

significance probability 0.000

The null hypothesis is rejected with 1% significance level. It can be said that those who visit for the purpose of hot spring often come for more than 2 days.

Null Hypothesis B-9): There is not so much difference whether “those who visit Izu Peninsula by one-day trip

consist mainly by the people who live nearby (Shizuoka, Kanagawa, Tokyo)” or not.

Summary table concerning Null Hypothesis B-9) is exhibited in Table 9.

Table 9. Summary table for Null Hypothesis B-9)

Q1 Address		Q11 Staying time in Izu Peninsula		
		One-day trip	Over 2 days stay	Total
vicinity	Frequency	42	121	163
	%	25.8	74.2	100.0
distance	Frequency	7	82	89
	%	7.9	92.1	100.0
Total	Frequency	49	203	252
	%	19.4	80.6	100.0

significance probability 0.001

The null hypothesis is rejected with 1% significance level. It can be said that those who visit Izu Peninsula by one-day trip consist mainly by the people who live nearby (Shizuoka, Kanagawa, Tokyo).

Null Hypothesis B-10): There is not so much difference whether “those who visit Izu Peninsula by the occasion of “Poster” often use JR or Izu-Kyuko train” or not.

Summary table concerning Null Hypothesis B-10) is exhibited in Table 10.

Table 10. Summary table for Null Hypothesis B-10)

Q1 Main occasion to visit to Izu Peninsula : ①		Q7 Means of transportation to IZU Peninsula : ②Sightseeing bus		
Poster		Public transport	Others	Total
Yes	Frequency	19	7	26
	%	73.1	26.9	100.0
No	Frequency	145	72	217
	%	66.8	33.2	100.0
Total	Frequency	164	79	243
	%	67.5	32.5	100.0

significance probability 0.520

The null hypothesis is not rejected. It can be said that there is not so much difference whether “those who visit Izu Peninsula by the occasion of “Poster” often use JR or Izu-Kyuko train” or not.

4. Remarks

The main results of basic statistical analysis are as follows.

- (1) The visitors were of all ages, from 20s to 70s-or-over, with no particular tendency towards visitors of a certain age group.
- (2) As regards the type of trip, most visitors had come as individuals, and a mere 8% had come as part of a group. Looking at specific age groups, although married and unmarried couples were common across all age groups, those aged 10-19 and those in their 40s tended to be visiting with their families.
- (3) The majority of visitors had been five or more times to the Izu Peninsula, indicating a tendency towards multiple repeat visits.
- (4) Most visitors to the Kawazu Cherry Blossom Festival were attending the event for the first or second time. It may be that advertising promotion or the like had caused visitors to come to the festival.
- (5) Most visitors came to the Izu Peninsula by train, and the majority of visitors moved around the Izu Peninsula solely on foot, or by train or bus. Only 3.14% of the visitors traveled to the west coast of the peninsula. This may be because the available transport in the area tends to serve the east coast.
- (6) For around half of the visitors, what prompted them to come to Izu was a travel agency pamphlet, or some kind of mass media such as the television or the Internet. However, the media on the Internet including the accommodation booking site served as trigger for only around 8% of these visitors. Although it is likely that

visitors used the Internet to gather information about their destination after they had booked their trip, it seems that, as ever, traditional analog sources of information still have the power to attract customers.

(7) As regards the visitors' objectives for the trip, as many as 279 visitors came for the flowers, while others came for hot springs, scenery, nature, and the cuisine/experiencing new tastes. In contrast, few visitors came to visit historical sites, monuments to literary figures, buildings, tourist facilities, art galleries, museums, or other cultural facilities, which may indicate that the natural environment in the area was sufficiently attractive for visitors.

(8) Most visitors (63%) stayed just one night on the Izu Peninsula, while 21% returned home on the same day. In addition, 60% of visitors were from the Tokyo, Kanagawa, and Shizuoka areas. Given that they stayed one night or returned home on the same day, it appears that they consider the Izu Peninsula a handy location for a short trip.

In the Kawazu survey, the authors have not asked questions about excursion-related behavior including tourist facilities (not restricted to specific administrative districts) and accommodation sites (actual and projected business performance).

As regards tourist facilities, most respondents mentioned Kawazu (234), followed by Shimoda (65), Inatori (32), Tsurushibina (31), Atami (27), Izu Kogen (19), ropeway (12), Ito (10), Shimokamo Onsen (8), Kawazunanadaru (8), Shuzenji (8), and Tokyo (8). As this list uses the words provided by the survey responders, even though, for example, Inatori and Tsurushibina are in the same region, they are considered as separate responses.

Furthermore, the average number of locations visited was 2.04 overall, those with bicycles or motorbikes visited 1.89 locations, those using public transport or other transport visited 2.08 locations, day-trippers visited 1.60 locations, and those making overnight stays visited 2.11 locations.

Furthermore, 3.14% of respondents visited the west coast (Nishiizu town, Matsuzaki town). Of these respondents, 9.23% visited the area with bicycles or motorbikes, 1.75% used public transport or other transport, 3.64% were day-trippers and 3.07% made overnight stays.

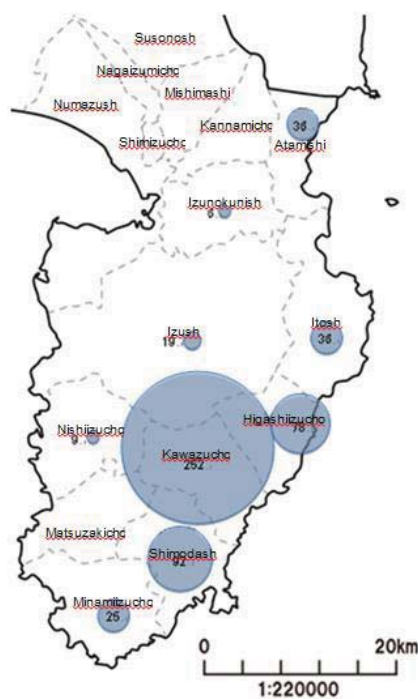


Figure 1. Destinations and number of visitors

The Results for Hypothesis Testing are as follows.

We set the following 10 Null hypotheses.

A-1) Those who are young have the image of Izu Peninsula as “sea bathing”.

A-2) Those who live far away (Chugoku, Remote part of Kanto area) often use sightseeing bus.

- A-3) Those who live far away have many souvenir budget (more than 5000 Japanese Yen).
- A-4) Those who are couple often visit Izu Peninsula (more than 5 times).
- A-5) Those who live nearby (Shizuoka, Kanagawa, Tokyo) often visit Izu Peninsula by private automobile.
- A-6) Those who felt good at the previous visit to Izu Peninsula consists mainly by repeaters.
- A-7) Those who felt good at the previous visit to Kawazu Town consists mainly by repeaters.
- A-8) Those who visit for the purpose of hot spring often come for more than 2 days.
- A-9) Those who visit Izu Peninsula by one-day trip consist mainly by the people who live nearby (Shizuoka, Kanagawa, Tokyo).
- A-10) Those who visit Izu Peninsula by the occasion of "Poster" often use JR or Izu-Kyuko train.

6 cases out of 10 are rejected and the majority of hypotheses (A-1, A-3, A-6, A-7, A-8, A-9) were insisted clearly.

5. Conclusion

In this paper, a questionnaire investigation is executed in order to clarify tourists' behavior, and to seek the possibility of developing regional collaboration among local government, tourism related industry and visitors. This survey of tourist behavior was carried out in February 2015, during the Kawazu Cherry Blossom Festival). The 25th Kawazu Cherry Blossom Festival was held from February 10 to March 10, 2015. It was attended by 801,330 people, which was an increase of 9% over the previous year. On the first day of the survey, 30-50% of the flowers were in bloom, and the nighttime illuminations lit up on the evening of the 21st. According to the figures of the Kawazu town Tourist Association, there were 30,590 visitors on the 21st and 20,913 visitors on the 22nd.

During the Kawazu Cherry Blossom Festival, around 150 stores were offering food & drink or souvenirs on the road with the row of cherry trees linked to Kawazu Station. A number of events were held during the festival, including the "Semi Gourmet" and "Izu no Odoriko Photography Event."

At around the same time (January 20 to March 31), the 18th "Hina no Tsurushikazari Festival" (Hanging Doll Festival) was held at Higashiizu town Inatori.

In order to look for policies for effective use of questionnaire surveys in tourist destinations, the present study reviewed preceding studies in the field. Moreover, an attempt was made to find possibilities for inter-regional cooperation based on the data.

In the hypothesis testing, 6 cases out of 10 null hypotheses were rejected and the majority of hypotheses (A-1, A-3, A-6, A-7, A-8, A-9) were insisted clearly. We have obtained fruitful results.

In the future, it will be necessary to continue such surveys at various locations on the Izu Peninsula using a standardized set of questionnaire items and methods, and the efficacy of the study will have to be confirmed.

Acknowledgements

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APPENDIX

Questionnaire about the Tourism in Izu Peninsula

Please select the appropriate item in each column. Please write down the details in ().

Q1. Address: Prefecture ()

⇒ If the prefecture is Tokyo, Kanagawa, Shizuoka, then City ()

Q2. Sex: ①Male ②Female

Q3. Age: ①10th ②20th ③30th ④4th ⑤50th ⑥6th ⑦70~

Q4. Occupation: ①Independents ②Office worker ③Student ④Housewife ⑤No job
⑥Miscellaneous ()

Q5. Fellow travelers:

①Solo trip ②Couple ③Family ④Male's small group ⑤Female's small group

⑥Male and female's small group ⑦Group (More than 7) ⑧Miscellaneous ()

Q6. Visiting frequency to Izu Peninsula and Kawazu Cherry Tree:

Izu Peninsula = ①First time ②Second times ③Third times ④Fourth times ⑤Fifth~
Nine

times ⑥More than ten times

Kawazu Cherry Tree = ①First time ②Second times ③Third times ④Fourth times ⑤
Fifth~Nine times ⑥More than ten times

Q7. Means of transportation to IZU Peninsula:

①JR, Izu-kyuko train ②Sightseeing bus ③Private automobile ④Rent-a car ⑤Highway bus
⑥Shuttle bus service by the hotel ⑦ Miscellaneous ()

Q8. Means of movement in Izu Peninsula: (Plural answers allowed)

①Walking ②Fixed-route bus ③Sightseeing bus ④Private automobile ⑤Rent-a car
⑥Taxi ⑦Miscellaneous ()

→To whom who has selected ⑤: Starting point () End point ()

Q9. Main occasion to visit to Izu Peninsula (Plural answers allowed)

①Poster ②Brochure by tour company ③TV program ④Newspaper ad ⑤Magazine
⑥Tour package for Kawazu Cherry Tree ⑦Online lodging reservation site ⑧Internet ⑨Advice
by family, acquaintance ⑩Felt good at the previous visit ⑪Miscellaneous ()

Q10. What is an objective to visit Izu Peninsula? (Plural answers allowed)

①Hot spring ②Scenery, Nature ③Dish, sense of taste ④Flower of the season ⑤Stroll around
town, Eating tour ⑥Budget ⑦Convenience of traffic ⑧Historic landmark, Literature
monument, Construction ⑨Sightseeing facilities ⑩Gallery, Museum ⑪Experience-based
tourism ⑫Park ⑬Miscellaneous ()

Q11. Staying time in Izu Peninsula:

①One - day trip () hour ②2 days stay ③3 days stay ④More than 4
days

⇒ If you have selected ②~④, please answer the following question.

(1) Staying type: ①Inn, Hotel ②Resort house ③Second house ④Relative's house ⑤Miscellaneous
()

(2) Use type of staying facilities: ①Per night with dinner and breakfast ②Per night with dinner ③Per
night with breakfast ④With no meals ⑤Miscellaneous ()

Q12. Where are you going to go in Izu Peninsula? ※Place at which staying time is more than 30
minutes

★ Customer type (): A: One - day trip, Depart from Kawazu Cherry Tree B: One - day
trip, Depart from elsewhere except for Kawazu Cherry Tree C: Stay more than one night, Depart
from Kawazu Cherry Tree D: Stay more than one night, Depart from elsewhere except for Kawazu

The Consequences of Perceived Usefulness of Training (PUT): The Self-Efficacy Perspective

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Abstract

This study aimed to exploring the consequences of perceived usefulness of training (PUT) and use self-efficacy perspective. Questionnaire was the tool of collecting data from a sample of (240) pharmacists. Our findings confirmed that there is a positive effect of PUT on task performance and context performance. As well as, there are full effect professional competency and core competency on the relationship between PUT and task performance and context performance. Finally, our study proposed some theoretical and managerial implications.

Keywords: perceived usefulness of training, professional competency, core competency, task performance, and context training

1. Introduction

The concept of competency was made by Stogdill (1948), Katz (1955), and Mann (1965), theories and practices regarding competency have flourished. The studies of competency's link to managerial success and to effective performance in literature also proliferated and widened into other fields (e.g., Boyatzis, 1982; Du Gay, Salaman, & Rees, 1996; Lawler, 1994; Mansfield, 1996; McCall & Lombardo, 1983; McLagan, 1996; Mirabile, 1997; Posner & Kouzes, 1988; Spencer & Spencer, 1993). Competency has great considerable practicality and has contributed to improving both individual and organizational performance (McClelland, 1973; Spencer et al., 1993). This notion of competency can also serve in health care and extend to other medical personnel et al. It is essential to raise the quality of medical services in health care industry. From the view of human resources, we must strengthen the professional competency and core competency of health manpower beyond the traditional technical field. In practice, the medical industry has become increasingly focused on the competency indicators of task and context performance. This study exploring the consequences of perceived usefulness of training (PUT) and use self-efficacy perspective and affects the output task and context performance of medical personnel.

McClelland (1973) refers to this concept of competence research indicates that an excellent worker performance, including attitude, cognitive and personality traits and other factors that defined competency. Boyatzis (1982) re-defined competency as a latent individual trait; this trait can produce superior efficiency of task and context performance. But, the definition of competency is rather vague (van der Klink and Boon, 2003). In order to ensure the definition of competency, scholars have chosen a broad definition (Delamare Le Deist & Winterton, 2005). This study following to Spencer & Spencer (1993) task and context competency is defined as the potential underlying characteristic of individuals, characteristic that include more than only work-related duties, features which inspire higher expectations of employers, and are likely to positively influence the behavior and performance of individual performance (p.9).

In this study, professional and core competency under the self-efficacy perspective that play important mechanism role between perceived usefulness of training (PUT) and task performance and context performance in pharmacists.

2. Theoretical Background and Hypotheses Development

2.1 Professional Competency and Core Competency

In the decades following McClelland's (1973) publication, many scholars also re-defined their research parameters based on the idea of competency between the 1980s and 1990s. Competency can be summarized by a

few priorities: first, competency can be observed and measured; secondly, competency requires knowledge, skills, and abilities; third, competency is associated with the performance output; and, finally, competency can be taught and acquired through training. This study will use the definition made by Spencer & Spencer (1993): competency is the basic potential characteristics of an individual, characteristics needed in work-related positions and will further expectations or affect individual behavior and performance. Spencer & Spencer (1993) divided competency into the implicit and explicit. The implicit elements contain self-concept, traits and motives, and the explicit element includes skills and knowledge. Spencer & Spencer (1993) focused on the explicit elements because they are most likely to be developed and are more cost-effective. This study focuses on the explicit elements of competency and divides it into professional competency and core competency.

2.2 Effects of Perceived Usefulness of Training (PUT) on Task Performance and Context Performance

Through training, you can increase employee knowledge, ability and achieving organizational goals. That is, systematic training program used to train the professional knowledge, skills, and attitudes. Human resource development includes training (Nadler & Nadler, 2012), it needed to develop staff to meet the requirements of their work. (Abiodun, 1999). The purpose of perceived usefulness of training (PUT) is to train employees, enhance their work ability, and should coincide with organizational strategic planning. Training basic function is to upgrade the ability of employees and training is determined at the improvement employees working and facilitates staff capability and adapted to organizational strategic planning. Gilley, Egglund, & Gilley (2002) put forward training is considered at affordable the existing employee job performance. In the short-term it is easier to see the results on task performance and context performance when training is more focused on goal-oriented (Thang, Quang, & Buyens, 2010). Accordingly, the present study suggests that enhanced employee task performance and context performance is the main purpose of learning within an enterprise. The purpose of task performance and context performance is to provide program objectives and organizational learning experiences and opportunities which will enhance employee's current or future performance and improve organizational performance. Based on the above reasoning, hypotheses were formulated as a follows:

Hypothesis 1: Perceived usefulness of training (PUT) will be positively related to task performance.

Hypothesis 2: Perceived usefulness of training (PUT) will be positively related to context performance.

2.3 The Mechanisms Role of Professional Competency and Core Competency

In order to the promotion of self-efficacy, the key are subject competency and acquired learning (Nahavandi, 2009). From the social learning theory of self-efficacy perspective, past achievements, alternative experience, verbal persuasion, and evoked emotions will form self-efficacy, and then through self-awareness system, this self-efficacy will be assessed. Through experience and observation form others' speech and behavior, personal will imitate the successful experience of others, will encourage positive feelings and behavior. Individuals through positive emotions will enhance self-efficacy, which, when followed by self-assessment, will lead to strong confidence about things, having a strong positive impact on task performance and context performance, thus causing further performance to be enhanced. Self-efficacy is the ability to continue to drive personal performance and motivation (Bandura, 1986), and self-efficacy will enhance individuals willing to accept and complete the challenge to get better performance (Bandura 1986; Wood & Bandura, 1989). Based on the above reasoning, hypotheses were formulated as a follows:

Hypothesis 3: Professional competency will mediate the positive relationship between perceived usefulness of training (PUT) and task performance.

Hypothesis 4: Core competency will mediate the positive relationship between Perceived usefulness of training (PUT) and context performance.

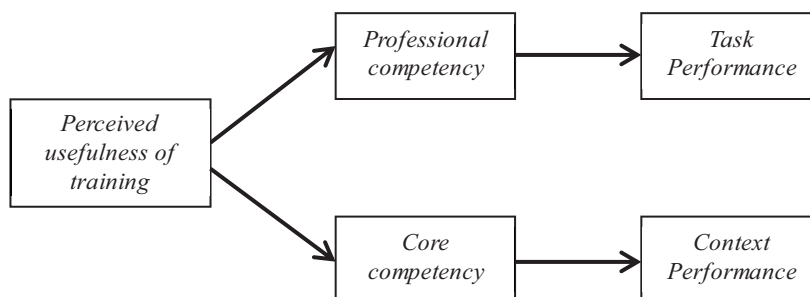


Figure 1. Theoretical model

3. Method

This study was based on a causal model which tries to exploring the consequences of perceived usefulness of training (PUT) in pharmacists.

3.1 Sample and Procedure

In this study, in order to avoid common method variance (CMV; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), using paired questionnaire. As subjects, this study uses pharmacists who were involved in a continuing education training process. In total, four echelons comprised of 240 pharmacists received training. After the training was completed, the researchers directly accessed pharmacists, pharmacists completed the competency and training questionnaire on the spot. And After six months, the workplace of the trained pharmacists' supervisor completed the task and context performance questionnaire. Part of the questionnaire commissioned by the colleagues on behalf of the distributed and collected, in order to ensure confidentiality, the questionnaires were collected promptly after they were filled out and placed in the enclosed envelope. A total of 240 valid questionnaires were obtained. In this study, members of the medical industry served as the population of the study. Individual serve as the unit of measurement. Grassroots professional pharmacists who engaged in continuing education were asked to fill out the questionnaires. In the research project, pharmacists from different back grounds and work places participated: 154 respondents work in hospital pharmacies, 55 in community pharmacies, 18 in clinics, and 13 are pharmaceutical or biotech drug dealers, making a total of 240 people. Regarding the participants' characteristics, 105 were male, 135 were female, with women accounting for 56.25% of the total; regarding age 102 of the respondents are between 21 and 30 years old, 62 between 31 and 40, 54 between 41 and 50, 17 between 51 and 60, and 5 are over 60 years old), The 21-30 year old group is the largest, and accounts for 42.50% of the total. As for education, the subjects can be broken down as follows: 16 bachelors (excluding) degree, 171 bachelor degrees, 49 master's degrees, and 4 PhDs. The largest group is made of up those with a bachelor's degree, accounting for 71.25% of the total. Regarding length of experience in the field, the respondents can be broken down as follows: 116 people (1-5 years), 38 people (6-10 years), 25 people (11-15 years), 29 people (16-20 years), 17 people (21-25 years), 15 people (26 - 30 years). Exactly half of the respondents have worked in the field for in 1-5 years, accounting for 48.33% of the total.

3.2 Measures

The survey items were provided using 5-point Likert scales with response scales being "strongly disagree"(1) and "strongly agree"(5). Independent variable is perceived usefulness of training (PUT), dependent variable is task performance and context performance and mediator variables include professional competency and core competency. Control variables include demographic variables. Pharmacists' work is statutory and exclusive. In the professional competency and core competency questionnaire design, business content which is controlled by pharmaceutical affairs regulations, were employed to measure the pharmacists' competency. According to the pharmaceutical affairs regulations, examine questions of competency scale through five experts, a total of 31 items, each including a professional competency and core competency. A total of 17 questions focus on an examination of professional competency. A total of 14 questions focus on core competency. The results of this study are reliability analysis. The Cronbach's alphas are 0.94 and 0.93 for professional competency and core competency, respectively. Regarding the topic of performance, we used the task performance and context performance scale developed by Motowidlo & Van Scotter, (1994). Task performance scale includes seven items. The Cronbach's α value of 0.90 is good. Context performance scale includes six items. The Cronbach's α value of 0.91 is good. When looking at training, we used perceived usefulness of training (PUT) scale developed by Giangreco et al., (2009). The training scale includes 5 items. The overall Cronbach's α value of 0.89 is good.

4. Result

4.1 Correlation Analysis

Table 1 shows descriptive statistics and inter-correlations for the study variables. The reliability coefficients were all greater than 0.89. The age correlated positively with tenure ($r = .83$, $p < 0.001$). The tenure correlated positively with professional competency ($r = .16$, $p < 0.05$). The tenure correlated positively with core competence ($r = .16$, $p < 0.05$). The tenure correlated positively with core performance ($r = .13$, $p < 0.05$). All variables positively related to each other ($r = .19 \sim .76$, $p < 0.001$)

Table 1. Means, Standard Deviations, and Inter-correlations

variables	M	SD	1	2	3	4	5	6	7
1. Age	36.14	10.69	-						
2. Tenure	9.63	8.93	.83***	-					
3. PUT	3.74	0.57	.10	.12	(.89)				
4. PC	3.58	0.65	.10	.16*	.22***	(.94)			
5. CC	4.00	0.53	.08	.16*	.37***	.50***	(.93)		
6. TP	4.07	0.46	.06	.07	.19***	.44***	.70***	(.90)	
7. CP	4.13	0.44	.09	.13*	.27***	.37***	.69***	.76***	(.91)

Note. N = 240. Coefficient alphas are listed in parentheses along the diagonal.

PUT= perceived usefulness of training, PC = professional competency, CC = core competency,

TP = task performance, CP= context performance * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

4.2 Hypothesis Testing

Table 2 shows the results of hierarchical regression. We tested the hypotheses by regressing perceived usefulness of training and task performance on the control variables (step 1), the main effects of perceived usefulness of training (step 2). At step 2, the main effect of perceived usefulness of training on task performance has significant ($\beta = .186, p < .01$). Hypothesis 1 was supported.

Table 3 shows the results of hierarchical regression. We tested the hypotheses by regressing perceived usefulness of training and context performance on the control variables (step 1), the main effects of perceived usefulness of training (step 2). At step 2, the main effect of perceived usefulness of training on context performance has significant ($\beta = .260, p < .001$). Hypothesis 2 was supported.

Table 4 shows the results of hierarchical regression. We tested the hypotheses by regressing perceived usefulness of training and task performance on the control variables (step 1), the main effects of perceived usefulness of training (step 2), and the mediating effect of professional competency (step 3). At step 2, the main effect of perceived usefulness of training on task performance has significant ($\beta = .186, p < .01$), the mediating effect of professional competency on task performance has significant ($\beta = .419, p < .001$). Hypothesis 3 was supported, as the beta for perceived usefulness of training became insignificant ($\beta = .102, p > .005$) when professional competency was included, demonstrating full mediation for task performance.

Table 5 shows the results of hierarchical regression. We tested the hypotheses by regressing perceived usefulness of training and context performance on the control variables (step 1), the main effects of perceived usefulness of training (step 2), and the mediating effect of core competency (step 3). At step 2, the main effect of perceived usefulness of training on context performance has significant ($\beta = .260, p < .001$), the mediating effect of core competency on context performance has significant ($\beta = .669, p < .001$). Hypothesis 3 was supported, as the beta for perceived usefulness of training became insignificant ($\beta = .024, p > .005$) when core competency was included, demonstrating full mediation for context performance.

Table 2. Hierarchical Regression Analysis

Variables	Task Performance	
	Model 1	Model 2
Control variable		
age	-.006	-.008
tenure	.074	.053
Independent variable		
perceived usefulness of training		.186**
R ²	.005	.039
F	.572	3.181*
ΔR ²	.005	.034
ΔF	.572	8.363**

Note. N = 240. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 3. Hierarchical Regression Analysis

Variables	Context Performance	
	Model 1	Model 2
Control variable		
age	-.056	-.058
tenure	.176	.147
Independent variable		
perceived usefulness of training		.260***
R ²	.018	.085
F	2.162	7.276***
ΔR ²	.018	.067
ΔF	2.162	17.209***

Note. N = 240. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 4. Hierarchical Regression Analysis

Variables	Task Performance		
	Model 1	Model 2	Model 3
Control variable			
age	-.006	-.008	.038
tenure	.074	.053	-.040
Independent variable			
perceived usefulness of training		.186**	.102
Mediator variable			
professional competency			.419***
R ²	.005	.039	.203
F	.572	3.181*	14.935***
ΔR ²	.005	.034	.164
ΔF	.572	8.363**	48.284***

Note. N = 240. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 5. Hierarchical Regression Analysis

Variables	Context Performance		
	Model 1	Model 2	Model 3
Control variable			
age	-.056	-.058	.054
tenure	.176	.147	-.026
Independent variable			
perceived usefulness of training		.260***	.024
Mediator variable			
core competency			.669***
R ²	.018	.085	.462
F	2.162	7.276***	50.390***
ΔR ²	.018	.067	.377
ΔF	2.162	17.209***	164.597***

Note. N = 240. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

5. Discussion

5.1 Discussion and Conclusions

In terms of the control variables, pharmacists' age and seniority, regardless of task performance and context performance, do not seem to be significant. In the main effect, however, these study findings confirmed that there is a positive role of perceived usefulness of training in improving task performance and context performance.

Regarding the mediator effect, the results of the study revealed that there is a significant impact. There are full effect of professional competency and core competency on the relationship between perceived usefulness of training and task performance and context performance. The main reason is that pharmacists have expertise knowledge and should be considered medical technical workers. The work environment and the medical system do not allow for any negligence. On the pharmacists' work content, professional-oriented results are significantly better than experience-oriented results.

5.2 Contribution

Since the 1940s, first, scholars have come to pay more attention to the impact of the performance of competency. This study proposes task performance and context performance, aimed at developing further insight into

competency perspectives as well as the mediating role of perceived usefulness of training and task performance and context performance. Secondly, the main effect of the present study, regarding the self-efficacy perspective is worth noting. Professional and core competency will through individual self-efficacy plays a mediating mechanism between perceived usefulness of training and task performance and context performance. This information should extend the scope of self-efficacy. Third, from the practical perspective, competency has become an important indicator of the medical industry. The results of this study make clear that whether it is through professional competency and core competency has a significant impact on task performance and context performance.

Therefore, this study makes the following recommendations; first, in addition to strengthening the training, the practice of professional and core competency should be further strengthened in the field of pharmacy care-related businesses, to enhance the quality of medical care and provide clients with more substantive help. In addition, the pharmacy industry's continuing education is often limited to those forced to participate, which can cause distress, in particular, the timing of the implementation of surface pharmacists often becomes troubled. This study suggests that if we make modest improvements in the training to make them more flexible, for example, open online credit courses to enable trainees' pharmacists to customize the selection of learning places, it should increase their learning willingness and strengthen professional and core competency in pharmacy care business.

5.3 Limitations and Future Research

In this study, the researcher seeks to improve the design and analysis, but there are still several points which should be noted. First, regarding external validity issues, the present study's sample survey of pharmacists failed to include other medical personnel, such as doctors, nurses and hospital administration staff. Second, in terms of research scale, the present study, although substantially complete in its efforts at sorting out professional competency and core competency, still finds it difficult to avoid the problem of lack of comprehensiveness. We propose that future research should focus on the integrity of the medical industry functions scale in order to enhance the quality scale. Third, as for training evaluation, although the present study adopts the more practical value of the first stage of the reaction level, the questionnaire respondents participated in training provided by the staff, however, to be able to arrive at a more complete understanding of training, it is recommended that in future research projects the scholars should simultaneously use the full four-stage level.

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Employee Engagement and Perceived Financial Performance: A Serene Insight

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Abstract

Employee engagement encompasses and connects a vast range of management discipline which turns it to be a wide spread concept. The correlation between employee engagement and perceived financial performance has rarely been studied. The intention of this study scrutinizes the connection between employee engagement and perceived financial performance. Based on data extracted from 67 HR managers in the listed companies in Sri Lanka, the study investigates two hypothesized relationships; the relationship between employee engagement and perceived financial performance, and the mediating role of employee job performance on the relationship between employee engagement and perceived financial performance. These ideas initiate important discussion for academics and practitioners.

Keywords: employee engagement, perceived financial performance, mediating role

1. Introduction

Employee engagement as Anita (2014) suggests explaining a number of studies are one of the fundamental factors that cultivate high levels of employee job performance. She has also discovered a significant impact by employee engagement on employee job performance. As it is obvious employee engagement enhances employee job performance, particularly when there is an association between employee engagement and the elements of employee job performance such as organizational citizenship behavior and task performance (Richman, 2006; Macey & Schneider, 2008; Demerouti & Cropanzano, 2010; Rich et al., 2010; Christian et al., 2011). Stewart & Brown (2011) divide employee job performance into three parts; specifically task performance, counterproductive performance and organizational citizenship behaviour. Christian et al., (2011) substantiate that employee engagement is interrelated to employee job performance, emphasizing a high level of connectivity of an engaged employee with one's work tasks; the force that drives employee toward the task-related goals and objectives which direct to task performance. A similar observation that an engaged employee is likely to initiate extra-role behaviors has also been made. This perhaps is due to the reason that a particular person capable of "freeing up" resources by efficiently performance and achieving goals, making room to achieve what is not part of one's is job descriptions. In summation, after considering the studies of the above mentioned researchers, a conclusion that an employee engagement leads to employee job performance can be made.

The relationship at the business-unit level between employee engagement and employee job performance is revealed by Harter et al., (2002) that when an employee as Xanthopoulou et al., (2009) state is engaged in work and focused on customers, that person brings high profit to the organization. In recent years, as Saks & Gruman (2014) mention, a great growth of interest in employee engagement has been observed. Employee engagement conjectures organizational success in relation to financial performance; for instance total shareholder return (Bates, 2004; Baumruk, 2004; Harter et al., 2002; Richman, 2006; Sahoo & Sahu, 2009).

Repeated research, according to Sahoo & Sahu (2009), has identified the direct correlation between the level of employee engagement in a company and the company's overall financial and operational performance. Considering the above mentioned literature evidence, the researchers can state that there is a relationship between employee engagement, employee job performance and financial performance.

This study attempt to cover;

1. Conceptualization and operationalization of perceived financial performance.
2. Reliability and validity of the constructs of perceived financial performance.
3. Identifying the impact of employee engagement on perceived financial performance in the Sri Lankan context.
4. Identifying whether employee job performance significantly mediates the relationship between employee engagement and perceived financial performance.

2. Research Design

The purpose of the study, extent of researcher interference with the study, type of investigation, unit of analysis, study setting and time horizon of study are the six components of the research design presented by Sekaran (2003). The details of the research design are represented under Table 1.

Table 1. The research design

	Research design	Description
1.	The purpose of the study	Hypothesis testing
2.	Extent of researcher interference with the study	Minimum interference
3.	Type of investigation	Correlational
4.	Unit of analysis	Individual
5.	Study setting	Non-contrived
6.	Time horizon of study	Cross-sectional

Unit of analysis is individual; to be specific Human Resource (HR) managers in the Sri Lankan listed companies. Proper conceptualization and operationalization helped to develop the questionnaire of this study. Likert scale is the measurement scale of the questionnaire and the rating scale is five-point. Non-probability sampling is used as the sampling method. The sample of this study is 67. Roscoe (1975), as cited in Sekaran (2003), comes up with a rule that the sample sizes should be more than 30 respondents and less than 500 respondents. The researchers of this study have followed that rule when it comes to a decision about the sample size. The response rate of this study is 24% from the population of 212. Refer to Table 2. Statistical Package for Social Science 23 (SPSS 23) is used for statistical analysis.

Table 2. Summary of the samples

Unit of analysis	Population/Total sample	Number of usable questionnaires	Total sample – Unsuitable or un-contactable of the sample	Response rate
Individual – HR managers	212	67	145	24%

3. Conceptualization of Perceived Financial Performance

Financial data, according to Harter et al., (2002) are of two types; namely business-unit sales (revenue) and margin (percent profit of total revenue). A link between human resource management (HRM) practices and financial performance has been suggested by many authors; for instance Huselid (1995) brings up an important link between financial performance and high performance work practices (HPWPs).

Schneider & Barbera (2014) wrote:

“The fundamental relationship between the internal functioning of an organization and profits is based on the service profit chain which integrates marketing, operations and human resources to handle the results for customers over the costs of service production.”

There is evidence that employee engagement leads to perceived financial performance as well. The researchers prefer the word perceived financial performance, because, in this study, the researchers study about how the Human Resource managers (HR managers), perceived, financial performance in relation to employee engagement.

3.1 Towards a Definition for Perceived Financial Performance

Corporate financial performance (CFP), defined by Karaye et al., (2014), is achievement of organizational objectives or as being both productive and efficient. Lorino's (2004) definition of corporate financial performance is that anything which contribute to ameliorate value-cost couple and not only which contributes to cost decrease or value increase (Karaye et al., 2014). The financial performance refers to the economic status of a firm such as profitability, sales growth, return on assets etc (Palagolla & Wickramasinghe, 2016). The measures

of financial performance contain profit, sales growth and return on assets (Shaverdi et al., 2014; Karaye et al., 2014; Boaventura, et al., 2012). The working definition has an influence of the definition by Palagolla & Wickramasinghe (2016). Their definition evidently indicates the measurements of financial performance.

3.2 Perceived Financial Performance – Working Definition

The perceived financial performance refers to the economic status of a firm such as profitability, sales growth and return on assets.

Source adapted: Palagolla & Wickramasinghe (2016)

4. Operationalization of the Variable of Perceived Financial Performance

4.1 Dimensions of Perceived Financial Performance

Boaventura et al., (2012) wrote:

“The concept of CFP [corporate financial performance] is influenced by many factors including CSR. The meta analysis of Boaventura et al. (2012) reported that most studies uses return on assets (ROA) to measure CFP [corporate financial performance] almost forty eight percent (48%), followed by return on equity (29%), sales growth (22%), return on sales (16%), contribution margin (15%), Tobins Q (10%), etc. Therefore these developments lead to the conclusion that researchers predominantly use return on asset (ROA) to measure CFP [corporate financial performance].”

The measures of financial performance include profit, sales growth and return on assets (Shaverdia et al., 2014; Karaye et al., 2014; Boaventura, et al., 2012). According to Palagolla & Wickramasinghe (2016), the dimensions are profit growth, sales growth, cash flow and return on investments. Hong et al., (2013) state that the proportions of financial performance are the sales growth, profit growth and revenue growth. The researchers, after considering all these features, have identified three dimensions for the construct of perceived financial performance; profit growth, sales growth and operating cost.

4.2 Profit Growth

The profit growth can be measured by the average profit during the last three years compared to competitors (Halpin & Senior, 2009; Walker, 2005; Mukharjee & Hanif, 1998). The dimension called profit growth is measured by the statements such as “the average of the profit during the last three years is high, comparing to our competitors, due to the high levels of employee engagement. Exhibit 1 presents the elements and statements of the dimension called profit growth.

Exhibit 1. Elements and statements of the dimension called profit growth

Element	Statement
Profit growth during the last three years	The average of the profit during the last three years is high, comparing to our competitors due to the high levels of employee engagement.

4.3 Sales Growth

The sales growth can be measured by the average sales during the last three years compared to the competitors (Halpin & Senior, 2009; Mukharjee & Hanif, 1998; Walker, 2005). The dimension called sales growth is measured by the statements such as “employee engagement has a positive effect on the sales growth during the last three years comparing to our competitors.” Exhibit 2 presents the elements and statements of the dimension called sales growth.

Exhibit 2. Elements and statements of the dimension called sales growth

Element	Statement
Sales growth during the last three years	Employee engagement has a positive effect on the sales growth during the last three years comparing to our competitors.

4.4 Operating Cost

Operating cost can be measured by the operating cost during the last three years compared to the competitors (Shaverdia et al., 2014; Halpin & Senior, 2009; Mukharjee & Hanif, 1998). The dimension called “operating cost” is measured by the statements such as “due to high levels of employee engagement, operating cost is low comparing to our competitors.” Exhibit 3 presents the elements and statements of the dimension called operating cost.

Exhibit 3. Elements and statements of the dimension called sales growth

Element	Statement
Operating cost during the last three years	Due to high levels of employee engagement, operating cost is low comparing to our competitors.

Figure 1 diagrams the dimensions and elements of the variable of perceived financial performance. In the Figure 1, (D) stands for a dimension and (E) stands for an element of the variable of perceived financial performance.

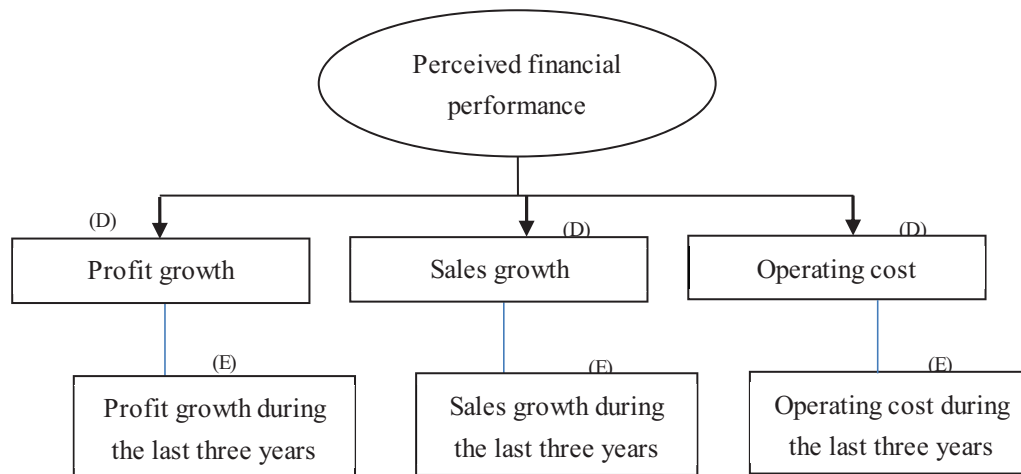


Figure 1. Dimensions and elements of the variable of perceived financial performance

5. Reliability and Validity of the Perceived Financial Performance Measure

Perceived financial performance is observed through profit growth, sales growth and operating cost; the three items related to three dimensions. First the researchers ensured the content validity, which, according to Sekaran (2003), is a function of how well the dimensions and elements of a concept have been delineated. Content validity has been guaranteed through proper conceptualization (Refer to 3.0) and operationalization (Refer to 4.0), and Construct validity, by a confirmatory factor analysis (CFA).

Theoretical predictions indicate three latent variables; profit growth (1 item), sales growth (1 item) and operating cost (1 item). The number of items is below the recommended levels by Nunnally (1978) and Tabachnick & Fidell (2001) that is 10:1 and 5:1 respectively. One latent variable for perceived financial performance is indicated by exploratory factor analysis (EFA). The recommended level of factor loading is 0.5 or above (Dubey, 2016; De Vries, 2012). Table 3 shows that all the factor loadings are above 0.5.

Perceived financial performance has a Cronbach's alpha level which is in an appropriate level. The Cronbach's alpha for the whole measure is 0.752. Nunnally & Bernstein (1994) as cited in Andrew et al., (2011) state that in social sciences, values at or above 0.7 are desirable. Since the Cronbach's alpha for the construct of perceived financial performance is high ($\alpha=0.752$) the items are highly connected and highly reliable for assessing perceived financial performance. Related to internal consistency reliability and content validity of perceived financial performance, the statistical output can be summarized as follows.

Table 3. Reliability and validity of perceived financial performance measure

Variable	Items	Principal Component Factor Loading	of Item Reliability Coefficient	Cronbach's Alpha if Deleted	Cronbach's Reliability Coefficient (α)	Alpha
Perceived financial performance	FIN1	0.650	0.552	0.554		
	FIN2	0.808	0.335			
	FIN3	0.740	0.473			

Source: Survey data

6. Introduction to Employee Engagement

The working definition for this study, is the definition by Iddagoda et al., (2016). That is employee engagement is the extent to which an employee gets involved in the job and the organization cognitively, emotionally and behaviorally. Iddagoda et al., (2016) in their study present dimensions of the construct of employee engagement;

namely, cognitive involvement, emotional involvement and behavioural involvement. These dimensions are the dimensions for the construct of employee engagement for this study.

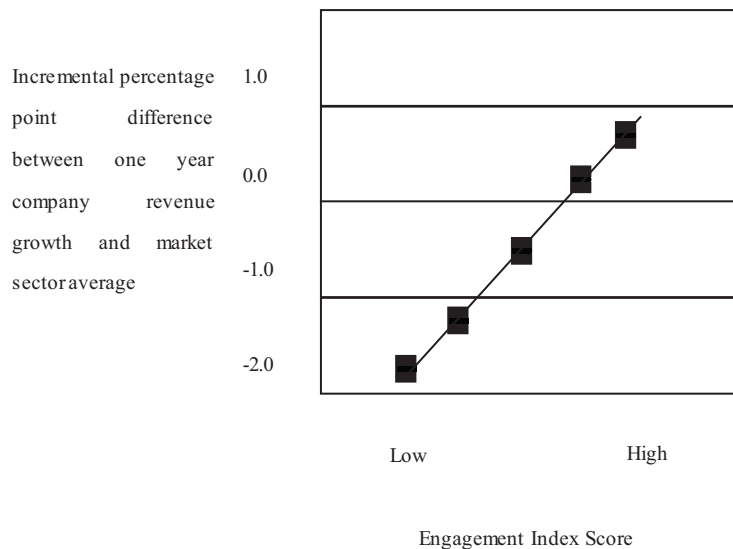
7. Introduction to Employee Job Performance

The label called “employee job performance” is used by the researchers of this study, instead of job performance because it is more comprehensible. Stewart & Brown (2011) interprets “job performance” as the contribution that individuals make to the organization that employs them, which is going to be the working definition of this study. The dimensions of this construct are task performance, citizenship performance and counterproductive performance.

8. Employee Engagement and Perceived Financial Performance

A massive growing interest in employee engagement has been observed by Saks & Gruman (2014) in recent years. The researchers mention that one reason is the impact of employee engagement on financial performance. According to Sahoo & Sahu (2009), a direct connection between the level of employee engagement in a company and the company's overall financial and operational performance has been identified. When it comes to financial performance, employee engagement predicts organizational success; for instance total shareholder return (Bates, 2004; Baumruk, 2004; Harter et al., 2002; Richman, 2006; Sahoo & Sahu, 2009).

Xanthopoulou et al., (2009) state that an engaged employee who is focused on his/her customers brings extraordinary profit to the organization, while the actively disengaged employees drive away the customers (Gallup, 2013). Active disengagement, according to Gallup (2013), is an immense drain on economies throughout the world. For instance, as Gallup estimates, for the United States, active disengagement costs US \$450 billion to \$550 billion per year while it is between £52 billion and £70 billion (US \$83 billion and \$112 billion) per year in the United Kingdom. Figure 2 explains how employee engagement helps to revenue growth.



Note: This graph plots the linear regression equation that correlates between two variables: Respondents’ engagement scores and their mean score on three survey questions assessing the degree of customer focus in their organization (using a five-point scale).

Figure 2. Employee engagement and revenue growth

Source: Towers Perrin (2003)

Thus, it is essential to test the relationship between perceive financial performance with employee engagement. All such findings lead to the next hypothesis:

Hypothesis 1: Employee engagement has a significant positive effect on perceived financial performance.

9. Testing Hypothesis 1

Hypothesis

H1: Employee engagement has a significant positive effect on perceived financial performance.

Pearson correlation matrix was used to test the null hypothesis. One tailed test was conducted. The Pearson correlation matrix of the variables investigation is shown in Table 4. According to the table, the relationship is significant at a level of 0.05. In other words there is a 95% confidence level. As Table 4 depicts perceived financial performance correlated with a coefficient of 0.278*. From this time the null hypothesis is rejected. In view of that, the researchers can say that there is a small correlation between perceived financial performance and employee engagement.

Table 4. Correlations of perceived financial performance and employee engagement

		Engnew5
OFinNew5	Pearson Correlation	0.278*
	Sig. (1-tailed)	0.011
	N	67

Source: Survey data

10. The Mediating Role of Employee Job Performance

The fact that employee engagement leads to employee job performance (Anitha, 2014) and the financial performance (Harter et al., 2002) is clear. Business units in the top quartile on employee engagement had, according to Harter et al., (2002), on average, from \$80,000 to \$120,000 higher monthly revenue or sales (and for one organization, the difference was more than \$300,000). Gallup (2013) has identified critical links between employee engagement, business growth and profitability.

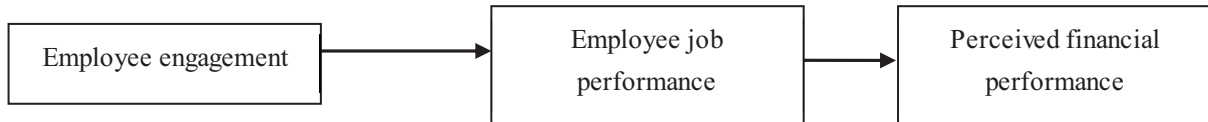


Figure 3. The mediating effect of employee job performance on the relationship between employee engagement and perceived financial performance

Emotional disconnection of an actively disengaged employee from his/her organization, as Gallup (2013) brings up, can work against vision and mission of the organization, which will also negatively influencing their coworkers to become less productive, miss workdays and drive away the customers. As Gallup (2013) mentions, active disengagement is a massive drain on economies all over the world. On the contrary, Sahoo & Sahu (2009) maintain the idea that higher levels of employee engagement indicate more productivity, less absenteeism, lower turnover, long-term organizational affiliation, higher job satisfaction, better client servicing and happier customers, higher levels of motivation, higher work morale, team spirit, loyalty and commitment to organization and high level of energy and enthusiasm.

Hypothesis 2: Employee job performance has a significant mediating effect on the relationship between employee engagement and perceived financial performance.

11. Testing Hypothesis 2

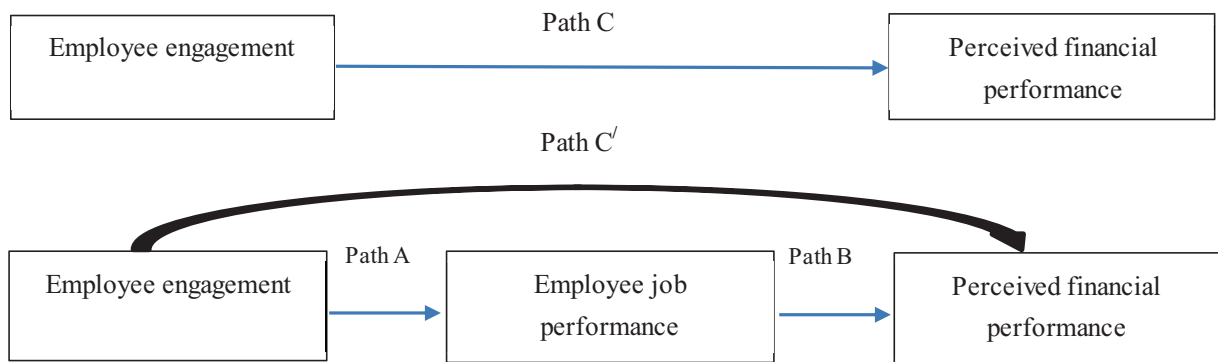


Figure 4. Diagram of direct and mediating effect

Source adapted: Frazier et al., (2004)

Mediation effect of predictor and outcome variables are explained in Figure 4. This has an influence of Frazier et

al., (2004) model. Path A, is predictor (employee engagement) related to mediator (employee job performance). Path B is mediator related to outcome variable; perceived financial performance. Path C is the total path. Path C' is the direct effect of the predictor on the outcome.

Employee job performance has a significant mediating effect on the relationship between employee engagement and perceived financial performance is the Hypothesis 2 (H2). The relationship between employee engagement and perceived financial performance is significant at 5%, meanwhile the p value is 0.023 ($p = 0.023$). Refer to Table 4. As a result Path C in Figure 4 is significant. The relationship between employee engagement and employee job performance is not significant ($b = -0.038, p = 0.760$). Refer to Table 5. Accordingly Path A in Figure 4 is not significant. In this manner it shows that the employee job performance variable is not mediated the relationship between employee engagement and perceived financial performance. Consequently H2 is rejected. Refer to Table 6.

Table 4. Coefficients of Path C

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.121	0.574		5.435	0.000
	Engnew5	0.324	0.139	0.278	2.330	0.023

a. Dependent Variable: OFinNew5

Source: Survey data

Table 5. Coefficients of Path A

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.660	0.599		7.779	0.000
	Engnew5	-0.044	0.145	-0.038	-0.306	0.760

a. Dependent Variable: Performance5

Source: Survey data

Table 6. Coefficients of Path B

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.129	0.804		3.891	0.000
	Engnew5	0.324	0.140	0.278	2.310	0.024
	Performance5	-0.002	0.120	-0.002	-0.015	0.988

a. Dependent Variable: OFinNew5

Source: Survey data

11. Limitations of the Study

Cross sectional research design: This is a cross sectional study. According to Saunders et al., (2007) the cross sectional study is a particular phenomenon at a particular time. There are two reasons for conducting this research based on cross sectional design. One is the time constraint and the other is since the profit making is the main concern of the organizations and they do not allow their workforce to spend time on responding the questionnaires numerous times.

Sectors of the listed companies: Respondents are from the Sri Lankan Listed Companies. Even though there are 20 sectors, the researchers were able to get the data from 18 sectors. The researchers of this study were unable to

cover the sectors such as Oil Palms and Stores and Supplies.

12. Discussion and Conclusion

Prior to the study about the mediation effect of employee job performance on the relationship between employee engagement and perceived financial performance (H2), discussing the relationship between employee engagement and perceived financial performance is important. Sixty seven HR managers of the Sri Lankan listed companies took part in the study of testing H1 and H2 to study the relationship between employee engagement and perceived financial performance. H2 is hypothesized as “employee engagement has a significant positive effect on perceived financial performance”. As the results suggest, employee engagement and perceived financial performance is noteworthy. The results of the first hypothesis support bridging the research gap in the literature of employee engagement by Iddagoda & Opatha (2017) that is “there is no empirical evidence on the relationship between employee engagement and financial performance in the Sri Lankan context.”

Hypothesis two (H2) represents the mediating effect of employee job performance on the relationship between employee engagement and perceived financial performance. According to the hierarchical regression results, employee job performance variable have no relation to the relationship between employee engagement and perceived financial performance. The researchers depending on these results were capable of bridging another research gap in the literature of employee engagement by Iddagoda & Opatha (2017); that is “there is no empirical evidence on employee job performance as an intervening variable for employee engagement and financial performance.” In addition, the well adapted instrument for perceived financial performance, has also been provided.

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Can Supplier Governance Improve Sustainable Performance of Manufacturing Firms?

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Abstract

Establishing relationships with suppliers has been found critically important for manufacturing organizations in meeting the challenges faced by them for maintaining sustainability in global supply chains. At the same time, managing these relationships so formed, by way of governance strategies is considered equally important in ensuring positive outcomes through the relationships established. This assertion of acquiring positive outcomes through managed relationships, suggested by the transaction cost theory was tested using data from the apparel manufacturing and exporting industry of Sri Lanka in relation to the sustainable performance of manufacturing firms. The results revealed that supplier governance negatively influences the relationship between sustainable practices and sustainable performance of manufacturing firms in the apparel manufacturing and exporting industry of Sri Lanka indicating that governance strategies do not always bring positive outcomes. These findings contribute to the knowledge by providing evidence as to the viability of governance mechanisms in achieving positive outcomes through buyer-supplier relationships in the context of developing countries.

Keywords: inter-organizational relationships, supplier governance, supply chain, sustainable performance

1. Introduction

In the recent years formation of inter-organizational relationships for the benefit of one another is dramatically increasing (Mellewigt et al. 2007). Supply chain is such a formation of inter-organizational relationships developed for the mutual benefit of organizations. As firms become dependent on resources that are scarce their coordination with other members of the supply chain increases.

The relationship that a manufacturing organization builds with its suppliers, for accruing such benefit can be identified with the inbound function of the supply chain (Rao and Holt, 2005). Such relationships that manufacturers form with their suppliers are found important in achieving sustainable performance. This has made many manufacturers to ensure that the material supplied by their suppliers satisfy the sustainability requirements.

Krause and Ellram (1997) explain that a company cannot be expected to be sustainable if their suppliers are not sustainable, highlighting the importance of suppliers in ensuring sustainability along supply chains. Moretto et al. (2012) have also identified that the source of environmental and ethical risks of many customer companies are their suppliers. Liker and Choi (2004) explain that businesses tend to find their suppliers important in ensuring a cost lower than the vendors of their rivals as well as in improving quality and developing new processes and products. As a result, manufacturers (buyers) show an interest in managing their suppliers when maintaining relationships with them along the supply chain to make sure that sustainability concerns are satisfied (Coxetal. 2004).

All parties to an economic exchange are expected to gain from their collective operation (Granovetter, 1985). Although the mutual and well balanced dependence between two parties to an exchange are expected to help form strong relationships, when there are imbalances in the mutual dependence the trust between parties can be damaged while sometimes creating conflicting situations (Bitran et al., 2006). This highlights that inter-organizational alliances come with potential hazards (Rowley et al. 2000). Governance is the mechanism through which such uncertainty is reduced (Grover and Saeed, 2007). It involves control and coordination. Wathne and Heide (2004) argue that where there is no governance exercised in upstream relationships it will

negatively influence the manufacturer's ability to respond to uncertainty in the downstream market. Carey and Lawson (2011) too share a similar view when they say that the performance of the supply chain can be improved with the social capital built up through enhanced supplier relationships (Nahapiet and Ghoshal, 1998). The implication is that without mitigating the uncertainty in the relationships with the suppliers a firm is unable to meet the expectations of their customers (Carey and Lawson, 2011).

Accordingly, supplier governance can be expected to bring positive outcomes to the manufacturer in his transactions with the supplier. On this ground, the researcher argues that if sustainable performance of manufacturing organizations is attributed to an outcome of social capital formed through supplier relationships (since social capital is the result of cognitive, relational and structural capital), through the application of supplier governance those organizations should be able to improve their sustainable performance. Sustainable performance is an outcome of sustainable practices. Therefore, it is reasonable to expect supplier governance to have a positive moderating effect on the relationship between these sustainable supply chain practices and sustainable performance of manufacturing organizations. Although there are many organizations in the South Asian region that have undertaken significant efforts towards establishing sustainable supply chain management initiatives, the researcher found that no previous research has tested an empirical link between how supplier governance could impact such efforts and resultant subsequent improvements in sustainable performance. Therefore it is important to address the role of supplier governance for bringing about favourable results from the relationship between the supplier and the focal manufacturing firm in achieving sustainable performance through sustainability initiatives. Present study addresses this need of identifying how a manufacturing firm gets the benefit of supplier relations towards achieving sustainable performance through supplier governance by examining the moderation effect of supplier governance. This paper presents the results of a survey conducted among apparel manufacturing and exporting organizations in Sri Lanka to address the above need.

The paper begins by presenting the theoretical foundation for understanding governance mechanisms in inter-organizational relations. Then it presents the conceptual model developed to test the moderation effect of supplier governance. It is followed by outlining the methodology employed to empirically test the conceptual model. The findings are tested using variance based structural equation modelling (PLS) with Smart PLS 3.0. The paper concludes with an analysis of the impact of governance mechanisms used by apparel manufacturing and exporting firms of Sri Lanka to manage their suppliers, in moderating the relationship between sustainable supply chain practices they adopt and the resulting sustainable performance.

2. Theory on Governance Mechanisms

The general understanding of theory on governance is that the characteristics of transactions translate into exchange hazards, which might be managed through governance. There are explanations in literature emphasizing the use of governance as a mechanism for reducing risk of opportunism as well as a coordinating tool against exchange hazards.

The mechanisms used to govern relationships have been categorized in literature as contractual governance (governance through formal contracts) and relational governance (governance based on trust) depending on the above stated nature of governance exercised. Contractual governance relies on the use of formalized, legally binding agreements to govern the buyer-supplier relationship (Zhao et al., 2008, Carey and Lawson, 2011). They include the formal contracts which include the promises or obligations to perform particular actions in the future (Espallardo et al., 2010). Here the parties to the exchange predict the potential hazards and define remedies for foreseeable contingencies (Poppo and Zenger, 2002). In relational governance, relational norms such as trust is expected to operate as a self-enforcing safeguard against inherent hazards. Trust and formal contracts have been identified as both substitutes and complements when they are considered as governance mechanisms. Whatever the way governance mechanisms are identified they are expected to make the governance possible by way of either control or coordination. In strategic management, transaction cost economics and the resource-based view are two theoretical perspectives that have been prominent in understanding the governance of inter organizational relations which aims at mitigation of opportunism and misappropriation of value by either parties in their relationships with other parties to an exchange. Transaction Cost Theory addresses both the controlling and coordination purposes sought by governance mechanisms in terms of contractual and relational governance. It promotes the idea that governance mechanisms serve the purpose of controlling when the parties to an exchange are well aware of its operation and thus reducing the transaction costs associated with it. The costs involved in engaging in activities that are not favourable to either party are minimized when the terms and conditions are laid down clearly. It could also be argued that when a formal contract exists it improves the understanding between the parties, enabling the buyer and the seller to strengthen relational governance.

3. The Conceptual Model

A conceptual model was developed in this study based on literature to empirically test the moderating impact of above said governance in relation to suppliers in buyer-supplier relationships. It was developed mainly based on the argument that when an individual member of a supply chain works in collaboration with another member they can move towards better performance. The researcher found the roots of this argument embedded in the social capital theory whereby the social connections in a network are supposed to bring positive outcomes for member firms (Nahapiet and Ghoshal, 1998). Accordingly, forming such relationships with suppliers in the supply chain network should provide an added advantage to the organization.

The conceptual model developed for the purpose of the present study, based on the above argument contains three constructs: supplier governance, sustainable supply chain practices and sustainable performance. The independent variable in this model is the sustainable supply chain practices. Sustainable performance is taken as the dependent variable. Since the magnitude of supplier governance is expected to moderate the impact of sustainable supply chain practices on the sustainable performance (explained in the agency theory and Transaction Cost Economics) the supplier governance becomes the moderator variable.

Although sustainable supply chain practices have been discussed in many research studies before, the framework suggested by Beske and Seuring (2014) provides a sound classification of dimensions. With the dimensions introduced by Beske and Seuring (2014) researcher could identify sustainable supply chain practices as a multidimensional construct. Law et al. (1998) explain that the dimensions of a multidimensional construct can be conceptualized under an overall abstraction and it is theoretically meaningful and parsimonious to use this overall abstraction as a representation of the dimensions. Therefore the researcher treats sustainable supply chain practices as a multidimensional construct consisting of the dimensions identified by Beske and Seuring (2014). The application of the Triple Bottom Line approach is not evident in the previous studies in conceptualizing sustainability. Present study analyses sustainable performance as a multidimensional construct consisting of environmental, economic as well as social performance. Supplier governance also is identified in a hybrid governance (plural form of governance) structure (Cai et al., 2009) with contractual governance and relational governance as dimensions.

3.1 Sustainable Performance

The impact of an organization's activities on air, water and energy are identified to reflect the **environmental performance**. **Social performance** is measured in terms of the impact of an organization's activities on the communities (Schaltegger and Burritt 2014). **Economic performance** of an organization is its financial achievement. Therefore, in the present study an organization is considered sustainable in its performance if it was able to produce satisfactory results in all the three areas of performance reflected by the above indicators (Triple Bottom Line approach).

3.2 Sustainable Supply Chain Practices

The sustainable practices identified and discussed in literature are introduced under a set of five broad headings (umbrella terms) by Beske and Seuring (2014) in a piece of more recent scholarly work. They identify these five broad headings as 'categories'. They are orientation, continuity, collaboration, risk management and pro-activity directed at sustainability of organizations. This classification has been done taking in to consideration the relationship of each practice to the strategy of an organization, its structure and the processes involved. The sustainable practices that are linked to the strategic level of an organization are the orientation towards the triple bottom line and supply chain management. These are listed under the broad category of '**orientation**'. The structure related practices are categorized as '**continuity**' which involves long term relationships, supply chain partner selection and partner development. **Risk management** and **pro-activity** are the categories of sustainable practices related to the processes of an organization. Selective monitoring, standards and certification and identifying pressure groups are the practices related to risk management. Learning, stakeholder management, innovation and life cycle assessment are identified as pro-activity related practices of sustainability. **Collaboration** is related both to the structure as well as the processes. Technological integration, logistical integration, enhanced communication and joint development are the practices related to collaboration.

3.3 Supplier Governance

The moderating variable supplier governance was defined based on a literature review to include both contractual and relational mechanisms used by manufacturing organizations for proper control and coordination of their relationships with supplier.

Contractual governance includes relying on the use of formalized, legally binding agreements to govern the

buyer-supplier relationship (Zhao et al., 2008, Carey and Lawson, 2011). *Relational governance* is identified as the self-enforceability of restraining opportunistic behavior of suppliers, relying on social sanctions for restraining deviant behavior of suppliers. This also includes a mutually beneficial re-adjustment/ renegotiation process that is cooperative.

All the above major constructs that constitute the conceptual model; sustainable performance, supplier governance and sustainable supply chain practices are multidimensional. At the same time, the constructs representing the main dimensions are manifestations of the main construct (Jarvis et al., 2003). Therefore, the researcher specifies the proposed conceptual model shown in Figure 1 formed with the above constructs as a second-order reflective hierarchical model (Aker et al., 2010, Wetzels, 2009). One of the significant advantages of hierarchical modeling is that it allows for more theoretical parsimony and less model complexity (Law et al., 1998).

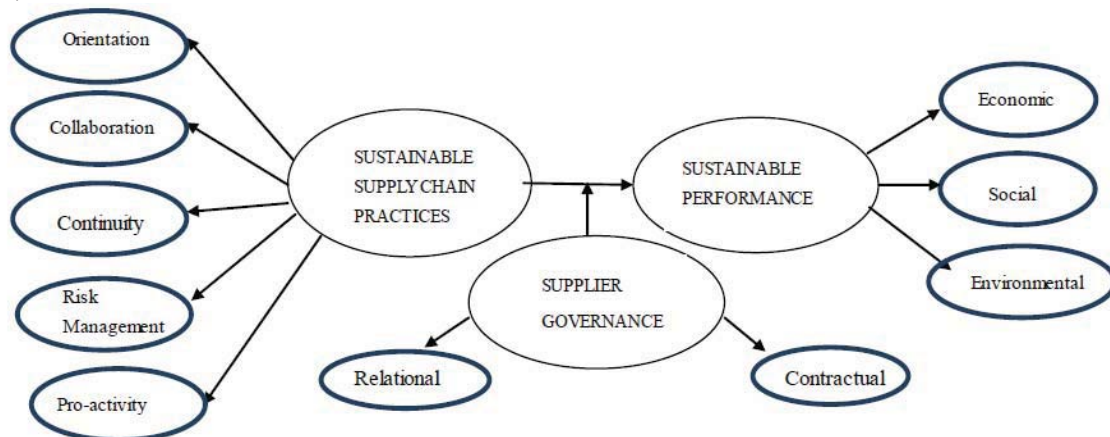


Figure 1. The Conceptual Model

4. Hypotheses Development

To embed the hierarchical model in a nomological network, the sustainable supply chain practices and supplier governance constructs were framed with the outcome construct sustainable performance through the development of hypotheses.

4.1 Sustainable Supply Chain Practices and Sustainable Performance

Carter and Rogers (2008) showed that firms strategically undertaking Sustainable Supply Chain Management can achieve higher economic performance than firms that pursue only one or two of the three components of the triple bottom line. Moretto et al. (2012) found that in the Italian fashion industry innovation performance in terms of sustainability could be improved through sustainable practices. Organizations that participate in environmental protection and fulfill social responsibility have been found to be compensated by an increase in long-term benefits (Brammer & Millington, 2008). At the same time, it is argued in literature how higher economic benefits empower corporations to take greater social responsibility. Those who are economically strong have been found to be capable of spending more money on pollution treatment, provide more benefits for society, and improve the welfare of their employees (Cao & Zhang, 2011). These explanations highlight a positive relationship between sustainable supply chain practices and sustainable performance. In explaining the positive relationship between sustainable supply chain practices and sustainable performance, the latter is calculated only in relation to environmental performance in many instances. Although it is the environmental performance or any other dimension that is considered to be 'sustainable performance' in literature, it is important to understand the relationship that exists between sustainable supply chain practices and sustainable performance considering all three dimensions of the Triple Bottom Line. The relationships that have been already identified in literature also have rarely focused on the developing countries. Rao and Holt (2005) explained the necessity of conducting similar studies in different countries to enable comparison. This gap in literature leads to a research question.

Research Question 01

What is the relationship between the adoption of sustainable supply chain practices and sustainable performance of individual organizations in the apparel manufacturing and exporting industry of Sri Lanka?

A relational hypothesis is developed to address this question.

H1: The higher the level of adoption of sustainable supply chain practices, the higher the level of sustainable

performance of individual firms in the apparel manufacturing and exporting industry of Sri Lanka.

4.2 Supplier Governance and Sustainable Performance

Verdecho et al. (2012) highlighted the fact that proper understanding of collaborative implications is often overlooked and this has caused collaborative relationships to fail. The explanation of Seuring and Muller (2008) that “supplier management for risk and performance” is necessary in meeting the sustainability needs emphasized by external triggers confirms the importance of a proper understanding of collaborative relationships. The importance of relational contract for supplier –buyer relationship which in turn affects supply chain performance has been emphasized by Chuah et al. (2010). Based on the predictions of Transaction Cost Analysis (TCA), Wathne and Heide (2004) explain that governance can improve focal company’s performance. These authors have clearly identified sustainable performance to result from supplier evaluation, selection and development. They argue that the risks regarding social and environmental sustainability may be mitigated by the application of above strategies. Carter and Rogers (2008) explain that firms that are dependent upon external resources can improve their economic sustainability through vertical coordination indicating that working closely with suppliers can lead to sustainable performance.

But how the governance structure influences sustainable performance is also an area that has not been covered by literature. Therefore a gap is created as to how supplier governance can affect the sustainable performance of organizations leading to another research question. In the present study this gap in literature is addressed in relation to a developing country.

Research Question 02

What is the impact of supplier governance practices on the sustainable performance of individual firms in the apparel manufacturing and exporting industry of Sri Lanka?

Relational hypothesis H2 is developed to address this question.

H2: The higher the level of application of supplier governance practices, the higher the level of sustainable performance of individual firms in the apparel manufacturing and exporting industry of Sri Lanka.

4.3 Supplier Governance Practices towards the Relationship between Sustainable Supply Chain Practices and Sustainable Performance

The summary of the previous explanations is that buyer- supplier relationships involve risks and uncertainty and supplier governance is a preventive mechanism. Therefore it is important to know how supplier governance can moderate the relationship between the sustainable supply chain practices and sustainable performance of individual apparel manufacturing and exporting firms since the implication of Transaction Cost Theory is that governance mechanisms bring better outcomes for the parties to a contract. The researcher found no previous studies that focused on studying this relationship. Literature could not be traced to empirically support this relationship. Therefore, a research question is formed to address this gap.

Research Question 03

What is the impact of supplier governance practices towards the relationship between sustainable supply chain practices and sustainable performance of individual firms in the apparel manufacturing and exporting industry of Sri Lanka?

Relational hypothesis H3 is developed to address this question.

H3: The higher the level of supplier governance the better will be the relationship between sustainable supply chain practices and sustainable performance of individual firms in the apparel manufacturing and exporting industry of Sri Lanka.

5. Methodology

5.1 Sampling

Data for this study was collected from the apparel manufacturing and exporting industry of Sri Lanka. There were two specific reasons behind the selection of the apparel manufacturing and exporting industry to represent the sample. First being the availability of clearly identified buyer – supplier relationships in the supply chains in which these firms are members. The second reason was that the organizations in this industry operate in the global network where sustainability is a major requirement for survival. The sampling unit of the study included individual organizations in this industry. A person at the management level of each of these organizations was identified to respond to the questionnaire.

5.2 Data Collection

A pre-designed questionnaire was used as the research instrument to collect the data required for the study. 154 apparel manufacturing and exporting organizations of Sri Lanka responded to the questionnaire.

The questions in the research instrument were based on the indicators of each dimension of the second order constructs identified from the literature review and purified after a pilot test [Statistical Package for Social Science (SPSS) was used for data cleaning and preliminary analysis before the final 154 cases were analyzed using Partial Least Squares – Structural Equation Modelling (PLS-SEM)].

Sustainable Performance consisted of 11 indicators (environmental performance 3, social performance 5 and economic performance 3). Sustainable supply chain practices had 28 indicators (orientation 4, continuity 9, collaboration 2, risk management 7 and pro-activity 8). The moderating variable supplier governance had 7 indicators (contractual governance 3 and relational governance 4). The perceptual evaluations of the respondents for the indicators of sustainable supply chain practices and supplier governance were measured in a structured format on a five-point Likert-type scale, ranging from “strongly agree” to “strongly disagree.” The five-point scale used to measure the perceptual evaluations for sustainable performance ranged from “strong positive variations” to “strong negative variations.” The measurement scale of the present study used to measure perceptual evaluations of the respondents assigned a score of ‘1’ if the respondents strongly agreed to the statements presented by the researcher.

5.3 Data Analysis Strategy

The researcher needed to establish rigor in the present study since the model explains something that is poorly or imperfectly understood beforehand. This necessitated to enable the researcher to discover the regularities that will allow adequate prediction of sustainable performance of organizations and the role of supplier governance. Variance based SEM (PLS) is found more suitable for studies that are relatively complex and the phenomenon under study is new or changing (Hair et al., 2012). At the same time since each of the constructs in the model were multidimensional, in selecting the analysis strategy, the ability of it to address complex models was also a consideration. Variance based SEM (PLS) enables analysis of models consisting of constructs involving more than one dimension when indicators are manifestations of constructs (Wilson, 2010, Hair et al., 2012). In addition, PLS-SEM was also suitable due to the integration of a newly-introduced construct (sustainable performance addressing the triple bottom line) to the model, that was seldom being examined in previous studies (Afthanorhan, 2013). Besides the examination of direct effect between sustainable supply chain practices and sustainable performance, researcher was more interested in understanding the moderating effect of supplier governance. The identification and quantification of moderating effects in complex causal structures could be analyzed by means of Partial Least Squares Path Modeling (Henseler and Fassott, 2010, Henseler and Chin, 2010, Hair Jr. et al., 2016). These reasons lead the researcher to use variance based SEM (Partial Least Squares) path modelling for analyzing the collected data.

6. Results

6.1 Role of Suppliers in the Apparel Exporting Industry of Sri Lanka

Before explaining the role of supplier governance the researcher found it important to explain the role of suppliers in the apparel exporting industry of Sri Lanka. In order to collect data for this purpose there were a few close ended questions presented to the respondents in the main survey. These data revealed that all firms were dealing with local as well as overseas suppliers, More than 50% of the fabric used for manufacturing was obtained from overseas suppliers. The other raw materials obtained from suppliers were thread, packing material, dye, chemicals, accessories etc. Table 1 summarizes the type of suppliers that the apparel manufacturers buy raw materials from and the materials that they obtain from them.

Table 1. Type of Supplier and Materials Obtained

	Fabric	Thread	Dye	Chemicals	Packing material	Other
Overseas	75%	20%	22%	05%	30%	-
Local	25%	80%	78%	95%	60%	-

The respondents were required to state whether they consider it important for their suppliers to be sustainable. The opinion of each of the respondents was that they need to be. Then the respondents were asked why they consider it important. The responses for the reasons given were as shown in Table 2.

Table 2. Reasons for Considering Supplier Sustainability Important

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
To ensure the chemicals used in the fabric are not hazardous		98%	02%		
Customers will assess us on our sustainability	80%	19%	01%		
Sustainable practices of suppliers will affect the quality of our output		100%			
Choosing sustainable suppliers will build our image in the customer	95%	05%			

The responses of the participants when they were asked what should be done to maintain the sustainable behavior of suppliers were as shown in Table 3.

Table 3. Mechanisms for Ensuring Supplier Sustainability

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
Bind with legal contracts	65%	35%			
Apply monetary sanctions against them		18%	82%		
Maintain close relationships with suppliers enabling self-enforceability	76%	34%			
Develop a mutual understanding with the supplier	70%	30%			

The descriptive statistics related to supplier governance helped in understanding the types of practices adopted and their level of adoption. It was interesting to find that none of the firms were confined to practice solely one type of governance. Rather all of them were practicing a combination of the two types of practices at different rates. The mean value for level at which the supplier governance was practiced in the apparel exporting industry of Sri Lanka was 1.93. This was a mean value closer to '2'. It was an indication that supplier governance was prevalent in the apparel exporting industry of Sri Lanka at a considerable level. When the responses for individual dimensions were examined contractual governance could be observed with a mean value of 1.94. The descriptive statistics in relation to relational governance was a mean value of 1.90. It is clearly evident from these statistics that the apparel exporters of Sri Lanka rely more on relational governance in managing their suppliers than exercising contractual governance.

These statistics are shown in Table 4.

Table 4. Descriptive Statistics for Supplier Governance

Type of Governance	Mean
Overall	1.93
Contractual	1.94
Relational	1.90

Further a one sample T-Test was carried out in order to compare means. For this, decision criteria were developed as the data was 'interval'. Accordingly an Assumed Mean of 1-2.49 was considered high, 2.5-3.49 considered moderate and 3.5 and above as low. According to the data collected the observed mean for supplier governance was 1.93 which falls between 1 and 2.49 of the decision criteria. This level of adoption could be considered as high according to the decision criteria. The t-statistic for this test to examine the difference between the observed and the assumed means was found significant proving that the level of application of supplier governance is high among individual firms in the apparel exporting industry of Sri Lanka.

The One sample T-Test carried out for the responses of apparel exporters of Sri Lanka, for Sustainable supply chain practices as well as Sustainable performance also revealed their existence at 'high' levels. This confirmed the researcher that it is reasonable to use the data collected for further analysis. PLS 3.0 software was used to do the variance based structural modeling in analyzing the relationships hypothesized at the outset of the study.

6.2 Model Specification

Before running the PLS analysis with Smart PLS 3.0 software, the model was specified enabling the researcher to distinguish between the measurement model which related constructs to their measures and the structural model which related the constructs to each other. In constructing the measurement model for this study it was important for the researcher to distinguish between the latent constructs and the manifest variables (their measures). Since all the constructs in the conceptual model are multi-dimensional the dimensions of the main constructs are identified as first order constructs and they become manifestations of the second order constructs. Since constructs of this study are linear combinations of their measures the researcher identified the Principal Factor (Reflective) model suitable for the present study (Bollen and Lennox, 1991, Bollen, 2002). In other words

the co-variation among measures is caused by and therefore reflects variation in the underlying latent factor (Jarvis, et al., 2003). A model was developed to show these relationships where the second order constructs that contained all indicators of first order constructs were identified with the repeated indicator approach (Wilson,2010, Wetzels, et al.,2 009, Akter et al., 2010).The detailed procedure of constructing the path model using Smart PLS 3.0 is explained below.

(1) Constructing the first-order latent variables (LV) and relating them to their respective manifest variables using reflective outer model.

(2) The second-order latent variables were constructed by relating them to the underlying first-order latent variables using reflective outer model. For the second order latent variable sustainable supply chain practices (SUSPRAC), the first order latent variables were orientation (ORI), continuity (CON), collaboration (COL), risk management (RISM) and pro-activity (PRO). For the second order latent variable sustainable performance (SUSP), the first order latent variables were environmental performance (ENVP), economic performance (EP) and social performance (SOCP). For the second order latent variable supplier governance (SUSGOV), the first order latent variables were contractual governance (CONGOV) and relational governance (RELGOV).

6.2.1 Assessment of the Measurement Models at the Item Level and Higher-Order Level

Hierarchical model so developed was then estimated using PLS path modeling. Estimates for the first-order loadings, second-order loadings and structural parameters could be obtained from this exercise. A nonparametric bootstrapping procedure was used to obtain standard error and calculate t-statistics for inferential purposes. The psychometric properties of the latent variables and the structural relationships were then assessed using the estimates obtained.

6.2.1.1 Assessing the First Order Constructs

Assessment of reflective measurement models includes examining composite reliability to evaluate internal consistency, individual indicator reliability, and average variance extracted (AVE) to evaluate convergent validity. In addition, the Fornell-Larcker criterion and cross loadings are used to assess discriminant validity (Chin 1998, 2010, Hair et al., 2012, Henseler et al., 2015, 2016, Gefen and Straub, 2005, Mulaik, 2009, Hair et al., 2013).

The exercise of assessing the above mentioned psychometric properties (validity and reliability) of the measurement model of this study was exercised by performing the Confirmatory Factor Analysis (CFA). The unidimensionality and internal consistency of the measures, were the first properties to be assessed. Data presented in Table 5 confirms the unidimensionality of the latent variables. Having confirmed the unidimensionality, composite reliability and Cronbach alpha, the obtained values were compared against the standard values of 0.70 (Hair et al., 2012, Cronbach, 1951). As shown in Table 5 these values relating to the latent constructs of the model met the threshold levels demonstrating the internal consistency. Convergent validity of the measures is evaluated by the value for Average Variance Extracted of each construct (Fornell and Larcker, 1981). According to Chin (1998) the AVE value of each construct should be 0.50 or more. Thus the Convergent validity for the measures was confirmed since the AVE exceeded the threshold value of 0.5. Discriminant validity was adequately demonstrated as all the PLS indicators load much higher on their hypothesized factor than on other factors (own loading are higher than cross loadings)(Chin 1998, 2010, Hair et al., 2012, Henseler et al., 2015, 2016, Gefen and Straub, 2005, Mulaik, 2009, Hair et al., 2013). The Fornell and Larcker (1981) criteria was also satisfied by the first order constructs ensuring discriminant validity as shown in Table 6.

Table 5. Psychometric Properties of the First Order Constructs

Construct	Item	Loading	Cronbach Alpha	CR	AVE
Orientation	o1. Top management provides support for reaching sustainability in the supply chain.	0.815	0.884	0.920	0.743
	o2. There is integration of sustainability in the organization's strategy and strategy formulation.	0.907			
	o3. There is dissemination and acceptance of sustainability values throughout the company .	0.847			
	o4. Integration of supply chain management thinking and goals into day to day management is present.	0.875			
Continuity	con1. Management takes a considerable effort towards maintaining a reasonable quality of life among supply chain partners	0.837	0.944	0.952	0.690
	con2. Engages in Supplier development Shares common goals and structures with suppliers.	0.817			
	con3. Values trust as an important component Supplier	0.816			

	base is reduced to maintain satisfactory partners.				
	con4. Managing relationships with strategic suppliers is considered important.	0.884			
	con5. Maintains transparency.	0.861			
	con6. Regular inter-departmental and inter-organizational meetings are held.	0.756			
	con7. Shares common goals and structures with suppliers.	0.832			
	con8. Maintain mutually beneficial relationships sharing risks and profits.	0.834			
	con9. Suppliers are informed of changes to specifications and product design	0.834			
Collaboration	col1. Direct involvement of the company with its suppliers and customers is encouraged in planning and forecasting logistics.	0.967			
	col2. Collaboration is maintained to enhance sustainability performance.	0.954	0.917	0.960	0.923
Risk Management	r1. Evaluate the acceptability of ingredients and working conditions of member firms.	0.722			
	r2. Exercise informal supplier assessment.	0.832			
	r3. Standards are specified for the purchase of raw materials.	0.882			
	r4. There is early supplier involvement	0.907	0.937	0.949	0.728
	r5. Total quality management practices are implemented.	0.884			
	r6. Pressure groups are involved for their knowledge of possible risks	0.856			
	r7. Top management focuses on customer quality needs in setting strategy	0.876			
Proactivity	p1. Use new found knowledge for improving products and processes	0.814			
	p2. Aware of stakeholder interests	0.921			
	p3. Use new found knowledge for improving products and processes	0.874			
	p4. Packing material is taken for re-use.				
	p5. Transparency maintained with stakeholders	0.943			
	p6. Responsiveness to employees in making suggestions for quality improvement	0.756	0.951	0.960	0.750
	p7. Conduciveness of company environment to employee wellbeing and growth is a concern	0.806			
	p8. Employees are empowered on quality issues	0.941			
		0.854			
Environmental	env1. Quantity of spillage.	0.899			
	env2. Quantity of non renewable energy resources used	0.911	0.860	0.915	0.783
	env3. Toxic discharges to water	0.842			
Social	s1. Wage levels	0.820			
	s2. Healthcare benefits for employees	0.809			
	s3. Number of accidents	0.812	0.879	0.912	0.675
	s4. Lost time injury frequency	0.783			
	s5. Customer complaints	0.880			
Economic	ec1. Return on assets and gearing	0.959			
	ec2. Average order fill lead time	0.959	0.896	0.937	0.832
	ec3. Market share.	0.811			
Contractual	cg1. Rely on legal enforceability for restraining deviant behavior of suppliers	0.935			
	cg2. Rely on monetary sanctions for restraining deviant behavior of suppliers	0.871	0.781	0.899	0.817
Relational	rg1. Self enforceability of restraining opportunistic behavior of suppliers.	0.888			
	rg2. Relying on social sanctions for restraining deviant behavior of suppliers.	0.908			
	r3. Re-adjustment/ renegotiation process that is cooperative and for mutual benefit	0.879	0.894	0.926	0.759
	r4. Having exchange practices such as strategic information exchange, asset specific investments, , supplier development, risk and reward sharing and social interactions.	0.806			

Table 6. Discriminant Validity through the Fornell Larker Criteria

	COL	CON	CONG	ECP	ENVP	ORI	PRO	RELG	RISM	SOCP
COL	0.960									
CON	0.514	0.831								
CONG	0.382	0.406	0.904							
ECP	0.501	0.570	0.652	0.912						
ENVP	0.489	0.744	0.342	0.587	0.885					
ORI	0.524	0.694	0.572	0.881	0.777	0.862				
PRO	0.546	0.795	0.493	0.707	0.717	0.793	0.866			
RELG	0.354	0.510	0.592	0.672	0.489	0.797	0.614	0.871		
RISM	0.506	0.591	0.286	0.581	0.596	0.684	0.729	0.522	0.853	
SOCP	0.354	0.766	0.388	0.535	0.560	0.606	0.659	0.466	0.444	0.822

6.2.1.2 Assessment of Higher Order Constructs

As the research involves exploring relationships at a higher level of abstraction, each second order construct (sustainable supply chain practices, supplier governance and sustainable performance) was assessed for its psychometric properties. Since the degree of explained variance of these constructs are reflected in the first order constructs this is a reflective hierarchical model. The repeated indicator approach was used to arrive at second order constructs (Aker et al., 2010).

In Table 7 the results show that the CRs & AVEs of the second order model are greater than 0.80 and 0.50 respectively, which provides evidence of reliable higher order measures.

Table 7. Psychometric Properties for Second Order Constructs

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
SUSGOV	0.880	0.911	0.634
SUSP	0.911	0.925	0.529
SUSPRAC	0.972	0.974	0.556

The model also revealed that all the first order constructs are reflective of the variances in the respective second order constructs. Orientation, continuity, collaboration, risk management and pro-activity explain 74%, 79%, 40%, 69% and 89% of the variance of sustainable supply chain practices respectively. Environmental performance, social performance and economic performance explain 68%, 74% and 67% of the variance of sustainable performance respectively. Contractual governance and relational governance explain 64% and 91% of the variance of supplier governance respectively. All the path coefficients from sustainable supply chain practices, sustainable performance and supplier governance to their first order constructs are significant at $P < 0.01$ as shown in Table 8.

Table 8. Path Coefficients from Second Order Constructs to First Order Constructs

	Path Coefficient	T Statistics	P Values
SUSGOV -> CONG	0.804	24.799	0.000
SUSGOV -> RELG	0.955	140.803	0.000
SUSP -> ECP	0.824	28.747	0.000
SUSP -> ENVP	0.828	25.210	0.000
SUSP -> SOCP	0.865	32.539	0.000
SUSPRAC -> COL	0.637	12.851	0.000
SUSPRAC -> CON	0.889	47.393	0.000
SUSPRAC -> ORI	0.863	37.097	0.000
SUSPRAC -> PRO	0.944	137.745	0.000
SUSPRAC -> RISM	0.834	28.901	0.000

6.2.2 Assessment of Structural Model

The predictive capability and the relationships between the constructs were assessed through the structural model. This exercise was carried out only after an examination of the structural model for collinearity. Based on VIF values it revealed that there isn't significant levels of collinearity among the predictor constructs.

It can be seen from the model estimates that the proposed model shows a high explanatory power (through determination coefficient, R^2) for sustainable performance (0.841). The results showing a good explanatory power and provide strong support for the nomological validity of the proposed model.

Since the structural model contained a moderator variable the assessment involved both the direct and interaction effects. When the model was assessed for direct effects the path coefficients from sustainable supply chain practices to sustainable performance and from supplier governance to sustainable performance indicated standardized beta values of 0.820 and 0.123 respectively, representing the hypothesized relationships among the constructs. These path coefficients were significant at $p < 0.01$ (Table 9) thus providing evidence that both

sustainable supply chain practices and supplier governance have direct impacts of 82% and 12 % respectively on sustainable performance. With this evidence of a significant, positive impact of both sustainable supply chain practices and supplier governance on sustainable performance, H1 and H2 were supported.

Table 9. Path Coefficients of Direct Effects in the Structural Model

	Path Coefficient	T Statistics	P Values
SUSGOV -> SUSP	0.123	2.289	0.023
SUSPRAC -> SUSP	0.820	18.315	0.000

Moderating effects are evoked by variables whose variation influences the strength or the direction of a relationship between an exogenous and an endogenous variable (Henseler and Fassott, 2010, Henseler and Chin, 2010). In the present study the researcher attempted to identify how the variation in supplier governance influences the strength of the relationship between sustainable supply chain practices and sustainable performance. The descriptive statistics showed that supplier governance is practiced at a higher level in the apparel manufacturing and exporting industry of Sri Lanka. When an interaction term was introduced to the model to assess the moderation effect of supplier governance a standardized beta value of -0.073 was obtained. This implies that if the level of supplier governance gets higher the relationship between sustainable supply chain practices and sustainable performance would decrease by the size of the interaction term. In other words the initial relationship will decrease by 0.073 and the strength of the relationship will decrease to 0.742 (0.825-0.073). Since such conclusions hold only when the interaction term is significant a bootstrapping procedure was run to find the t-value which gave a value of 5.068 indicating that the finding is significant. Although this path coefficient was statistically significant the relationship was in the opposite direction to what was hypothesized. For firms that practiced more supplier governance, the relationship between sustainable supply chain practices and sustainable performance was found weaker. Hypothesis 3 (H3) has to be rejected with this result.

Table 10. Path Coefficients of the Interaction Effect in the Structural Model

	Path Coefficient	T Statistics	P Values
Moderating Effect 1 -> SUSP	-0.073	5.007	0.000
SUSGOV -> SUSP	0.101	2.010	0.045
SUSPRAC -> SUSP	0.825	18.326	0.000

6.2.3 Overall Assessment of the Model

Instead of applying measures of goodness of fit, the structural model in PLS SEM is assessed on the basis of heuristic criteria that are determined by the model's predictive capabilities (Hair et al., 2012, 2013, Henseler et al., 2015, 2016). In other words the model is assessed in terms of how well it predicts the endogenous constructs. Therefore the key criteria for assessing the structural model in PLS SEM, are the significance of the path coefficients, level of R^2 values, the f^2 effect size and the predictive relevance (Q^2).

The most commonly used measure to evaluate the structural model is the coefficient of determination (R^2). It indicates the model's predictive accuracy and the variance in the endogenous construct explained by all of the exogenous constructs linked to it. In the present study the predictive accuracy is high with 84.1% variance in sustainable performance being explained by sustainable supply chain practices and supplier governance. The effect sizes for evaluating the predictive importance of each determinant were 0.034 and 2.316 respectively for supplier governance and sustainable supply chain practices indicating a small effect and a large effect of the two variables on sustainable performance. Further, the predictive relevance of the exogenous constructs for the endogenous construct in the model was established with a Q^2 value of 0.377.

7. Discussion & Implications

The results of PLS modeling support two of the hypotheses while rejecting the hypothesis that tested the moderation effect of supplier governance. This brought about an important contribution to the theoretical knowledge in relation to the outcomes of governance when it is applied to suppliers in the context of sustainable performance of manufacturing firms in developing countries.

TCT argues that exchange conditions have varying levels of costs associated with establishing and maintaining a relationship. Firms that are able to match the governance structure with the exchange context perform better (Grover and Saeed, 2007). The underlying argument here is that although opportunism increases where parties invest asymmetrically in an exchange the relation of comparative commitment and opportunism may be moderated by various governance safeguards (Lusch and Brown, 1996). It is with this understanding that the researcher expected a positive moderating influence of supplier governance on the relationship between the sustainable supply chain practices of the manufacturers in the apparel exporting industry of Sri Lanka and their

sustainable performance. But Hypothesis 3 (H3) which was developed to test this relationship was not supported by the empirical data. Rather it was showing results in the opposite direction.

The application of governance mechanisms in the apparel manufacturing and exporting industry was tested in terms of relational governance and contractual governance which were identified as hybrid governance mechanisms by Cai et al. (2009). According to them quasi integration between organizations should allow them to access resources from one another, including information knowledge to support transaction and innovation, resolve differences between two parties, coordinate activities of two parties to handle environmental uncertainty, improve performance and promote innovation and protect transaction specific investments (TSI) in achieving better results. The existence of both relational and contractual governance were identified as important by the authors since in a highly competitive relationship one should not expect that all disputes can be resolved through such a process whereby the buyer and the supplier work together to settle their differences. Lusch and Brown (1996) also supported this idea when they explain that utility of safeguards that rely on the power of social conformity and sanctions have been questioned since social standards tend to be broadly defined and are subject to varying interpretations and can be manipulated to the advantage of one party thus highlighting the importance of both relational and contractual governance. Cannon et al. (2000) refers to this hybrid structure of governance as plural form of governance. They explain that when the governance structure involves more relational content it makes easy to bring better performance outcomes from contractual governance. Contractual governance is necessary as a mechanism that serves as a broad structural framework for the relationship. The results show that performance suffers when detailed contracts are used without a well-developed social relationship to govern exchanges involving high transactional uncertainty.

But Cannon et al. (2000) explain that while interdependence motivates companies to develop complicated contracts between them, such contracts are often expensive to draft and cover all possible future contingencies so that the parties to an exchange tend to rely more on relational governance elements to safeguard the relationship. As a result the plural governance mechanisms that bring positive outcomes to the exchange parties does not take place all the time.

In the apparel manufacturing and exporting industry of Sri Lanka the researcher could identify the practice of both relational and contractual governance. However in explaining total supplier governance in the measurement model, relational governance explained 91%. But as explained in previous literature the outcomes of relational governance are relatively weaker than the contractual governance although they bring positive results in combination. Sri Lanka being a developing nation the manufacturers are unable to spend large amounts on contracts and therefore they are heavily dependent on the suppliers who are recommended by their customers. This fact was revealed in the in depth interviews with the representatives of the manufacturing firms. The reason for not getting the expected results for H3 might be due to the fact that relational governance could not bring better outcomes for the exchange parties since the optimal level of contractual governance was not present to bring the positive outcome.

But in contrast to this finding Cai et al. (2009) suggest that increasing the relational content of a governance structure alone results in enhanced performance for relationships involving both high levels of transactional uncertainty as well as low levels of uncertainty. They argue that joint planning, joint problem solving and collaborative communication are important elements of relational governance and if the relational governance is confined merely to problem solving the expected improvements in performance are less likely. The position in the apparel manufacturing and exporting industry of Sri Lanka could be similar in nature where the supplier governance is not supporting the relationship between the sustainable supply chain practices of the organizations in the apparel manufacturing and exporting industry of Sri Lanka and their sustainable performance. This has to be further studied since the questionnaire items used in the present study did not directly question the practice of joint problem solving. An important fact here is that relational governance is said to bring positive outcomes only when the relational content is increased alone. But in the Sri Lankan context both contractual and relational governance is practiced.

There is also a completely different argument which highlights that when environments are more certain or tasks involve little ambiguity, with few relationship specific adaptations, future contingencies can be projected with greater accuracy and addressed more precisely in a written agreement. There is little need to modify contracts or rely on other safeguards under such conditions. Therefore when the exchanges involve low levels of transactional uncertainty enhanced performance does not occur by coupling contractual governance and relational content. By relating these explanations what the researcher could infer from the findings is that the firms in the apparel manufacturing and exporting industry of Sri Lanka may be exposed to a more certain exchange environment where future contingencies can be projected with greater accuracy, less ambiguity is

present and few relationship specific adaptations exist where relational norms become unnecessary. The suppliers with whom these manufacturing firms deal with are specified by the customers. Therefore it is reasonable to assume that the above characteristics are prevalent in the exchanges that are formed by the apparel manufacturing and exporting firms in Sri Lanka with their suppliers. Literature suggests that contractual governance would be sufficient to obtain better outcomes under such circumstances. This might have been a possible reason for the negative moderating effect of supplier governance on the relationship between the sustainable supply chain practices and sustainable performance of firms in the apparel manufacturing and exporting industry of Sri Lanka since they adopted a plural governance mechanism with relational governance at a comparatively higher level.

8. Conclusion

Organizations in the apparel manufacturing and exporting industry of Sri Lanka have suppliers of material and accessories with whom they build relationships in delivering a valued product to their customers. These organizations are compelled to engage in sustainable production to satisfy the requirements of their stakeholders. Governance is a strategy suggested in literature that helps firms to bring better exchange outcomes. Therefore the researcher expected that by exercising supplier governance the manufacturers could improve the relationship between sustainable supply chain practices and sustainable performance. However the data collected from 154 firms in the industry revealed that this logic does not hold true in the apparel manufacturing and exporting industry of Sri Lanka. With the arguments presented in literature researcher concluded that a plural mechanism of governance may not be a suitable one for supplier governance of these firms. The environment they face can be assumed to be much certain since there are less chances of adaptation and less ambiguity in the exchange relationship when much of the exchanges with suppliers are explained and detailed by the customer who is at the other end of the supply chain. There is also a possibility that the method used to analyze performance and relational governance mechanisms in this particular study and those of others is different and therefore the finding of different studies were not of similar nature to clearly confirm the existing theory.

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What Effects Repurchase Intention of Online Shopping

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Abstracts

The development of the internet raises opportunities for the marketing of a product and bring new forms for retail transactions, one of which is online shopping. Furthermore with the Internet, online consumers more easily gain access to information and they offered a wide variety of products and services that can be selected at competitive prices. The purpose of this study is to determine whether there is influence of E-Service Quality, Price Perception and Experiential Marketing to Repurchase Intention which mediated by Customer Satisfaction in On-line Shopping. The amount of samples is 180 respondents. Questionnaires were distributed to respondents who have shopped using online shopping with random sampling method. This study uses data analysis of Structural Equation Modeling by using Lisrel software. The result showed that there is the influence of e-service quality to customer satisfaction and to repurchase intention, while repurchase intention has negative influence occurs. Furthermore, price has no influence to customer satisfaction but has an influence to repurchase intention. Experiential marketing has no influence to customer satisfaction and repurchase intention. Customer satisfaction has positive effect on repurchase intention. The effect of e-service quality and experiential marketing through customer satisfaction as mediation variable has no influence to repurchase intention, while price perception influence to repurchase intention.

Keywords: e-service quality, price perception, experiential marketing, customer satisfaction, repurchase intention

1. Introduction

The development of the internet raises opportunities for the marketing of a product and bring new forms for retail transactions, one of which is online shopping (Bulut, 2015). Furthermore with the Internet, online consumers more easily gain access to information and they offered a wide variety of products and services that can be selected at competitive prices (Park & Kim, 2003). This phenomenon anticipated by retailer in Indonesia as an opportunity to market their products by using online shopping. In addition to major retailer, small-scale retailer and the public can also market their products by using online shopping. This is seen in the number of online shopping such as: Lazada, Elevenia, Zalora, bukalapak, OLX, Tokopedia and others. These conditions will tighten competition between online shopping (Yang et al., 2003).

One benefit for companies in marketing their products through the online shopping is cheap cost, but the company should also pay attention to the quality of services to customers. E- service quality is the difference between consumer expectations of the performance and the services provided by the company according to consumer perceptions of services received. In addition, the company markets its products through online shopping, it should also pay attention to customer satisfaction and repurchase intention. Consumers are satisfied with the performance of online shopping has positive influence on their repurchase intention (L.D. Pleessis, 2010). Furthermore, price perception also affects customer satisfaction. Worthy price is one of the marketing mix that influence customer satisfaction and repeat purchase towards online shopping (Ha, et al, 2010). Based on the above phenomenon, the author will conduct research of the topic: what effects repurchase intention on oline shopping

2. Literature Review

2.1 E Service Quality (ESQ)

Definition of E-Service Quality: the extent to which a Web site facilitates efficient and effective shopping, purchasing, and delivery (Zeithaml, et.al, 2000). Swaid & Wigand (2009), said the information provided by the company has a positive impact on e-service quality. In addition, according to Zeithaml, et.al, (2000), there are 11 dimensions of e-Service Quality, namely: reliability, responsiveness, access, flexibility, ease of navigation,

efficiency, assurance/trust, security/privacy, price knowledge, site aesthetics and customization/personalization. The works of Yang & Tsai (2007), and Jain & Kumar (2011) utilizing E-SERQUAL in measuring quality of B2C websites indicated that the instrument is highly reliable in predicting how online shoppers evaluate quality of retailers' websites.

2.2 E-Service Quality Influence Customer Satisfaction

E-SQ literature focuses on the influence of E-SQ on a number of variables, and positive and significant links have been found between E-SQ and variables satisfaction (Zeglat, Shrafat & Al-Smadi, 2016), Than & Grandon (2002), Wolfenbarger & Gilly (2003). According to Wang & Lo, 2002; Kim et al., 2004; Turel & Serenko, 2006; Wang & Liao, 2007; Shin & Kim, 2008; Kuo et al., 2009; Lai et al., 2009), there is e-service quality influences customer satisfaction.

H1: There is the influences of E-Service Quality to Customer Satisfaction

2.3 Price Perception (PP)

Chih (2012) suggests that perception of the price of products at online shopping, are: consumers trust the quality of products offered in accordance with the price offered, the manufacturer gives discounts for products marketed when compared with competitor prices, the prices charged by manufacturers reasonable, overall consumers are satisfied with the price of the product, consumers will consider information from experts of the price of the product to be purchased. In addition, according to Feick & Lind (1987), attributes the perception of prices in online shopping is: in general the price of an expensive product reflects the high quality of products, buying products with brands that most expensive price, making consumers feel classy. Marketing literature described price perception as an important factor for customer satisfaction because customers always refer to price when assessing product and service value (Fornell, et.al.1992).

2.4 Price Perception Influence Customer Satisfaction

Peatti & Peters (1997) stating that the match price perception by online consumers will influence them to make a repeat purchase. Furthermore, the perception of price is also affected customer satisfaction. Worthy price is one of the marketing mix that influence customer satisfaction and repurchase intention towards online shopping (Ha, et al, 2010).

H2: There is the influences of Price Perception to Customer Satisfaction

2.5 Experiential Marketing (EM)

Experiential marketing is an extension of traditional marketing that integrates a variety of methods, concepts and media used for marketing campaigns which appeals consumers to engage the value products offered by manufacturers. Maghnati et al. (2012) states that experiential marketing is not only seen from the functions of products and services, but can affect people's emotions and stimuli. According to Schmith (1999), experiential marketing consists of: sense, feel, think, act and relate. Barrett, Mesquita, Ochsner & Cross (2007) argued that the subject can experience the object in a variety of ways, including sensorially, emotionally, intellectually, imaginatively, physically, socially, and spiritually

2.6 Experiential Marketing Influence Customer Satisfaction

Indrawati & Fatharani (2016) states Experiential Marketing has a simultaneous significant effect towards Customer Satisfaction. The experiential process is the act of experiencing the object by the subject. Lee Ming-Sing, et.al. (2010) said that experiential marketing has significantly positive effect on customer satisfaction.

H3: There is the influences of Experiential Marketing to Customer Satisfaction

2.7 Customer Satisfaction (CS)

According to Kotler & Keller (2012), satisfaction is derived from a comparison of product or services performance perceived by customer and the customers' expectation on the product or services. Tianxiang & Chunlin Liu Sheng (2010), indicate consumer satisfaction indicators such as consumers: are satisfied with the online shopping experience, feel wise use online shopping, satisfied that the use of online shopping can satisfy their request, in general consumers think that the decision to make a purchase through online shopping is right. Kotler (2010) suggest, consumers are satisfied: they will make repeat purchases, increasing the desire to make purchases online (L.D. Pleessis, 2010). Consumers are satisfied with decisions they make a purchase through online shopping, and consumers are happy to make a purchase at online shopping.

2.8 Customer Satisfaction Influence Repurchase Intention

According to Ibsan, E., et. al. (2016), there is a positive relationship between customer satisfaction and

repurchase intention. Consumers who are satisfied with the performance of online shopping has positive influence on their repurchase intention (L.D. Pleessis, 2010). Customer satisfaction has an important effect to increase the repurchase purchase intention (Santoso & Aprianingsih, 2017).

H4: There is the influences of Customer Satisfaction to Repurchase Intention

2.9 Repurchase Intention (RI)

Repurchase intention is a positive attitude of consumers towards e-retailer that will generate repeat purchases (repeat buying behavior). Zhou et.al. (2009) & Kim et al, (2012), repurchase intention is that consumers are interested in making a purchase by using online shopping, consumer online shopping will be revisited in the future and consumers are interested in to recommend online shopping because they also use online shopping.

2.10 E-Service Quality Influence Repurchase Intention

Kim et al. (2012) stating that e-service quality significantly affects customer repurchase intention.

H5: There is the influence of E-Service Quality to Repurchase Intention

2.11 Price Perception Influence Repurchase Intention

Thus, price fairness research suggests a positive relationship between perceived price and repurchase intentions (Garbarino & Maxwell 2010; Grewaletal.2004; Xia & Monroe 2010)

H6: There is the influences of Price Perception to Repurchase Intention

2.12 Experiential Marketing Influence Repurchase Intention

Experiential marketing had impacts on repurchase intention (Razi & Lajevardi, 2016)

H7: There is the influences of Experiential Marketing to Repurchase Intention

H8: There are the influence of E-Service Quality, Price Perception and Experiential Marketing to Repurchase Intention mediated by Customer Satisfaction

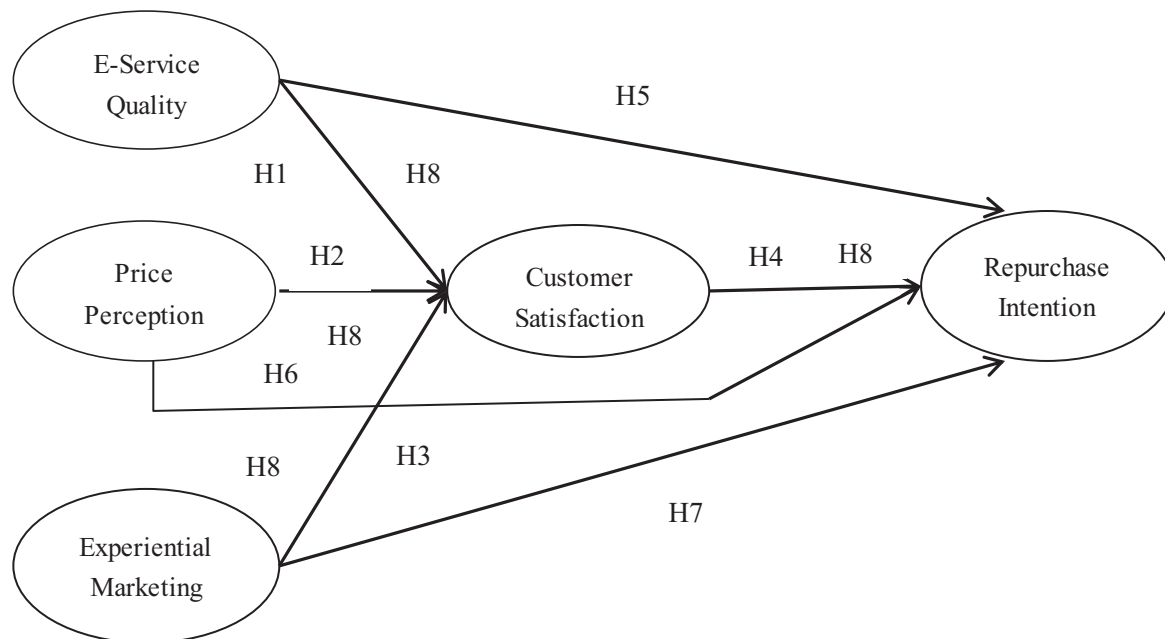


Figure 1. Research model

3. Methodology

In the data collection, the population in this study is unknown, therefore the number of samples used can be calculated from the variables or indicators used. Hair, et al. (2006, 373) gives information that in unknown population in calculating the sample can be based on the indicators studied multiplied at least 5 and maximum 10. Therefore in this study the number of samples used as many as 180 respondents. Questionnaires were distributed to respondents who have shopped using online shopping, with random sampling method. This study uses data analysis of Serqual Equation Modeling by using Lisrel software to see the effect of E-Service Quality, Price Perception, Experiential Marketing to Repurchase Intention mediated by Customer Satisfaction on On-line

Shopping.

To test the instrument then tested the validity and reliability. After that to test the validity and reliability use structural equation modeling. The validity test results are shown in table 1.

Table 1. Test results validity

Indicators	E Service Quality	Price Perception	Experiential Marketing	Customer Satisfaction	Repurchase Intention
ESQ1	0.544				
ESQ2	0.706				
ESQ3	0.723				
ESQ4	0.639				
ESQ5	0.527				
ESQ6	0.535				
ESQ7	0.759				
ESQ8	0.684				
ESQ9	0.791				
ESQ10	0.742				
ESQ11	0.579				
ESQ12	0.687				
ESQ13	0.585				
ESQ14	0.683				
PP1		0.645			
PP2		0.808			
PP3		0.610			
PP4		0.649			
EM1			0.780		
EM2			0.789		
EM3			0.552		
EM4			0.787		
EM5			0.851		
EM6			0.690		
CS1				0.686	
CS2				0.668	
CS3				0.778	
CS4				0.769	
CS5				0.751	
CS6				0.721	
CS7				0.761	
RI1					0.870
RI2					0.857
RI3					0.609

Table 1 shows that the value of each indicator in the form of a variable above 0.5, meaning that these indicators can form a variable. In the variable E service quality, the largest indicator value is ESQ 9, it means that clear information is needed by consumers in buying products online. For the largest variable price perception is PP2, it means that the whole consumers are satisfied with the price set on the online shop. In experiential marketing variables, the largest indicator is EM5, meaning that it needs to bring up positive consumer behavior towards the website so that they will make an online purchase.

Variable customer satisfaction is formed by indicator CS3 which has the greatest value, meaning that in general consumers think that the decision to make purchases through online shopping is appropriate. On the variable experiential marketing the biggest indicator is EM5, meaning that it needs to bring up positive consumer behavior towards the website therefore they will make an online purchase. Variable customer satisfaction is formed by indicator CS3 which has the greatest value, meaning that in general consumers think that the decision to make purchases through online shopping is appropriate. In variable repurchase intention, indicator that has the biggest value is RI1, meaning consumers are interested to make another purchase by using online shopping. In test reliability then used construct reliability. Seen at table 2.

Table 2. Reliability Test Results

Variable	Reliability
E- service quality	0.915
Price perception	0.731
Experiential marketing	0.848
Customer satisfaction	0.848
Repurchase intention	0.766

The cut-off rate of construct reliability 0.6 is quite good (Bagozzi; Yi, 1988). Construct reliability test results show that all variables have values above 0.6 means that each indicator can form variables.

After tested the validity and reliability then tested the model. The model test results are shown in table3.

Table 3. Model test results

Fit Measure	Good Fit	Acceptable Fit	Estimated
χ^2 (Chi-square)	$0 \leq \chi^2 \leq 2df$	$2df \leq \chi^2 \leq 3df$	$\chi^2 = 1320.87$
p value	$0,05 < p < 1,00$	$0,01 \leq p \leq 0,05$	p-value = 0.00
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 < \chi^2/df \leq 3$	2.37
RMSEA	$0 \leq RMSEA \leq 0,05$	$0,05 \leq RMSEA \leq 0,08$	0.08
SRMR	$0 \leq SRMR \leq 0,05$	$0,05 \leq SRMR \leq 0,10$	0.06
NFI	$0,95 \leq NFI \leq 1,00$	$0,90 \leq NFI \leq 0,95$	0.94
NNFI	$0,97 \leq NNFI \leq 1,00$	$0,95 \leq NNFI \leq 0,97$	0.96
CFI	$0,97 \leq CFI \leq 1,00$	$0,95 \leq CFI \leq 0,97$	0.96
GFI	$0,95 \leq GFI \leq 1,00$	$0,90 \leq GFI \leq 0,95$	0.70
AGFI	$0,90 \leq AGFI \leq 1,00$ close to GFI	$0,85 \leq AGFI \leq 0,90$ close to GFI	0.65

Source: Engel, Moosbrugger, Muller (2003). Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-Fit Measures and estimated

The model test results show that χ^2/df , RMSEA, SRMR, NFI, NNFI and CFI at acceptable fit level, meaning that the model can be used in this study.

4. Analysis and Result

The data obtained as many as 180 respondents. The results of the data are made characteristic respondent as follows:

Table 4. Characteristics of Respondents

Characteristics of Respondents	Frequency	Percentage
Gender		
Male	86	47.8
Female	94	52.2
Total	180	100
Age		
18	6	3.3
19	32	17.8
20	40	22.2
21	43	23.9
22	31	17.2
23	13	7.2
24	5	2.8
25	6	3.3
28	1	.6
33	2	1.1
38	1	.6
Total	180	100
Education		
SMA	66	36.7
Diploma	10	5.6
S1	104	57.8
Total	180	100

The result of characteristic respondent shows that respondents both women and men prefer to shop online. Seen at the age of 19, 20, 21 and 22 years where they are millennial generation. This is seen at the level of education S1. Therefore shopping using online will they choose, because according to its characteristics.

Table 5. Hypothesis test results

No.	Hypothesis	Path Coefficient	Value - t	t-table	Results	Conclusion
H1	Effect e service quality to customer satisfaction	0.37	3.20	1.96	significant	H1 accepted, there is influences between e service quality to customer satisfaction
H2	Effect price perception to customer satisfaction	0.34	1.60	1.96	No significant	H2 rejected, there is no influences between price perception to customer satisfaction
H3	Effect experiential marketing to customer satisfaction	0.23	1.30	1.96	No significant	H3 rejected, there is no influences between experiential marketing to customer satisfaction
H4	Effect customer satisfaction to repurchase intention	0.74	4.17	1.96	significant	H4 accepted, there is influences between customer satisfaction to repurchase intention
H5	Effect e service quality to repurchase intention	-0.35	-2.31	1.96	significant	H5 accepted, meaning there is influence between e service quality to repurchase intention but have negative effect
H6	Effect price perception to repurchase intention	0.63	2.23	1.96	significant	H6 accepted, there is the influence between Price perception to repurchase intention
H7	Effect experiential marketing to repurchase intention	-0.15	-0.68	1.96	No significant	H7 rejected, there is no influences experiential marketing to repurchase intention

On hypothesis test H1 and H5 hypothesis test shows that e-service quality has a positive influence to customer satisfaction and repurchase intention, while repurchase intention has negative influence occurs. The results of this study support to Wang & Lo, 2002; Kim et al., 2004; Turel & Serenko, 2006; Wang & Liao, 2007; Shin and Kim, 2008; Kuo et al., 2009; Lai et al., 2009) that suggest there is e-service quality influences customer satisfaction. Also support to Kim et al. (2012) stating that e-service quality significantly influences customer repurchase intention.

In the test of price perception hypothesis both H2 and H6, indicates that the price has no influence on customer satisfaction but has an influence on repurchase intention. This means that the price responding to the purchased product will lead to buy back to the consumer, but the price does not lead to customer satisfaction because satisfaction arising from e service quality.

In experiential marketing hypothesis test both H3 and H7, show that experiential marketing has no effect on customer satisfaction and repurchase intention. Consumers in making online purchases do not need any experiential marketing.

In the hypothesis test customer satisfaction (H4) show that customer satisfaction has positive effect on repurchase intention, indicating that when consumers are satisfied it will make repeat purchase. Therefore, the satisfaction becomes the basis for consumers to make repeat purchases and satisfaction needs to be a concern for online shopping.

In the test of hypothesis 8, bring up the equation:

$$\text{Repurchase intention} = -0.067 \text{ ESQ} + 0.88 \text{ PP} + 0.02 \text{ EM} + 0.28 \text{ CS}$$

(0.12)	(0.31)	(0.25)	(0.18)
-0.43	2.83	0.09	2.39

The result of hypothesis test 8 shows that the effect of e-service quality (ESQ) and experiential marketing (EM) through customer satisfaction (CS) as mediation variable has no effect on repurchase intention, while price perception (PP) has an effect on repurchase intention through customer satisfaction. These results are seen in Figure 2.

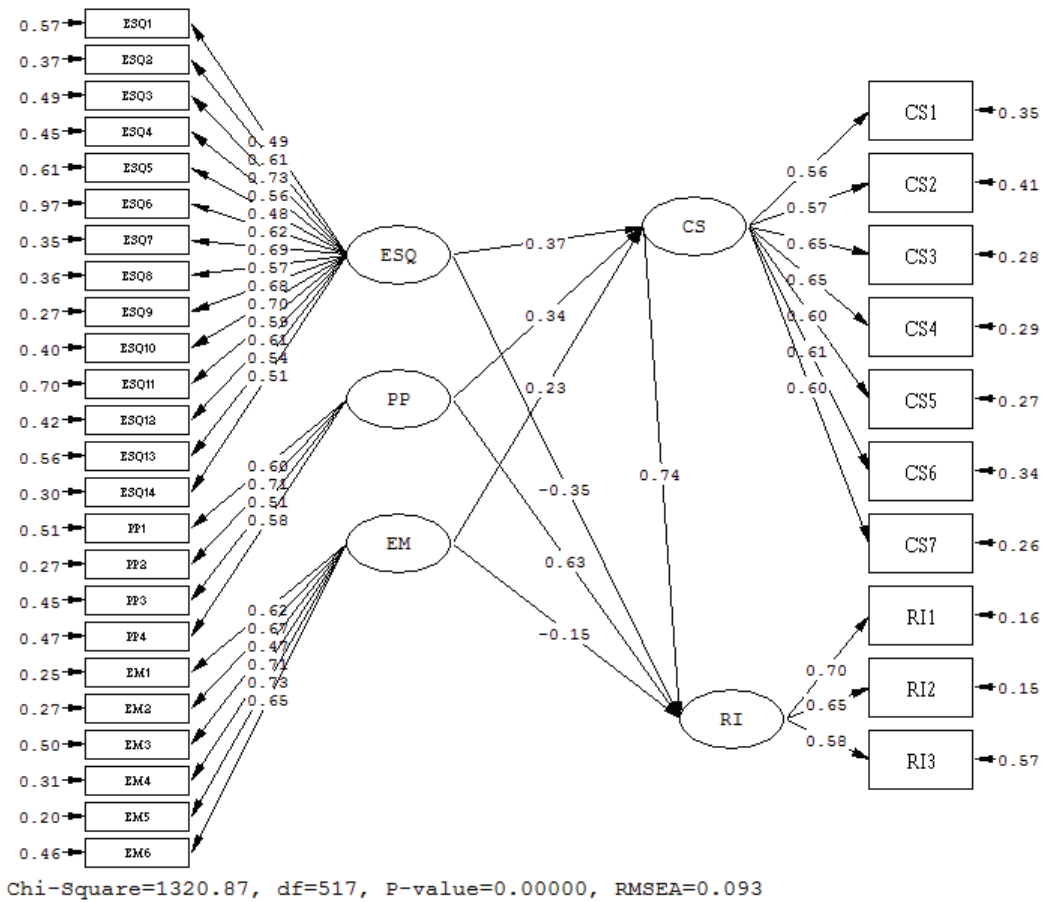


Figure 2. Output Lisrel

5. Discussion

The result of researched by authors showed that e-service quality has a positive influence to customer satisfaction and repurchase intention, while repurchase intention has negative influence occurs. These findings show that while e-service quality has an influence on repurchase intention, it shows the opposite direction, meaning that higher e-service quality causes lower repurchase intention, and vice versa.

It may be based that online purchasing e-service quality is not a major influence to repurchase intention, but there is other things that cause negative repurchase intention. Therefore, online sales service providers are not too concerned with e-service quality for repurchase intention. The results of this study appropriate to Wang & Lo, 2002; Kim et al., 2004; Turel & Serenko, 2006; Wang & Liao, 2007; Shin & Kim, 2008; Kuo et al., 2009; Lai et al., 2009) that suggest there is e-service quality influences customer satisfaction.

In addition, the results showed that the price perception has no influence to customer satisfaction but has an influence to repurchase intention. This means that the price responding to the purchased product will lead to repeat purchase, but the price does not lead to customer satisfaction because satisfaction arising from e-service quality. The result of this study appropriate to Garbarino & Maxwell (2010); Grewaletal (2004); Xia & Monroe (2010) that said, price fairness research suggests a positive influence of perceived price to repurchase intentions.

Hence, the results showed that experiential marketing has no effect on customer satisfaction and repurchase intention, because consumers in making online purchases do not need any experiential marketing. The result of this study not appropriate to Lee, Ming-Sing; Hsiou, Huey-Der; Yang, Ming-Fen (2010) that argue experiential marketing has significantly positive effect on customer satisfaction. Also the result of this study not appropriate to Razi & Lajevardi (2016) that stated experiential marketing had impacts on repurchase intention.

Next, the results showed that customer satisfaction has positive effect on repurchase intention, indicating that when consumers are satisfied it will make a repeat purchase. Therefore, the satisfaction becomes the basis for consumers to make repeat purchases and satisfaction needs to be a concern for online shopping. The result of this

study appropriate to (L.D. Pleessis, 2010) that said consumers who are satisfied with the performance of online shopping has positive influence to their repurchase intention.

The result showed that the effect of e-service quality and experiential marketing through customer satisfaction as mediation variable has no effect to repurchase intention, while price perception has an effect to repurchase intention through customer satisfaction.

6. Conclusion

There is the impact of e-service quality to customer satisfaction and repurchase intention, while repurchase intention has negative influence occurs. Hence the price perception has no influence to customer satisfaction but has an influence to repurchase intention. Besides, experiential marketing has no effect on customer satisfaction and repurchase intention. In addition, customer satisfaction has positive effect on repurchase intention. The effect of e-service quality and experiential marketing through customer satisfaction as mediation variable has no effect to repurchase intention, while price perception has an effect to repurchase intention through customer satisfaction.

The implications of the results of this study indicate that consumers tend not to pay attention to e-service quality to improve satisfaction and repurchase, but more emphasis on the price of the product. Therefore for companies that sell through online can pay attention to prices compared to existing e-service quality.

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The Analysis of Hypothesis Testing on Rare Sugars in Kagawa Prefecture

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Abstract

The Rare Sugars exist naturally and have many kinds (more than 50). They have good effect for health such as prevention of increasing the blood - sugar level after eating, suppression of fat accumulation, suppression of increasing the blood pressure, and anti-oxidative effect etc. It is in the spotlight for many people especially for those who are in the metabolic syndrome. The Rare Sugars are prevailing in Japan by such activities as cooking class where the Rare Sugars are utilized for the new cuisine. There are few related papers concerning the marketing research and its utilization of this matter. In this paper, a questionnaire investigation is executed to the student of Kagawa Junior College in order to clarify consumers' current condition and their consciousness, and to seek the possibility of utilizing the Rare Sugars. Fundamental statistical analysis and Hypothesis Testing analysis are executed based on that. Some interesting and instructive results were obtained.

Keywords: rare sugars, health, consumer, hypothesis testing

1. Introduction

The Rare Sugars' study has launched on 1980th by Professor Takeshi Izumori (Kagawa University). The way to the mass production was developed by the method of enzymatic reaction. The International Society of Rare Sugars was established in 2001. Local government of Kagawa Prefecture comes to assist this research activity on this big innovation newly born in Kagawa Prefecture. The Rare Sugars have advantage that a blood-sugar level does not increase so much after eating, in spite of it being a sugar. And it also holds the upturn of the blood pressure. Therefore it is expected as a new functional material for the prevention of metabolic syndrome.

By the way, one kind of the Rare Sugar D-psicose has the following characteristics.

- ① a sweetening made by the natural starch
- ② non calorie and its sweetness is 70% to those of sugar
- ③ organoleptic property of coolness and sharpness in taste

Many medical research papers are published on the Rare Sugars as follows.

Analysis of the function of D-psicose ; Hossain et al., 2011, Hayashi et al., 2010, Iida et al., 2010

Analysis of the function of D-allose ; Yamada et al., 2012, Kajikawa et al., 2010, Hirata et al., 2009

On the other hand, these are few papers analyzed by the viewpoint from consumers. Kondou(2017) has made a versatile survey on the development and prevailing activities mainly executed by the local government of Kagawa Prefecture in Japan, International Association of Rare Sugar, and The Rare Sugar Spreading Organization. The Rare Sugars is good for the health and is sold in the market as a sweetening, seasoning or functional ingredient for food. The Rare Sugars are prevailing in Japan by such activities as cooking class where the Rare Sugars are utilized for the new cuisine.

In this paper, a questionnaire investigation is executed to the student of Kagawa Junior College in order to clarify the recognition level among consumers and to pursue the future possibility of the Rare Sugars. Basic statistical analysis and Hypothesis Testing analysis are conducted. The nine issues are set and Hypothesis Testing analysis

is executed.

The rest of this paper is organized as follows. In section 2, outline of the questionnaire investigation and its basic statistical results are exhibited. After that, Hypothesis Testing analysis is performed in section 3, which is followed by the remarks of section 4.

2. Outline and the Basic Statistical Results of the Questionnaire Research

2.1 Outline of the Questionnaire Research

A questionnaire investigation is executed to the student of Kagawa Junior College in order to clarify the recognition level among consumers and to pursue the future possibility of the Rare Sugars. The outline of the questionnaire research is as follows. The questionnaire sheet is attached in Appendix.

- (1) Scope of investigation : Student of Kagawa Junior College
- (2) Period : (1) April – June 2015, (2) April – June 2017
- (3) Method : Leave until called for
- (4) Collection : Number of distribution (1) 186, (2) 335
 Number of collection (1)186 (collection rate 100.0%), (2) 335
 (collection rate 100.0%)
 Valid answer (1)186, (2) 333

2.2 Basic Statistical Results

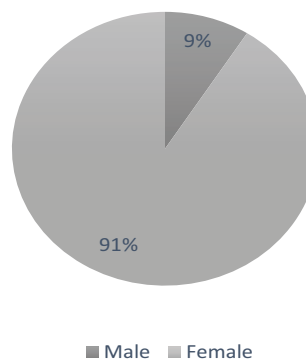
Now, we show the main summary results by single variable.

(1) Basic characteristics of answerers

Q32 Sex

	Frequency	%
Male	30	9.0
Female	303	91.0
Total	333	100.0

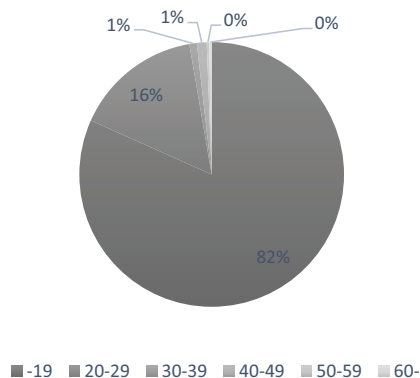
Q32 Sex



Q33 Age

	Frequency	%
-19	272	81.7
20-29	52	15.6
30-39	3	0.9
40-49	4	1.2
50-59	1	0.3
60-	1	0.3
Total	333	100.0

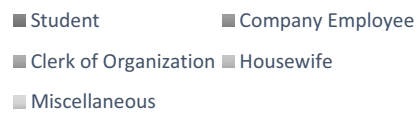
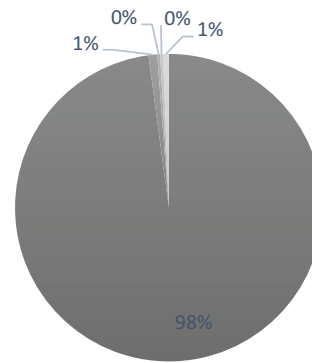
Q33 Age



Q34 Occupation

	Frequency	%
Student	324	97.9
Company Employee	3	0.9
Clerk of Organization	1	0.3
Housewife	1	0.3
Miscellaneous	2	0.6
Total	331	100.0

Q34 Occupation



(2) Summary results for the items used in Hypothesis Testing

Q8 Do you want to try to eat or drink the food in which the Rare Sugar is included?

	Think it very much	Slightly think so	Cannot say either	Slightly do not think so	Do not think so	Total
Frequency	45	59	48	5	2	159
%	28.3	37.1	30.2	3.1	1.3	100.0

Q15 I want to know how long I should use it in order to confirm the effectiveness.

Frequency	53	109	112	44	14	332
%	16.0	32.8	33.7	13.3	4.2	100.0

Q18 I cannot grasp the concrete effect.

Frequency	82	118	82	33	17	332
%	24.7	35.5	24.7	9.9	5.1	100.0

Q25 Do you take interest in a diet?

Frequency	128	105	52	23	24	332
%	38.6	31.6	15.7	6.9	7.2	100.0

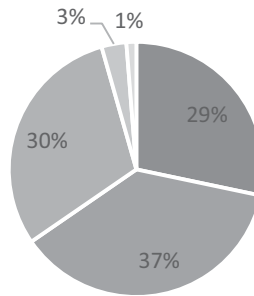
Q26 Are you careful for the health?

Frequency	44	127	127	23	10	331
%	13.3	38.4	38.4	6.9	3.0	100.0

Q27 Do you take interest in the designated health food?

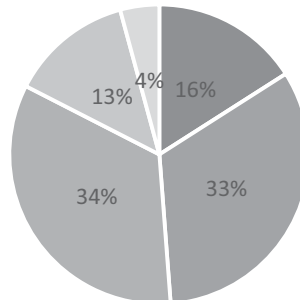
Frequency	49	107	124	37	14	331
%	14.8	32.3	37.5	11.2	4.2	100.0

Q8 Do you want to try to eat or drink the food in which the Rare Sugar is included?



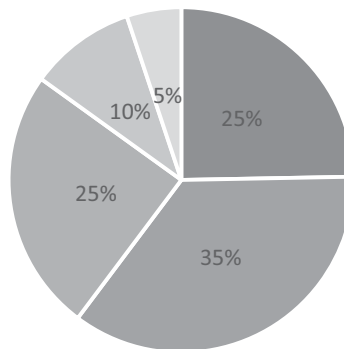
- Think it very much ■ Slightly think so ■ Cannot say either
- Slightly do not think so ■ Do not think so

Q15 I want to know how long I should use it in order to confirm the effectiveness.



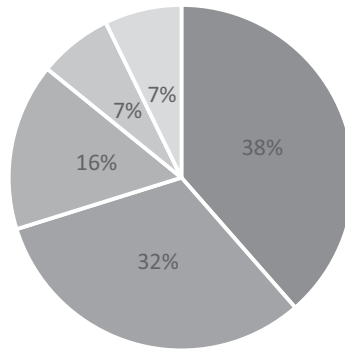
- Think it very much ■ Slightly think so ■ Cannot say either
- Slightly do not think so ■ Do not think so

Q18 I cannot grasp the concrete effect.



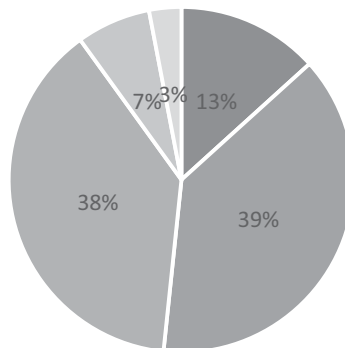
- Think it very much ■ Slightly think so ■ Cannot say either
- Slightly do not think so ■ Do not think so

Q25 Do you take interest in a diet?



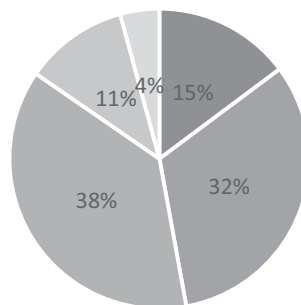
- Think it very much ■ Slightly think so ■ Cannot say either
- Slightly do not think so ■ Do not think so

Q26 Are you careful for the health?



- Think it very much ■ Slightly think so ■ Cannot say either
- Slightly do not think so ■ Do not think so

Q27 Do you take interest in the designated health food?



- Think it very much ■ Slightly think so ■ Cannot say either
- Slightly do not think so ■ Do not think so

As the Rare Sugar is used in the cooking experiment in the Nutrition and Cooking Course at Kagawa Junior College, many students know its presence and its utility. But they also feel that the Rare Sugar is not so famous

in society. Junior College students consists of the female students in majority, therefore they are conscious for the diet.

3. Hypothesis Testing

Hereinafter we make Hypothesis Testing analysis based upon the questionnaire investigation data.

(1) Setting Hypothesis

In the Hypothesis Testing analysis, nine issues are set as follows.

- A-1) Those who want to try to eat or drink the food in which the Rare Sugar is included have interest in a diet.
- A-2) Those who want to try to eat or drink the food in which the Rare Sugar is included are careful of his/her health.
- A-3) Those who want to try to eat or drink the food in which the Rare Sugar is included have interest in the designated health food.
- A-4) Those who want to know how long he/she should use it in order to confirm the effectiveness have interest in a diet.
- A-5) Those who want to know how long he/she should use it in order to confirm the effectiveness are careful of his/her health.
- A-6) Those who want to know how long he/she should use it in order to confirm the effectiveness have interest in the designated health food.
- A-7) Those who cannot grasp the concrete effect have interest in a diet.
- A-8) Those who cannot grasp the concrete effect are careful of his/her health.
- A-9) Those who cannot grasp the concrete effect have interest in the designated health food.

Now, we set the following nine Null hypotheses.

- A-1) There is not so much difference whether those who want to try to eat or drink the food in which the Rare Sugar is included have interest in a diet or not.
- A-2) There is not so much difference whether those who want to try to eat or drink the food in which the Rare Sugar is included are careful of his/her health or not.
- A-3) There is not so much difference whether those who want to try to eat or drink the food in which the Rare Sugar is included have interest in the designated health food or not.
- A-4) There is not so much difference whether those who want to know how long he/she should use it in order to confirm the effectiveness have interest in a diet or not.
- A-5) There is not so much difference whether those who want to know how long he/she should use it in order to confirm the effectiveness are careful of his/her health or not.
- A-6) There is not so much difference whether those who want to know how long he/she should use it in order to confirm the effectiveness have interest in the designated health food or not.
- A-7) There is not so much difference whether those who cannot grasp the concrete effect have interest in a diet or not.
- A-8) There is not so much difference whether those who cannot grasp the concrete effect are careful of his/her health or not.
- A-9) There is not so much difference whether those who cannot grasp the concrete effect have interest in the designated health food or not.

(2) Hypothesis Testing

The results of Hypothesis Testing analysis are as follows.

Null Hypothesis A-1): There is not so much difference whether those who want to try to eat or drink the food in which the Rare Sugar is included have interest in a diet or not.

Summary table for Null Hypothesis A-1) is exhibited in Table 1. Figure is also attached (Figure 1).

Table 1. Summary table for Null Hypothesis A-1)

Do you take interest in a diet?		Do you want to try to eat or drink the food in which the Rare Sugar is included?		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	80	29	109
	%	73.4	26.6	100.0
Cannot say either/ Do not think so	Frequency	23	25	48
	%	47.9	52.1	100.0
Total	Frequency	103	54	157
	%	65.6	34.4	100.0

significance probability 0.002

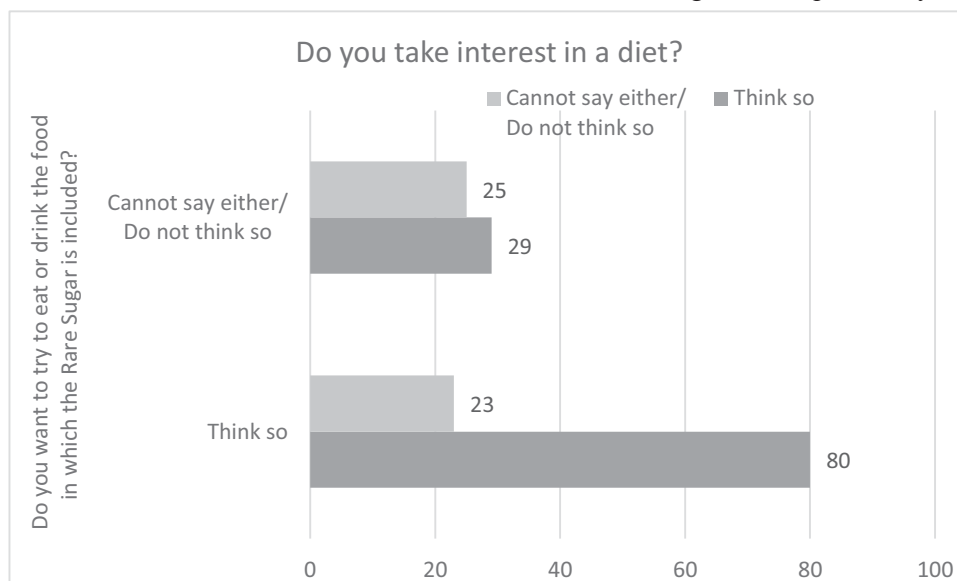


Figure 1. Summary for Null Hypothesis A-1)

The null hypothesis is rejected with 1% significance level. It can be said that those who want to try to eat or drink the food in which the Rare Sugar is included have interest in a diet.

Null Hypothesis A-2): There is not so much difference whether those who want to try to eat or drink the food in which the Rare Sugar is included are careful of his/her health or not.

Summary table concerning Null Hypothesis A-2) is exhibited in Table 2. Figure is also attached (Figure 2).

Table 2. Summary table for Null Hypothesis A-2)

Are you careful for the health?		Do you want to try to eat or drink the food in which the Rare Sugar is included?		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	65	21	86
	%	75.6	24.4	100.0
Cannot say either/ Do not think so	Frequency	37	33	70
	%	52.9	47.1	100.0
Total	Frequency	102	54	156
	%	65.4	34.6	100.0

significance probability 0.003

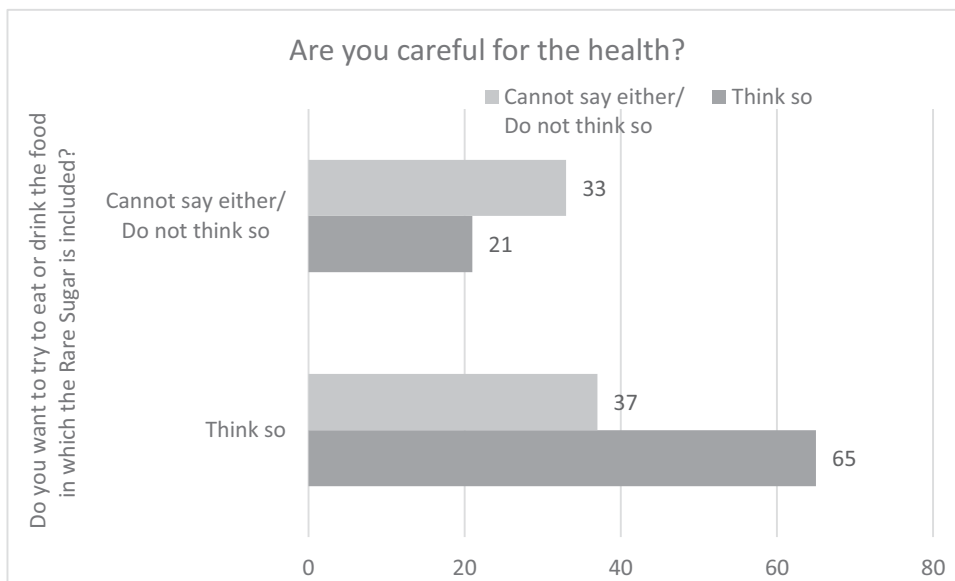


Figure 2. Summary for Null Hypothesis A-2)

The null hypothesis is rejected with 1% significance level. It can be said that those who want to try to eat or drink the food in which the Rare Sugar is included are careful of his/her health.

Null Hypothesis A-3): There is not so much difference whether those who want to try to eat or drink the food in which the Rare Sugar is included have interest in the designated health food or not.

Summary table concerning Null Hypothesis A-3) is exhibited in Table 3. Figure is also attached (Figure 3).

Table 3. Summary table for Null Hypothesis A-3)

Do you take interest in the designated health food?		Do you want to try to eat or drink the food in which the Rare Sugar is included?		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	55	16	71
	%	77.5	22.5	100.0
Cannot say either/ Do not think so	Frequency	48	38	86
	%	55.8	44.2	100.0
Total	Frequency	103	54	157
	%	65.6	34.4	100.0

significance probability 0.004

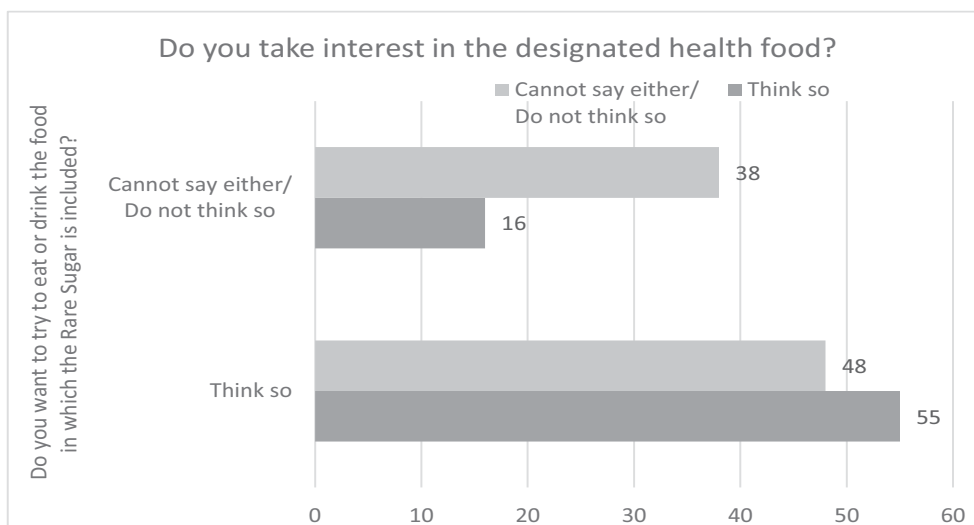


Figure 3. Summary for Null Hypothesis A-3)

The null hypothesis is rejected with 1% significance level. It can be said that those who want to try to eat or drink the food in which the Rare Sugar is included have interest in the designated health food.

Null Hypothesis **A-4**): There is not so much difference whether those who want to know how long he/she should use it in order to confirm the effectiveness have interest in a diet or not.

Summary table concerning Null Hypothesis **A-4**) is exhibited in Table 4. Figure is also attached (Figure 4).

Table 4. Summary table for Null Hypothesis **A-4**)

Do you take interest in a diet?		I want to know how long I should use it in order to confirm the effectiveness.		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	126	107	233
	%	54.1	45.9	100.0
Cannot say either/ Do not think so	Frequency	36	61	97
	%	37.1	62.9	100.0
Total	Frequency	160	168	330
	%	49.1	50.9	100.0

significance probability 0.005

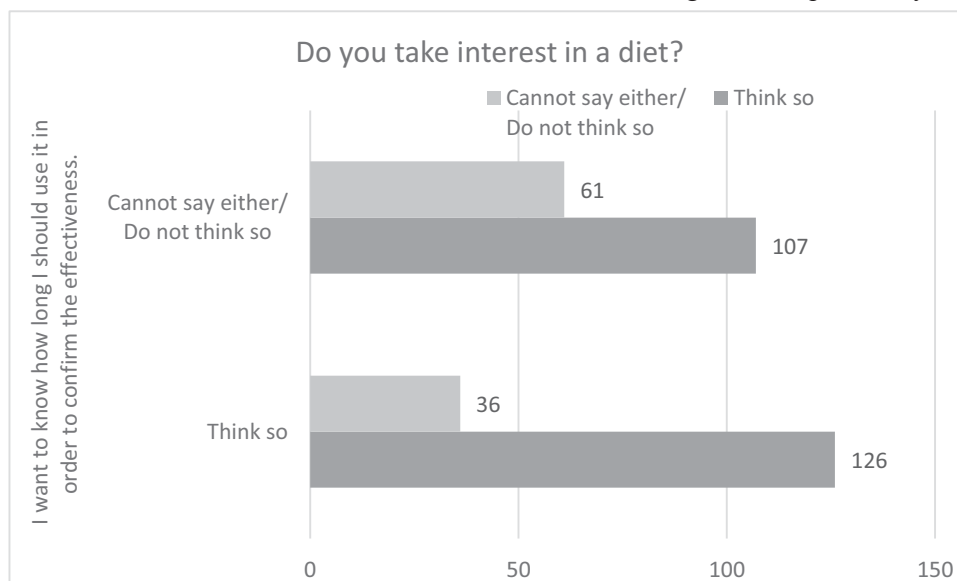


Figure 4. Summary for Null Hypothesis **A-4**)

The null hypothesis is rejected with 1% significance level. It can be said that those who want to know how long he/she should use it in order to confirm the effectiveness have interest in a diet.

Null Hypothesis **A-5**): There is not so much difference whether those who want to know how long he/she should use it in order to confirm the effectiveness are careful of his/her health or not.

Summary table concerning Null Hypothesis **A-5**) is exhibited in Table 5. Figure is also attached (Figure 5).

Table 5. Summary table for Null Hypothesis A-5)

Are you careful for the health?		I want to know how long I should use it in order to confirm the effectiveness.		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	99	71	170
	%	58.2	41.8	100.0
Cannot say either/ Do not think so	Frequency	62	97	159
	%	39.0	61.0	100.0
Total	Frequency	161	168	329
	%	48.9	51.1	100.0

significance probability 0.000

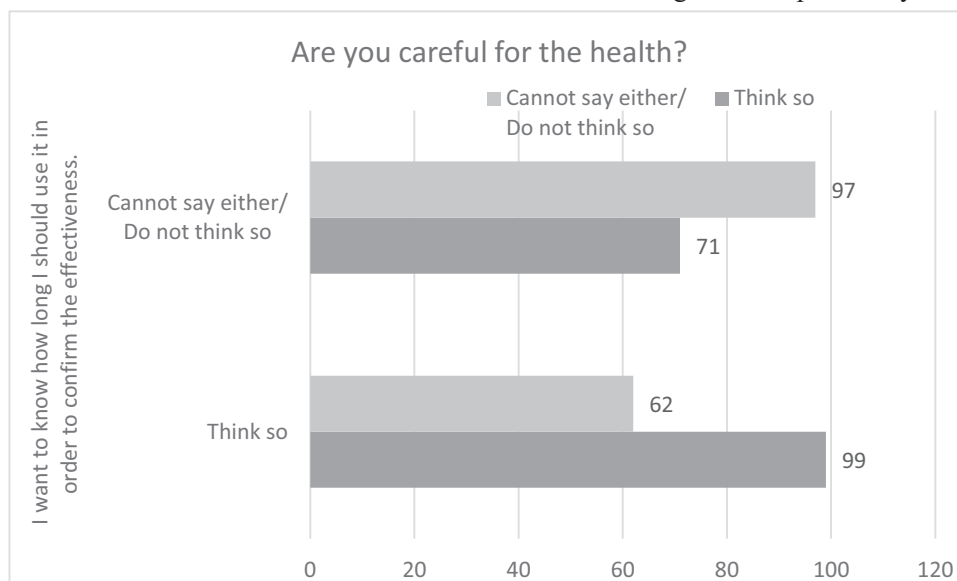


Figure 5. Summary for Null Hypothesis A-5)

The null hypothesis is rejected with 1% significance level. It can be said that those who want to know how long he/she should use it in order to confirm the effectiveness are careful of his/her health.

Null Hypothesis A-6): There is not so much difference whether those who want to know how long he/she should use it in order to confirm the effectiveness have interest in the designated health food or not.

Summary table concerning Null Hypothesis A-6) is exhibited in Table 6. Figure is also attached (Figure 6).

Table 6. Summary table for Null Hypothesis A-6)

Do you take interest in the designated health food?		I want to know how long I should use it in order to confirm the effectiveness.		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	89	66	155
	%	57.4	42.6	100.0
Cannot say either/ Do not think so	Frequency	72	102	174
	%	41.4	58.6	100.0
Total	Frequency	161	168	329
	%	48.9	51.1	100.0

significance probability 0.004

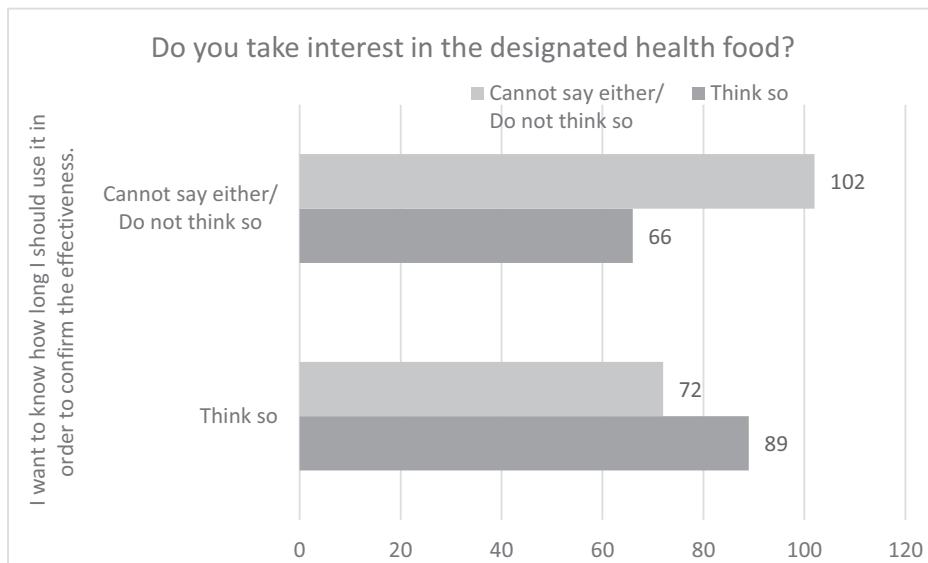


Figure 6. Summary for Null Hypothesis A-6)

The null hypothesis is rejected with 1% significance level. It can be said that those who want to know how long he/she should use it in order to confirm the effectiveness have interest in the designated health food.

Null Hypothesis A-7): There is not so much difference whether those who cannot grasp the concrete effect have interest in a diet or not.

Summary table concerning Null Hypothesis A-7) is exhibited in Table 7. Figure is also attached (Figure 7).

Table 7. Summary table for Null Hypothesis A-7)

Do you take interest in a diet?		I cannot grasp the concrete effect.		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	147	85	232
	%	63.4	36.6	100.0
Cannot say either/ Do not think so	Frequency	53	45	98
	%	54.1	45.9	100.0
Total	Frequency	200	130	330
	%	60.6	39.4	100.0

significance probability 0.115

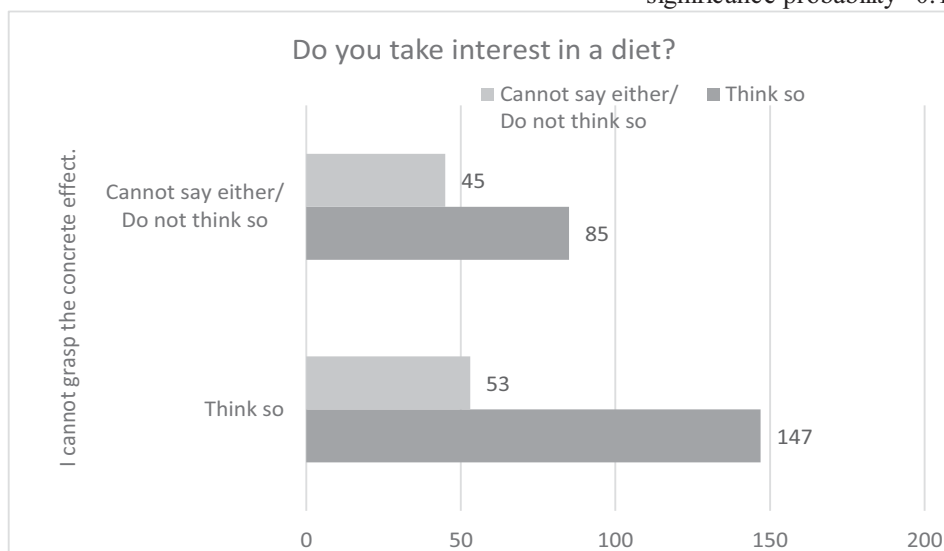


Figure 7. Summary for Null Hypothesis A-7)

The null hypothesis is not rejected. It can be said that there is not so much difference whether those who cannot grasp the concrete effect have interest in a diet or not.

Null Hypothesis **A-8)**: There is not so much difference whether those who cannot grasp the concrete effect are careful of his/her health or not.

Summary table concerning Null Hypothesis **A-8)** is exhibited in Table 8. Figure is also attached (Figure 8).

Table 8. Summary table for Null Hypothesis **A-8)**

Are you careful for the health?		I cannot grasp the concrete effect.		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	110	59	169
	%	65.1	34.9	100.0
Cannot say either/ Do not think so	Frequency	89	71	160
	%	55.6	44.4	100.0
Total	Frequency	199	130	329
	%	60.5	39.5	100.0

significance probability 0.079

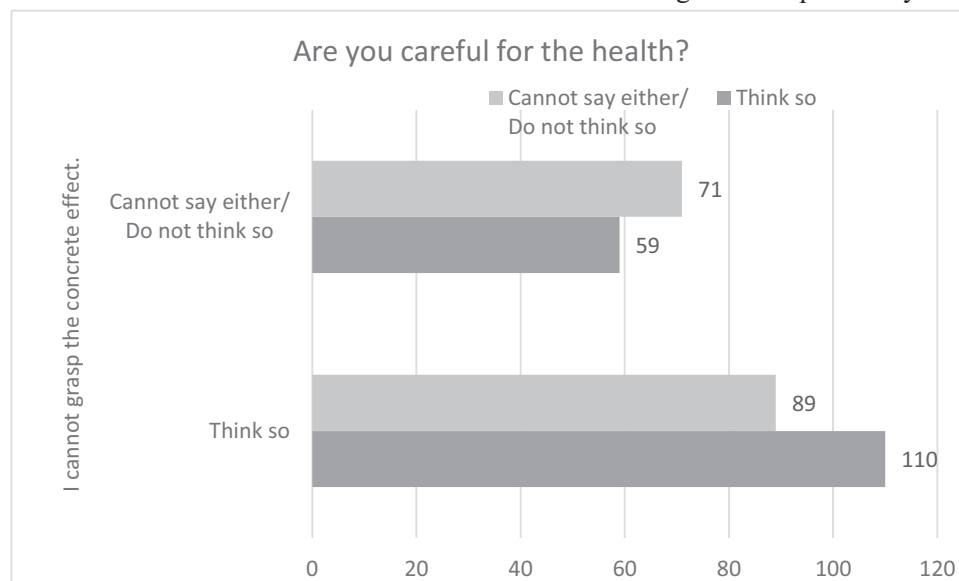


Figure 8. Summary for Null Hypothesis **A-8)**

The null hypothesis is not rejected. It can be said that there is not so much difference whether those who cannot grasp the concrete effect are careful of his/her health or not.

Null Hypothesis **A-9)**: There is not so much difference whether those who cannot grasp the concrete effect have interest in the designated health food or not.

Summary table concerning Null Hypothesis **A-9)** is exhibited in Table 9. Figure is also attached (Figure 9).

Table 9. Summary table for Null Hypothesis **A-9)**

Do you take interest in the designated health food?		I cannot grasp the concrete effect.		
		Think so	Cannot say either/ Do not think so	Total
Think so	Frequency	98	57	155
	%	63.2	36.8	100.0
Cannot say either/ Do not think so	Frequency	102	72	174
	%	58.6	41.4	100.0
Total	Frequency	200	129	329
	%	60.8	39.2	100.0

significance probability 0.393

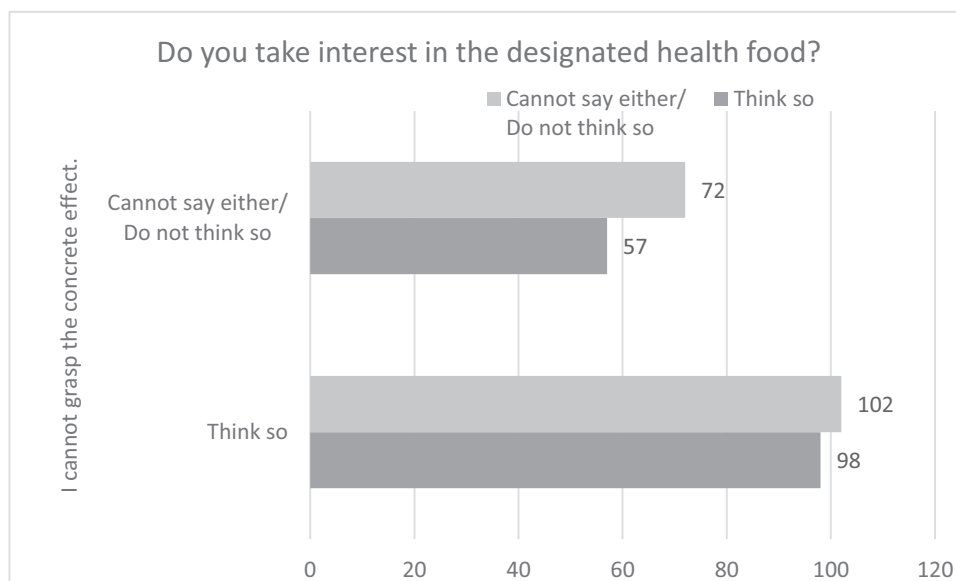


Figure 9. Summary for Null Hypothesis A-9)

The null hypothesis is not rejected. It can be said that there is not so much difference whether those who cannot grasp the concrete effect have interest in the designated health food or not.

4. Remarks

As the Rare Sugar is used in the cooking experiment in the Nutrition and Cooking Course at Kagawa Junior College, many students know its presence and its utility. But they also feel that the Rare Sugar is not so famous in society. Junior College students consists of the female students in majority, therefore they are conscious for the diet.

The results for Hypothesis Testing analysis are as follows. 6 cases out of 9 are rejected (A-1, A-2, A-3, A-4, A-5, A-6). It can be said that the majority of issues are insisted clearly.

5. Conclusion

The Rare Sugars exist naturally and have many kinds (more than 50). They have good effect for health such as prevention of increasing the blood - sugar level after eating, suppression of fat accumulation, suppression of increasing the blood pressure, and anti-oxidative effect etc. It is in the spotlight for many people especially for those who are in the metabolic syndrome. The Rare Sugars are prevailing in Japan by such activities as cooking class where the Rare Sugars are utilized for the new cuisine. There are few related papers concerning the marketing research and its utilization of this matter. In this paper, a questionnaire investigation was executed to the student of Kagawa Junior College in order to clarify consumers' current condition and their consciousness, and to seek the possibility of utilizing the Rare Sugars. Hypothesis Testing analysis was conducted based on that. We have set nine issues as follows.

- A-1) Those who want to try to eat or drink the food in which the Rare Sugar is included have interest in a diet.
- A-2) Those who want to try to eat or drink the food in which the Rare Sugar is included are careful of his/her health.
- A-3) Those who want to try to eat or drink the food in which the Rare Sugar is included have interest in the designated health food.
- A-4) Those who want to know how long he/she should use it in order to confirm the effectiveness have interest in a diet.
- A-5) Those who want to know how long he/she should use it in order to confirm the effectiveness are careful of his/her health.
- A-6) Those who want to know how long he/she should use it in order to confirm the effectiveness have interest in the designated health food.
- A-7) Those who cannot grasp the concrete effect have interest in a diet.
- A-8) Those who cannot grasp the concrete effect are careful of his/her health.

A-9) Those who cannot grasp the concrete effect have interest in the designated health food.

The results for Hypothesis Testing analysis are as follows. 6 cases out of 9 are rejected (A-1, A-2, A-3, A-4, A-5, A-6). It can be said that the majority of issues are insisted clearly.

Although it has a limitation that it is restricted in the number of research, we could obtain the fruitful results.

Further study on this should be executed such as multivariate analysis. Various cases should be investigated here after.

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Appendix. Questionnaire about the Rare Sugars

◆Questionnaire about the Rare Sugars◆

2015/6/15

The Rare Sugars exist naturally and have many kinds (more than 50). They have good effect for health such as prevention of increasing the blood-sugar level after eating, suppression of fat accumulation, suppression of increasing the blood pressure, and antioxidative effect etc. It is in the spotlight for many people especially for those who are in the metabolic syndrome.

Please select the appropriate item in each column.(Plural answers are allowed for Q2, 9, 24, 28. Select ①~⑤ in the right column for Q7, 8, 10-23, 25-27.)

1.We ask you about the Rare Sugars.						
1-1. Do you know the Rare Sugars?						
Q1	①Know ②Do not know (⇒ Proceed to Q8 who has selected ② and answer until to the last.)					
1-2. We ask you who have selected ①. Where did you know the Rare Sugar?【Plural answers are allowed】						
Q2	①TV ②Magazine ③Newspaper ④Shop ⑤Vending Machine ⑥Seminar ⑦Internet ⑧Hear from another person ⑨Miscellaneous ()					
1-3. Do you know that the Rare Sugar has effect on obese prevention and/or diabetes prevention etc.?						
Q3	①Know ②Do not know					
1-4. Have you heard or used the syrup which includes Rare Sugar "Rare Sugar Sweet"?						
Q4	①Heard ②Not heard					
Q5	①Used ②Not used					
1-5. Have you drunk or eaten the food which includes the Rare Sugar?						
Q6	①Yes ②No					
Q7	1-6. We ask you who have selected ① in Q6. Was the Rare Sugar effective after using it for more than one month? (⇒ Proceed to Q9)	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q8	1-7. We ask you who have selected ② in Q1, ② in Q6. Do you want to try to eat or drink the food in which the Rare Sugar is included?	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
1-8. What kind of food do you want to eat if the Rare Sugar is included?【Plural answers are allowed】						
Q9	①Cake ②Juice ③Japanese food ④Western food ⑤Chinese food ⑥Miscellaneous ()					
1-9.How do you want to use the Rare Sugar?						
Q10	a. I want to use it in the cooking.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q11	b. I can easily use it if there is a recipe.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q12	c. I want to know where I can buy it because I want to use it as a seasoning.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q13	d. I want to know where I can get information because I want to use it as a supplement.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q14	e. I want to know the hospital where the Rare Sugar is used as a tool for treatment.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q15	f. I want to know how long I should use it in order to confirm the effectiveness.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
1-10.Do you have a question(doubt) or anxiety for the Rare Sugar?						
Q16	a. It is not so popular.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q17	b. It seems to be expensive.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q18	c. I cannot grasp the concrete effect.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q19	d. I cannot have confidence that it is safe for anybody.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q20	e. Surrounding people do not use it so often.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q21	f. I cannot find the food in the shop in which the Rare Sugar is included.	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q22	g. I cannot guess how I should use the Rare Sugar to what kind of cooking?	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q23	h. Miscellaneous ()	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
1-11.Choose the drink that you are interested in.【Plural answers are allowed】						
Q24	①aojiru ②OS-1(oral rehydration solution Drink for sports) ④designated health drink ⑤drink with the Rare Sugar ⑥None ⑦Miscellaneous ()					
Q25	1-12. Do you take interest in a diet?	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q26	1-13. Are you careful for the health?	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
Q27	1-14. Do you take interest in the designated health food?	①Think it very much	②Slightly think so	③Cannot say either	④Slightly do not think so	⑤Do not think so
1-15. Which method would be suitable for the Rare Sugar to become popular?						
Q28	①TV CM ②Use Twitter,Facebook ③Advertisement by the company ④Spread the way of cooking ⑤Sell candy with the Rare Sugar ⑥Sell juice with the Rare Sugar ⑦Restaurant at which the Rare Sugar is used in the cooking ⑧Use it in the food at the hospital ⑨Sell it as a supplement ⑩Make promotion by utilizing famous sportsmen or entertainers ⑪Miscellaneous ()					
2.What is your hobby? (Select only one in the right hand column)						
Q29	2-1.Playing Sports: ①Baseball ②Football ③Tennis ④Golf ⑤Miscellaneous ()	①Like it very much	②Slightly like it	③Ordinary level		
Q30	2-2. Watching Sports: ①Baseball ②Football ③Tennis ④Golf ⑤Miscellaneous ()	①Like it very much	②Slightly like it	③Ordinary level		
Q31	2-3. Drinking: ①Beer ②Wine ③Japanese wine-sake ④Japanese liquor-shochu ⑤Whisky ⑥Miscellaneous ()	①Like it very much	②Slightly like it	③Ordinary level		

3. We ask you questions about your current condition.	
Q32	3-1. Sex: ①Male ②Female
Q33	3-2. Age: ①~19 ②20~29 ③30~39 ④40~49 ⑤50~59 ⑥More than 60
Q34	3-3. Occupation: ①Student ②Officer ③Company Employee ④Clerk of Organization ⑤Independents ⑥Part-timer ⑦Housewife ⑧Miscellaneous()
Q35	3-4. Address: ①Prefecture() ②City()
Q36	3-5. What kind of lifestyle do you like?: ①Outdoor ②Indoor ③Not either

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Determining Critical Success Factors that Contribute to the Delay of Water Infrastructure Construction Projects in the Abu Dhabi Emirate: A Conceptual Framework

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Abstract

The purpose of this study is to investigate the relationship between the critical success factors and the critical delays in the context of water infrastructure construction projects (WICPs) in the Abu Dhabi Emirate. In addition, the purpose of this paper is to develop a conceptual model to investigate the potential relationship. The literature concerning the critical success and delay factors and the related models that are available provide a starting point for developing the conceptual model. Based on the comprehensive and thorough literature review, all the dimensions of the variables are identified and discussed in detail.

This study attempts to reduce the existing gap in the literature regarding the relationship between the critical success factors and critical delay. It forms a foundation upon which further local research can be conducted. In addition, it attempts to identify and point out the most critical success factors that will minimize the delay claims in water infrastructure construction projects (WICPs), as such delays would lead to some of the most difficult and controversial disputes to resolve. Internationally, it is expected that the findings of this research may help as an evidentiary reference data on which other and further similar comparative researches could be initiated and developed in different environments in terms of cultural, social, contractual, political, and environmental mediums.

Finally, the conceptual framework was developed by identifying six (6) variables for project critical success namely Project Management Process (PMP), Project Manager Competency (PMC), Project Team Members' Competency (PTC), Project Organizational Planning (POP), Project Resources' Utilization (PRU) and Project Organizational Commitment (POC).

Keywords: Abu Dhabi, construction delay, construction projects, critical success factors, success factors

1. Introduction

The construction industry represents one of the most important sectors and is considered to be one of the main contributors to the socio-economic growth of a country (Elawi, Algahtany & Kashiwagic, 2016).

The United Arab Emirates is experiencing a rapid growth in all infrastructure fields, including both urban and rural areas (Ali & Beheiry, 2015). The government of the Abu Dhabi Emirate, in particular, is progressively allocating large amounts of resources and money to develop its infrastructure throughout its Emirate territory. Infrastructure, including energy, transport, water, power, and ICT, is very important and requires prolonged and sustained investment to provide for a growing population and increased economic activity (Mohsen, B. Akash, Abdo & O. Akash, 2016).

Although achieving the completion of construction projects on time is a basic requirement, projects are rarely completed as scheduled despite of the use of developed project management resources, and water infrastructure projects are no exception (Rafat & Ahmed, 2017). The growing rate of delays in project delivery has become a worldwide problem and a major criticism facing the construction industry, including water infrastructure construction projects (Tumi, Omran & Pakir, 2009). Delays in infrastructure construction projects can be defined

as the time overrun either by exceeding the specified completion date in the contract agreement or beyond the date that the construction project main parties agreed upon to deliver (Gunduz, Nielsen & Ozdemir, 2015). Alternatively, delays can be attributed to unexpected uncertainties during the construction phase (Gardezi, S. S., Manarvi, & Gardezi, S. J., 2014). Motaleb and Kishk (2013) correlated risk to delay and highlighted delay implications on project success.

During the last five years and due to the subject's high importance, several studies have investigated the factors that lead to the successful completion of construction projects; particularly those factors that influence construction project success more than others (Iyer & Jha, 2006; Toor & Ogunlana, 2009; Mukhtar, Amirudin, Sofield & Mohamad, 2016; Chou, Irawan & Pham, 2013; Yong & Mustafa, 2013; Doloi, Sawhney, Iyer & Rentala, 2012; Chen, W., Chen, T., Lu & Liu, 2012; Ahadzie, Proverbs & Olomolaiye, 2008; Amade, Ubani, Omajeh & Njoku, 2015; Gudienè, Banaitisa, Banaitienè & Lopesb, 2013; Tabish & Jha, 2012). Rockart (1982) was the first to use the term "critical success factors." The term "critical success factors" or CSFs implies that certain elements significantly contribute to or are crucial to the success of a project (cited in Tsiga, Emes & Smith, 2016). In addition, more attention and focus has been oriented against some special areas or factors that might have a significant impact on project success more than others. "Critical success factors thus are, for any business, the limited number of areas in which results, if they are satisfactory, will ensure competitive performance..." (Rockart, 1982). Since the term was first used, numerous studies have explored CSFs for construction projects (Gunduz & Yahya, 2015; Gudienè, Banaitis, Podvezko & Banaitienè, 2014; Tsiga et al., 2016). Hence, to be able to achieve success on a project, one must start by determining the factors that affect project success and cause project failure (Toor & Ogunlana, 2009).

The purpose of this study is to investigate the effect of critical success factors on the project delay in the Abu Dhabi Emirate water infrastructure construction projects (WICPs).

2. Identification of the Problem

WICPs perform a significant component of the existing construction industry in the Abu Dhabi Emirate and are subject to the same difficulties that face other sectors in the construction industry in general (Mohsen et al., 2016).

Like other construction sectors, water infrastructure construction projects in the Abu Dhabi Emirate suffer from the chronic problem of project delay, and, during the last two decades, although many water infrastructure projects were started, a high percentage missed the actual contractual completion dates (Gunduz & AbuHassan, 2016).

The fact that the infrastructure water construction industry in the Abu Dhabi Emirate suffers the most to meet deadlines necessitates great attention to determine the critical success factors, and it is motivated this study. This research builds on the previous studies by examining the success and delay factors that have already been identified for the construction industry, in general, and examines the success and delay factors in an integrated and combined form to identify which critical success factors are the most effective in avoiding or preventing specific critical delay factors in the context of WICPs in the Abu Dhabi Emirate.

Based on the past three decades, all the construction concerned bodies in this region have agreed that the construction industry is facing grave issues, such as inefficiency, non-performance, and a lack of delay analysis (Memon & Rahman, 2013). While the importance of the Abu Dhabi Emirate construction sector over the past two decades has witnessed a significant growing level, the lack of finesse within the infrastructure construction supply chain remains a key issue in the industry (Gunduz & Yahya, 2015). There is strong evidence of uncertainties of performance in the Abu Dhabi Emirate construction projects, a trend that is clearly increasing (Gunduz & Yahya, 2015). An understanding of the inherent factors impacting these key performance measures is still considered as being under investigation, at least in the Abu Dhabi Emirate context; hence, the present study spots shed on the analysis of construction projects performance in terms of the timely delivery of water infrastructure construction projects.

With this growing volume, the scheduled performance of the Abu Dhabi Emirate water infrastructure construction sector is certainly an important topic for investigation. While several previous studies have investigated and published the critical success factors affecting the construction project performance and schedule, in particular, most of the studies are area specific (Thi & Swierczek, 2010; Chen et al., 2012; Yong & Mustafa, 2013; Alzahrani & Emsley, 2013; Gudienè et al., 2014; Mukhtar et al., 2016). In addition, the applicability of such research in the Abu Dhabi Emirate water infrastructure construction context still considered unexplored, and there is a strong demand to figure out the attributes that lead to project success, understand the effect of these attributes, and combine them into factors. Thus, the main objectives of this research are to identify

the various attributes for construction success, to identify the relationship between these attributes using statistical methods, and to predict the impact of these identified attributes on construction success using a model in the Abu Dhabi Emirate water infrastructure construction sector.

This study is expected to provide organizations involved in WICPs in the Abu Dhabi Emirate with a solid and useful foundation upon which such strategies concerning how to avoid or prevent delays can be established in the future. This study focuses on water infrastructure construction projects in the Abu Dhabi Emirate. Also, it will assess the critical delay factors, and investigate the relationship between the critical success factors and critical delay to develop the performance of the Abu Dhabi Emirate WICPs against delays by identifying the most critical success factors.

3. Justification for the Study

The study focuses on the effect of the critical success factors on the critical delays in the context of WICPs in the Abu Dhabi Emirate. The main rationale for the selection of this area of research is the role that the water infrastructure construction industry plays in the ongoing development of the Abu Dhabi Emirate in line with its 2030 vision to diversify economic resources through the development of the infrastructure of industrial zones, residential areas, shopping facilities, trading centres, housing compounds, and many others.

For every finished WICP in the Abu Dhabi Emirate, a number of deficiencies or delays have occurred (Ali & Beheiry, 2015), and continue to occur. It has been observed that the delays in WICPs in the Abu Dhabi Emirate have increased considerably in the last ten years and the government, at present, is spending billions of dollars, and it is expected that more money will be invested in this sector. Occasionally, new difficulties develop, and, despite the serious efforts to put into action every success measure, these problems persist (Motaleb & Kishk, 2013). Similar problems are notified in the status of numerous WICPs.

While a body of research exists that recognizes the main reasons behind project delays, and further literature points out a wide range of success factors in the construction industry, in general, and in different countries, no research was found that illustrates the influence of critical success factors on the critical delay in WICPs, and how knowledge of this interplay might facilitate the completion of more successful projects (Mukhtar et al., 2016; Gunduz & AbuHassan, 2016; Amade et al., 2015; Gudienè et al., 2013). This study is also the first of its kind to explore and rank the effect of the critical success factors in a trial to help the project parties involved in WICPs prevent or avoid critical delays.

Mukhtar et al. (2016) and Chen et al. (2012) concluded from the existing empirical studies on the influence of the critical success factors on project performance in terms of delays that targeted the general construction industry in the researcher's country that further investigation in different countries/areas is necessary due to the localized nature of the construction industry. Thus, it is expected that this study will contribute by providing useful information by investigating this issue in different countries and filling the gap related to the specific type of construction industry in developing Arab countries in the Middle East, and, in particular, in the UAE in the Abu Dhabi Emirate.

Furthermore, an important contribution of this research relies on the significance of the selected industry – the water infrastructure industry – due to the significant and critical role of this industry on many levels (Mohsen et al., 2016). Thus, the results of this study will be useful to various stakeholders and make several contributions. For the government, development partners, project managers, consultants, contractors and clients in the water sector, the study will clarify the relationship between CSFs and project delay as an indicator of project performance. Through this, the project participants, including the main players, such as project managers, are expected to adopt appropriate procedures that will enhance project performance in the water sector.

With enhanced project performance in the water sector, it is expected that the study findings will result in value for money, and, hence, reduce the wastage of public funds through a reduction in the delay and associated cost over-runs. Accordingly, this would enable the government to channel saved resources to other sectors of the economy or to start more projects. In addition, the study findings are expected to spur social-economic development in the country through the provision of affordable and sustainable water services to its industries and citizens.

There is limited research concerning the strength of the relationship between the critical factors and the success criteria, and there is even less analysis of the relationship between these factors and the performance of projects in Asia in terms of delay. Key construction project factors need to be identified as successful by consider the level of performance accomplished in a several real projects (Thi & Swierczek, 2010).

The Abu Dhabi Emirate don't have empirical research in this area of study, and this study is the first of its type to

check into thoroughly the main success factors for the success of WICPs in the Abu Dhabi Emirate. This research forms a platform upon which further local research can be performed. In addition, it attempts to identify the most critical success factors that will minimize delays in WICPs as such delays lead to some of the most difficult and controversial disputes to resolve. Internationally, it is expected that the findings of this study may help as an evidentiary reference data on which other and further similar studies could be initiated and developed in different environments in terms of cultural, social, contractual, political, and environmental mediums.

4. Literature Review

4.1 Most Common Critical Delays

From the presented literature review and many other studies, five (5) factors were identified as common in different geographical areas and for various types of construction industry (Elawi et al., 2016; Marzouk & El-Rasas, 2014; Gunduz & AbuHassan, 2016; Frimpong, Oluwoyeb & Crawford, 2003; Motaleb & Kishk, 2013; Aziz & Abdel-Hakam, 2016; Durdyev, Omarov & Ismail, 2017; Alzaraa, Kashiwagib, Kashiwagic & Al-Tassand, 2016; Gonzalez, P., Gonzalez, V., Molenaar & Orozco, 2013).

However, due to the similarity in their economic position, weather conditions, cultural mode, and several other issues, the delay attributes shared among the Gulf community countries were given the most weight in selecting the critical delay factors. The selected five delay factors are:

- (1) change in scope, design, and specifications,
- (2) material problems,
- (3) financial difficulties (cash flow),
- (4) poor productivity/non-availability of labour, and
- (5) poor communication and coordination among parties.

4.2 Critical Success Factors (CSFs)

The CSF implies certain elements that significantly contribute to, and are vital to the success of a project (Rockart, 1982). Therefore, to be able to achieve project success, one must start by determining those factors that affect project success and cause project failure (Toor & Ogunlana 2009). This study refers to the six factors – project management process, project manager's competency, project team member's competency, project organizational planning, project resources utilization, and project organizational commitment – that enable project organizations to achieve better performance.

4.2.1 Project Management Process (PMP)

The project management process consists of acceptable level of funding through the project including incentives and motivation (Gudienè et al., 2014). These ensure that construction projects run smoothly (Gudienè et al., 2014). Money and other resources in terms of continuous funding through on time payments until project completion are obviously imperative for the successful completion of projects (Ng, Tang & Palaneeswaran, 2009; Marzouk & El-Rasas, 2014; Gudienè et al., 2013). Proper emphasis on the past experience and qualifications of the awarded contractors through strict prequalification procedures are among the success factors proposed in many textbooks and previous research works (Alzahrani & Emsley, 2013). In addition, a very clear project scope will eliminate any ambiguity in the way the project progresses to achieve the desired outcomes (Jha & Iyer, 2006; Doloi et al., 2012; Gudiene et al., 2013; Ihuah, Tippett & Eaton, 2014; Chan et al., 2004). However, it is highlighted that the need to conduct proper site investigation prior to establishing the scope would play a critical role in determining the most fit scope of work (Ihuah, Tippett & Eaton, 2014; Ng, Wong, Y. & Wong, J., 2012).

Proposition 1. PMP has a significant effect on critical delay.

4.2.2 Project Manager Competency (PMC)

Project managers (PMs) are the key people in the projects (Tabish & Jha, 2012). They show multi-dimensional skills and capacities including interpersonal, technical, and administrative skills (Fortune & White, 2006; Gudiene et al., 2013; Ihuah et al., 2014). The most important element is that PMs understand clearly their function as project leaders; clearly defining their magnitude level of involvement, and the authority and control, they practice over personnel. According to several researchers (Gudiene et al., 2013; Nguyen, Ogunlana & Lan, 2004; Tabish & Jha, 2012; Toor & Ogunlana, 2009), the main competency fields of the project manager are capability in terms of the proper technical background that encourages respect from team players, technical experience, coordinating, mutual trust and understanding, and decision-making effectiveness.

Proposition 2. PMC has a significant effect on critical delay.

4.2.3 Project Team Members' Competency (PTC)

Several researchers highlighted the capabilities that members possess in general, including capacities and experience, hold on appropriate interpersonal skills, coordination skills and a good working relationship with the owner, the project team members (PTM) and the stakeholders, and maintain a healthy work attitude (P.C.Chan, Scott & P.L.Chan, 2004; Gudienė et al., 2013; Ihuah et al., 2014; Jha & Iyer, 2006; Tabish & Jha, 2012; Yang, Huang & Wu, 2011). Furthermore, Famakin et al. (2012) and Gudienė et al. (2013) pointed out PTMs responsibilities for organizing, appointing and illustrating the responsibilities of the project resources. Also, according to Toor and Ogunlana (2009), monitoring the achievements, classifying problems, communicating the status of interfaces to participants, and initiating and co-coordinating remedy action come under the responsibilities of PTMs. Toor and Ogunlana (2009) and Gudienė et al. (2014) opined that project team members capabilities include make effective decisions, and convince the project participants to cooperate with each other guided by the proper troubleshooting of project related issues (Toor & Ogunlana, 2009; Ismail, Yusuwan & Baharuddin, 2012; Gudienė et al., 2014).

Proposition 3. PTC has a significant effect on critical delay.

4.2.4 Project Organizational Planning (POP)

From the literature, the factors relating to the project organization planning include top management decisions and support, delegation and allocation of authority and responsibility, effective well-established information and communication routines, effective budget controlling, and adequate management of resources (Ng et al., 2009; Gudienė et al., 2013; Alzahrani & Emsley, 2013). Thi and Swierczek (2010) remarked that one of the significant critical factors for the successful completion of projects is top management support. Support is usually strongest if there is proper delegation and allocation of authority and responsibility (Thi & Swierczek, 2010; Chen et al., 2012). Top management support depends on the effective communication channels in which the information flow facilitates the provision of the proper resources under the umbrella of effective budget controlling measures (Ogwueleka, 2011; Chen et al., 2012).

Proposition 4. POP has a significant effect on critical delay.

4.2.5 Project Resources' Utilization (PRU)

This factor includes the utilization of up-to-date technology, ensuring and controlling the quality of all the activities of the construction works, adequate resources and proper allocation resources, and awarding bids to the right designer/contractor (Ng et al., 2009). Construction projects need particular types of technology; however, selecting the proper technology may be problematic, especially when there is no right allocation of resources (Fortune & White, 2006; Chan et al., 2004). A serious challenge to the construction industry in developing countries, due to the lack of transparency, is their inability to adopt or adapt established best practices in terms of the quality standards and prequalification programmes (Babatunde, Olusegun & Akinsiku, 2012; Abdul-Aziz & Kassim, 2011; Ng et al., 2009; Ling & Bui, 2010; Gudienė et al., 2013; Yong & Mustafa, 2013; Gudienė et al., 2014).

Proposition 5. PRU has a significant effect on critical delay.

4.2.6 Project Organizational Commitment (POC)

Commitment is broadly considered to be an important factor for the success of projects. It is a critical sign that all the project members and people involved are strongly interested in the project (Chan et al., 2004; Tabish & Jha, 2012; Yang et al., 2012; Yong & Mustafa, 2013). Some researchers highlighted the role of the participants to understand, and how dedicated and strongly committed to achieve, maintain and fulfil the project goals (Jha & Iyer, 2006; Tabish & Jha, 2012). Other researchers remarked the participants' commitment to the concept of project planning and control, and how to be able to put the concept into practice (Jha & Iyer, 2006; Thi & Swierczek, 2010). Furthermore, they highlighted the importance of project participants understanding of the project management process, its purpose and value, and be committed to the necessary procedures (Jha & Iyer, 2006; Thi & Swierczek, 2010).

According to some researchers, commitment factor is made up of owner commitment to the approval and payment method, commitment to the goals/objectives, commitment to the quality standards and owner's standards, commitment to safety, and the prevention of accidents and hazards, and commitment to zero variation orders (Gudienė et al., 2014; Chen et al., 2012; Doloi et al., 2012; Alzahrani & Emsley, 2013; Cserháti & Szabó, 2014).

Proposition 6. POC has a significant effect on critical delay.

5. Conceptual Framework

Understanding the significance and importance of each success factor will facilitate the formulation of CSFs for WICPs in the Abu Dhabi Emirate. Therefore, a consolidated framework of critical success factors has been suggested based on the analysis of the review. After a review of the relevant literature and the formulation of the conceptual research framework, the conceptual model was developed which shows the relationships among the variables.

The model of hypothesized relationships between the critical success factors and critical delay in WICPs in the Abu Dhabi Emirate is presented diagrammatically in Figure 1. The six factors appear in the model depict the exogenous variables (independent variables), while the critical delay is the endogenous variable (dependent variable). In each of the relationships, a line has been drawn with a single arrowhead starting from each of the factors pointing towards the critical delay, which indicates a direct positive association. The effect of each group with common interest is estimated by the parameters linking a critical success factor and critical delay (P1–P6), which displays the amount of change in the endogenous variable as a result of a unit change in the exogenous variable (Kline, 2011). For instance, the project management process (PMP) is hypothesized to have an effect on the critical delay. Thus, an arrow starts from the project management process (PMP) factor to the critical delay. In the same manner the other five factors – project manager’s competency (PMC), project team members’ competency (PTC), project organizational planning (POP), project resources’ utilization (PRU) and project organizational commitment (POC) – are hypothesized to have an effect on the critical delay.

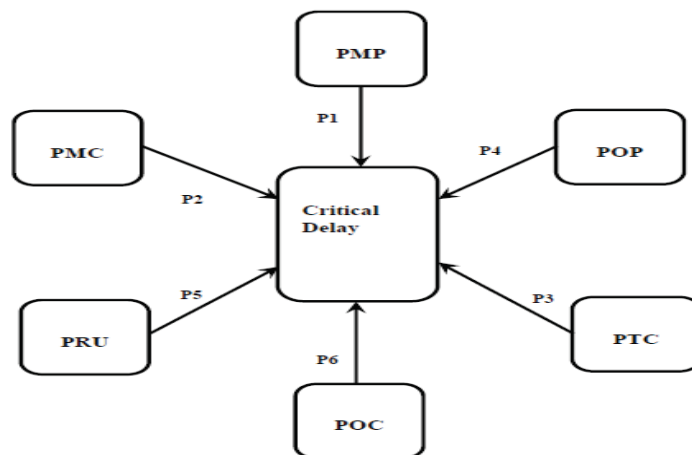


Figure 1. Conceptual framework

6. Discussion

The problems facing the construction industry have a negative impact on construction projects, in general, and, ultimately, affect the economy as a whole (Motaleb & Kishk, 2013). Hence, this research investigates these problems in the context of water infrastructure projects in the Abu Dhabi Emirate in order to highlight the importance of the success factors that could avoid or eradicate the delay factors that affect WICPs in the Abu Dhabi Emirate. The research proposes that simply applying critical success factors or taking the necessary precautions might not be enough to enable the partners in the Abu Dhabi Emirate water infrastructure construction projects to avoid or prevent critical delay factors mainly during the construction. Further research to investigate the interrelationship between critical success and the critical delay factors will help the concerned bodies in the Abu Dhabi Emirate water infrastructure construction projects, including the developers, contractors, and consultants, to determine which factors would deserve high attention and accordingly provide the most effective measures to avoid or prevent critical delay.

7. Conclusion

The main goal of this research is to improve the efficiency of WICPs in the Abu Dhabi Emirate by preventing or avoiding delays and enhancing the success in the delivery of WICPs by investigating the effect of the critical success factors on critical delays. This research develops a conceptual framework to investigate the relationship between CSFs and critical delay from the perception of the main participants of WICPs.

This study makes effort to reduce the existing gap in the literature regarding the relationship between the critical

success factors and critical delay. It establishes a solid ground upon which further future local study can be administered. In addition, it attempts to determine the most critical success factors that will minimize the claims for delay in WICPs, as delays would lead to some of the most difficult and controversial disputes to resolve.

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The Study of Influential Integrated Marketing Communication on Iranian Consumer Buying Behavior for Imported Branded Cars: Datis Khodro

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Abstract

The automobile industry especially imported cars are the most lucrative sector in Iranian market since the disposable income in both urban and rural are increasing and easy alternative finance being provided by all Iranian financial institutions are developing, furthermore imported cars are considered as a short-term investment among the consumer in Iranian market due the foreign currency fluctuations. This study is considered as the first research to review the consumer buying behavior about imported cars and how Datis Company advertise, promote and what is the best place to be advertised to convince customers to buy or try new cars in the Iranian market. Promotional mix have the consequence of creating brand images and symbolic appeals that can be the effective way to strike the responsive chord with consumers. The purpose of this paper is to examine the consumer buying behavior about the imported car through various IMC tools, discover most efficient place , most influential advertising message and how often consumers decide to change the car to better or new one in the Iranian market. A simple random sampling was selected as the sampling method. The customers of Datis Company (Previous Purchase) were sampled to respond to the online questionnaires and 197 questionnaires were returned providing an 89.5 % response rate. We initiated with conducting an exploratory research on Iranian consumer behavior to determine the most important attribute adopted by them. The regression method applied to understand the influence of independent variables (Advertising, WOM, Internet Marketing, Direct Marketing, Public Relations, and Sales Promotion) on the dependent variable (IMC) in Datis Company. Above all, online marketing Communication (OMC), web and social network is discovered as the most effective way of placing the advertisement for Datis Company in the Iranian market. The findings of this study provide managerial implications for marketers for the advertising practice of technologically advanced products. The ambiguous results of the analysis suggest that companies should put more emphasis on the selection of the communicated information content of their advertisements.

Keywords: consumer behavior, IMC, OMC, advertising, Iranian market

1. Introduction

For most of the people, purchasing a car is the second most important and expensive decision next to purchase of a house for the automotive manufacturers, first-time car buyers give them the opportunity to create positive brand image which definitely could be reflected in next coming years because consumers could make repeat car purchasing. The concept of buying behavior is of prime importance in marketing and has evolved over the years. It is very important to understand consumer buying behavior as it plays a vital role while purchasing products. Day to day human want s are growing, expectation is growing. Car Models are no exception to this behavior. Consumer behavior is fairly complex as Car Purchase implies a high level of social and psychological involvement. Consumer buying behavior is a blend of Economic, technological, political, cultural, demographic and natural factors as well as Customer's own characteristics which is reflected by his attitude, motivation, perception, personality, knowledge and lifestyle. Integrated Marketing Communications tools consist of sales promotion, advertising, direct marketing, internet marketing, public relations and personal selling. As you know

advertising is paid to introduce our organization, product, services, and idea. This communication tools will have beneficial and critical consequences on customer mind especially consumer behavior. Certainly, advertising is considered to be the most effective communication tools. There is a wide range of investigation due to effective advertising(Nikhil & Bhunvender, 2012). Whereas there is a considerable demand for imported cars in Iran and this action is increasing annually, On the other hand, We can find different and numerous company which has wide ranging duties in the field of importing, selling and leasing agency. Undoubtedly competitive market between these kinds of companies leads integrated marketing communication especially advertising to critical tools for attraction consumer on purchasing. The purpose of this paper is an evaluation of the effective advertising dimensions to customer's attraction in order to purchase imported car in Iran. Our case study is Datis khodro Company in Iran . Consumer behavior consists of all human behavior that goes in making and post purchase decision . one can succeed in the competitive market only after understanding the complex consumer behavior .an understanding of the consumer enables a marketer to take marketing decisions which are compatible with its consumers need in automobiles market around the world (Vikram 2014).

1.1 Datis Khodro Company

Datis Khodro company was established in 2013 and relying on 12 years' experiences of its managers to import and sales of luxury cars, it Intends to create a new point of view for the customers. The main activity of the company is import and sales the stylish cars. Providing the consultancy services to obtain the best choice in addition to timely fulfillment obligations let the Datis khodro to find the significant place in the competitive vehicle market. Datis khodro would like to reach the main and defined goal and better progress so this company was built the major fundamental as the table 1.

Table 1. Major Fundamental of Datis Khodro

No	Subject	Features
1	Headquarter (Head Office)	In Tehran (600sqm)
2	Central showroom for services	In Tehran (1000sqm)
3	Central workshop for services	In Tehran(3000sqm)
4	dealers for sales and after sales-services nationwide	More than 10

Datis khodro company is the holding company as following:

- I. Datis Tejarat Mandegar,. Tehran Iran (Import, sale and service of all products)
- II. Datis Co. Ltd., Yerevan- Armenia (Import and export cars)
- III. Datis is pressing the registration in Hamburg-Germany (Import and Export from Europe, financing requirements of the holding main customer.

The business of Datis Company lines is including import vehicles such as car, heavy cars, motorcycle, bike, E-bike, spare parts, consumable parts, and so on. In addition brands which is imported and sold such as Toyota, Lexus , Kia Motors ,Hyundai, BMW, Mercedes in Iranian market.(Datis 2013)

1.2 Datis Sales Revenue for Major Imported Cars

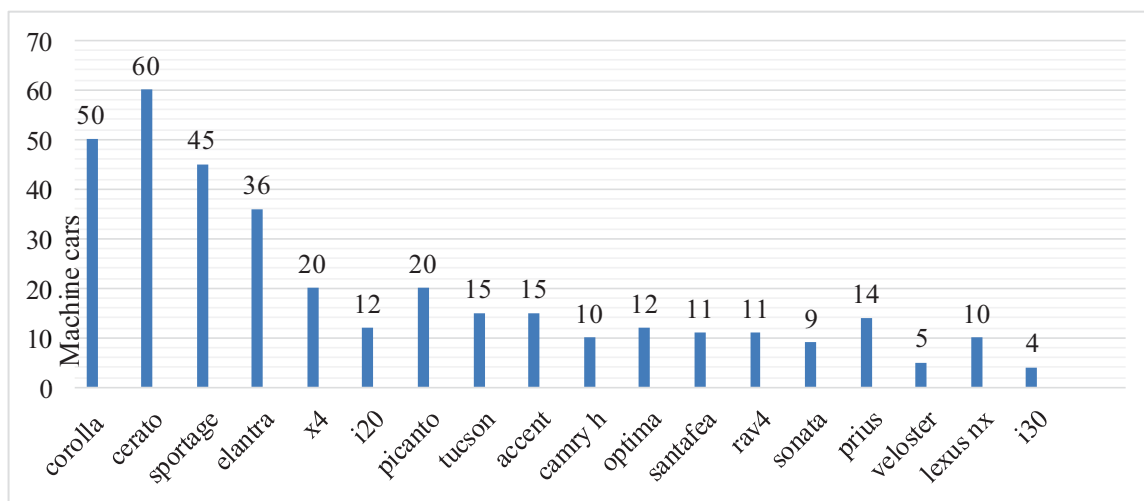


Figure 1. Sales Amount Of Datis Khodro For Imported Cars in 2016

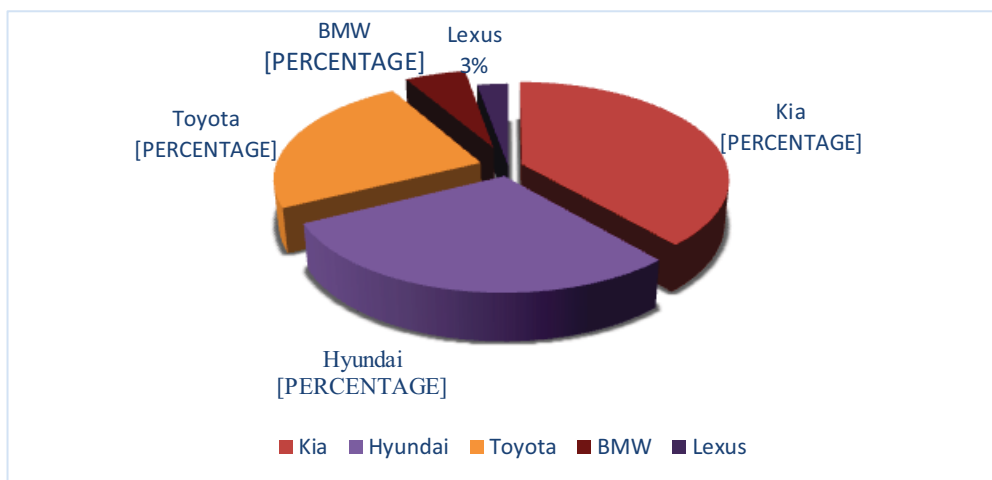


Figure 2. Sales Volume Based on Imported branded Car through Datis khodro

1.3 The Need of Study

Due to the emergence of globalization and liberalization there is a stiff completion among the Automobile industries which are focusing attention in capturing the Iranian markets. Customers have now changed their attitude that yesterday's luxuries are today's necessities. To be a successful marketer it is absolutely essential to study the consumer buying behavior and perceptions of the prospective buyers and track their drivers of those perceptions. Unfortunately, the manufacture of the domestic car can't fulfill the customer needs and expectations so the tastes of Iranian customers are gradually shifted from domestic cars to imported cars. Datis is a pioneer in importing branded cars and trying to fulfill this gap in the Iranian market. Datis company imported cars Company is trying to fulfill the existing gap between domestic cars with the imported one. The experimental data are rather controversial and there is no general agreement about studying the customer perception regards imported cars, therefore the literature reviews are really limited in this existing scenario

2. Literature Review

The automobile industry especially imported cars is the most lucrative sector in Iranian market since the disposable income in both urban and rura are increasing and easy alternative finance being provided by all Iranian financial institutions are developing, furthermore imported cars are considered as short-term investment among the consumer in Iranian market due the foreign currency fluctuations and domestic automobile industry are not comparable with imported cars.. This study is considered as the first research to review the consumer buying behavior about imported cars and how we advertise, promote and what is the best message can convince customers in the Iranian market. It also equips the Datis khodro to take advantage of various promotional, message creation methods and marketing techniques to increase the chance of grabbing the customers. (Miremadi, 2012). Concerning advertising and effect of this on customer awareness and image, We could collect plenty of investigation and studies. Studies are illustrated five vital communications function of advertising as following: Informing, Influencing, Reminding and increasing salience, adding value and assisting other company efforts. The first function of advertising is related to informing in which advertising leads the consumer to aware of the new brand, educates them in order to brands' benefits, features and so on. Another function of advertising is proven to be influenced by which companies and sellers could have important consequences for choosing one brand versus another not only primary demand but also the secondary brand. A brand will be reminded and fresh in the consumers' mind by advertising, in addition, this function has been pertained to as making a brand salient. Undoubtedly effective advertising also increments the consumers' preference and interest in the mature brand and furthermore this IMC tool has been corroborated to consequence brand switching by reminding consumers. Improving quality, innovating and altering consumer perception is the new offer and unique selling proposition which are demonstrated to add value by producer and an effective advertising will cause to illustrate these adding value. When consumer used to be identified product packages by advertising, certainly this process could assist salesperson and will declining costs due to answering consumers' expectation on television or others medias and medium vehicles. Assisting other company efforts is last but not list of adverting functions. (Shimp & Andrews, 2012, p. 276). In fact, some advertising experts contend that advertising is most effective when it reflects both ends of the creative advertising continuum that is, by addressing not only functional product benefits but also symbolic or psychosocial benefits. (Shimp & Andrews, 2012).

Table 2. Various Research and Study in Advertising Methods

Year	Author	Description
2017	(Acar & Temiz)	Advertising effectiveness on financial performance of banking sector is studied .The result of this case is displayed significant and positive association between advertising expenses and financial performance long term by advertising. Additionally effectiveness advertising will bring accounting and amortization policy toward their expenses on mind.
2014	(Hadadi & Almsafir)	One of the marketing strategies is advertising through media that plays a substantial role in illustrating the merits and demerits aspects of products and services to the audiences. Absolutely advertising as integrating marketing communication is so costly but companies can only reach positive effects by arranging their advertisements budgets wisely. In order to avoid expensive costs, marketers will can evaluate the impact of online advertising on sells.
2012	(Shimp & Andrews)	Some advertising experts contend that advertising is most effective when it reflects both ends of the creative advertising continuum that is, by addressing not only functional product benefits but also symbolic or psychosocial benefits.
2011	(Ha, John, Janda, & Muthaly)	Advertising would affect brand loyalty via satisfaction, perceived quality, in addition indirectly this IMC tools would have efficacy on brand loyalty through affecting image and conviction stages of the communication process (as opposed to the preliminary attention stage). Advertising follows from the fact that personalities are particularly useful for the creation of brand associations. Brand associations influence the “evaluation of alternatives” stage in basic consumer buying behavior models.
2007	(Rajagopal & Gopal)	Effective brand management, encompassing brand personality, is of paramount importance in reaching the overall company goals towards satisfaction, loyalty, and profitability.
2006	(Rajagopal)	Advertising plays an important role in reinforcing perceived performance and usage experience of a particular brand.
2002	Idsmith & Laffer	Internet is one of the impressive tools of advertising in which we can find a wide range of both positive and negative points for producers and sellers until moving consumer to purchasing. Internet advertising include two chapters in which can be viewed Offline traditional media advertising similar to TV, newspaper and so on. Another chapter is pertained to online advertising as Email, website, social network and something like that.
2000	(Greuner, Kammerschen, & Klein)	In the past studies discovered relationship between advertising and profits. By the way advertising is treated an investment, overstating the real rates of return to advertising. Advertising on competition in the US automobile industry such as General Motors, Ford, and Chrysler over the 25-year period from 1970 to 1994. Subsequently they could support the view of advertising by which car industry market is more competitive. The result show that advertising is effectiveness in this industry.
1993	(Kwoka)	Regarding the competitive issues, the sales effects of own advertising and style change make clear that these strategies are advantageous to each seller individually .Substantively sizeable positive effects from style change, model age, and advertising in US car models over a 22-year period. Advertising and style change each increases a model's sales. In addition this action is proven to be short-lived but styling has a much longer impact
1993	(Bendixen)	The influence of advertising is related to products and services with low consumer involvement such as foodstuffs, cigarette and something like that. Advertising would play a remarkable role at attraction consumer. Although content of advertising is so important, undoubtedly advertising in different media and mediums will have different consequences.
1971	(Cowling & Cubbin)	In order to investigating price, quality and advertising competition in United Kingdom Car Market examined that the behavior of advertising appropriations is consistent with long-term rule-of-thumb behavior, which directly relates advertising appropriations to sales revenue, coupled with a short-run compensatory mechanism, whereby a reduction in market share generates an increase in advertising appropriations.

2.1 Major Players in Iranian Automobile Industry

Table 3. Major Player in Iranian Automotive Industry

Company	History	Bestselling product
 Iran Khodro Company	<p>To found in August 1962. To sign a contract with the English company for 'Paykan'. In late 1977, the company held talks with France's Peugeot to replace Paykan. In 2003, Pars and Samand models of the year and Peugeot 206 sedan were put into production. In 2004, the two sedans of Pars ELX and Samand Lx were introduced to the market. In 2006, the national engine production line and Samand sedan production lines in Azerbaijan, Belarus and Syria were put into production. In 2008, IKCO designed Runna.</p>	Peugeot405 Peugeot206 Peugeot Pars Samand Dena
 SAIPA Group	<p>SAIPA was established in 1966, with 75% Iranian ownership. In 1968, Producing Dyan models. Producing pickup with 2000 cc displacement in 1983. Producing Renault 21 in 1993. In 1994, Producing various Models of "Carburetor-Engined Pride". In 1999, Producing Pride Safari. Localization of parts; 81% for Pride, 79% for Nissan pickups. In 2002, Launching and Producing SAIPA 141. In 2005, Launching Rio Production Line. In 2007, Launching Tondar 90 in 3 Types. Launching SAIPA 132. In 2012, Introducing of 3 new models: TIBA2, SAIPA 151 and Automatic X100. In 2014, Launching TIBA2 Production Line in SAIPA. Launching Kia Cerato Production Line in SAIPA. Launching ARIO Experimental Production Line in BONRO. In 2016, Joint-Venture of SAIPA and Citroën (SAIPA Kashan). Launching CS35. Launching Renault Sandero Step way. Launching CERATO Optional. Launching Quick.</p>	Tiba Saipa 131
 Modiran Vehicle	<p>Modiran Vehicle Manufacturing Company is an Iranian automobile firm that currently makes a version of the Chery QQ3 called the MVM in 2001.</p>	MVM chery tigo5
 PARS KHODRO	<p>Pars Khodro was the first manufacturer of sport utility vehicles in Iran. 1968- 1978, Industrial co-operations of GM as a shareholder. Renaming Jeep co-investor Co. to 'Iran GM'. Launching new products :'Chevrolet Iran' (Opel), 'Chevrolet Pickup', 'Chevrolet Nova', 'Buick Sky Lark', and 'Cadillac Civil'. 1986-1990, initiation of co-operations with Nissan Japan. Additional options of Army equipment to Jeep. Launching the production lines Nissan Patrol with variety of models (Van, Hard Top, Ambulance). 1995-1999, Transferring Renault 5 production line from Saipa to Pars Khodro. 2000-2004, Saipa Purchasing 51% of Pars Khodro shares in Tehran Stock Market. 2005-2011, Purchase of Zagros Khodro Co. by Pars Khodro Co. and transferring Pickup & Roniz production lines from PK to Zagros Khodro. Initiating the production of Renaults France new cars including Megane and Logan (by the trading name of Tondar 90).</p>	Tondar 90
 Bahman group	<p>Bahman Motor Company Bahman Motor Company was founded in 1952 under the title of Iran Khalij Co. and increased range of products to Mazda 1000 with cargo capacity of 500 Kg and Mazda 1600 with cargo capacity of 1 Ton. Changing the name to Bahman Group and signing a contract with the Japanese Motors company Mitsubishi in 2002. In 2003 Bahman Group, with the launch of Mitsubishi Pajero entered to 4WD market. In 2008 a new passenger car" Mazda 3" and" Capra 1600" double cap pickup were produced and released to the market. In year 2010 new "Mazda 2", "Mazda3" and "Capra" pickup were lunched into market and also on the same year Bahman Motor Center. Year 2011 began with production of Mazda 1600 passenger vehicle , sedans B50, and Mini-track. Eventually in year 2012 Bahman Motor Center became independent company under Bahman Motor Co.</p>	Mazda 3
 Kerman Automotive	<p>Kerman Group started its activities on January of 1990. Kerman Khodro started its activity in the field of importing various models of Daewoo vehicles, After outstanding welcome by customers form our products in order to reach our primary objects, absorb foreign investment and take position in the cycle of vehicle production, execute vehicle production design in Arg e Jadid.Executive operation of this project was started in 1993 and its result was creating various companies and assembly of vehicles like Kerman Motor, Rayen Vehicle Making, Bam Vehicle Making.</p>	JAC S5 Lifan 820

The primary objectives of advertising are to create awareness among the target consumers. Undoubtedly controlling time of advertising has critical consequences on budget constraints. So companies need to identify reach and frequency. Reach and frequency is well-established marketing metrics for planning and evaluating the effectiveness of advertising campaigns.

Actually, companies have diverse type of advertising though they need to establish a suitable schedule via advertising technique. Reach and frequency are proven to an important technique. In major, frequently purchased

packaged goods markets, returns to advertising diminish fast. A small frequency, therefore (one to three reminders per purchase cycle), has an sufficient and important role in advertising an awareness and established brand.(Turner, Hojjat, Cetintas, & Yang, 2016), (Vakratsas & Ambler, 1999).There is several technique for achieving effectiveness advertising. The first technic is pertained to placing advertisement in prime time commercials. An another technic refers to placing ads in large circulation general interests magazines. last but not least is appropriate to using multiple network ,stations, many national news, papers simultaneously. In spite of this, If we would like to present a beneficial advertising when frequency is emphasized as primary goal of media plan and reach as secondary target, we have to place advertising in late night TV program, use experience magazines, sponsorship of major events and something like that.

Table 4. Type of Advertising Techniques

Type of advertising	Description
Online Advertising	Advertising via internet (World Wide Web).* <ul style="list-style-type: none"> • AdSense (These are the ads served to consumers via Google, by showing ads relevant to the information on any page.) • Email advertising (and SPAM) • Native Advertising (This continues to grow and dominate the online advertising space.) • Facebook Ads • YouTube Ads • Sponsored Tweets • Website Takeovers • Rich Media Ads • Pop Up Ads (and pop-under) • Pre-video ads • Blogging
Cell Phone & Mobile Advertising	Banners ads (These include skyscrapers, full banners, squares, and buttons.) This advertising is similar to online advertising but It can be better that is utilize due to all of applications in which use cell phones, iPads, Kindles, Nooks, and other portable electronic devices with Internet connectivity. Current trends in mobile advertising involve major use of social media such as Twitter, Instagram, Snapchat, and Facebook
Public Service Advertising	Public Service Advertisements (PSA)s traditionally appear on TV and radio, but are also being promoted online in nowadays.
Print Advertising	Before digital advertising one of the effectiveness advertising is proven to be print advertising in which is split into three sub-categories, such as: <ul style="list-style-type: none"> • periodical advertising (a magazine, a newspaper, or anything else that comes out at regular intervals) • Brochures, • Leaflets • Flyers • Handouts • Direct mail advertising.
Outdoor Advertising	This type of advertising is known all of ads when people is Out Of Home (OOH) . <ul style="list-style-type: none"> • Billboards • Bus shelter posters • Fly posters • Even those big digital boards in squares and highway • Even shopping centers are some of type outdoor advertising.
Broadcast Advertising	The term broadcast advertising applies to commercials aired on either television or radio, which are typical called spots.
guerrilla Advertising	Innovation and ideas is created guerrilla advertising even without a large budget. It will happen via word of mouth and social media

2.2 Advertising Content Influences

(MacInnis & Jaworski, 1989) find that emotional advertisings are more likely to generate sales than ads based on informative content.(Ndubisi, 2007) find that marketers can defer advertising wear-out effects, or the “decreasing response to an advertising with improving repetition of display to the advertising”, by offering emotional content. On the whole, most of studies is shown that appropriate advertising content moderates the effect of ad spending on sales and decision purchasing. (Becker, 2017).Print advertisements could have greater attention since this type of advertising usually consist of text or a single picture. On the other hand TV advertisements include a wide range of picture series pictures. So this type is more complex for analysis than. Cross-cultural studies focused on the differences in content in terms of advertising expression. Content of advertising could takes shape by means of nostalgic appeal, use of music, animations, role of women and ambient advertising (Srivastava et al., 2017). Several goals of content of advertising will be matched by correct and false ad recognition, subjective ad

comprehension, perceived advertiser awareness to viewers' needs, ad involvement, and overall ad persuasion. (Bishop, Brocato, & Vijayalakshmi, 2017)

3. Research Methodology

The purpose of this study is to elaborate the Datis consumer buying behavior for imported car through various IMC tools in Iranian market, In other words, the aim is to answer the following research objectives:

RQ1: To determine the most influential Integrated marketing communication techniques on consumer buying behavior about imported cars by Datis Company.

RQ2: To Examine and analyze the advertisement influences outcome created by datis company to motivate customer to buy imported car in Iranian market.

RQ3: Determine the customer perception about integrated Marketing Communication on introducing new imported cars by Datis company.

RQ4: To Highlight the importance of brand awareness and brand association in Datis company

The research started with conducting an exploratory research on Iranian consumer behavior to determine the most important attribute adopted by them. The research gradually shifted from exploratory research to quantitative. Through literature review and conducting deep interviews with the experts in Iranian automobile industry , we have divided the questionnaire into four sections. The method of distribution questionnaire was through online methods for Iranian customer in Datis Company. The first section, we asked about demographic information of the respondents, the second section, the respondents asked about the Promotion Place and main objective of the unique message and attractive IMC technique towards them. The third section is about the various IMC attributes, determining the Reach and Frequency techniques and the last part we asked about the brand association and brand awareness, furthermore, the questionnaire used five points Likert scale. The respondents were asked to reflect the amount of measured variable from completely agree to completely disagree.

3.1 Research Approach

There are two Scientific approaches when writing an executive study , a deductive and an inductive . using an inductive approach means that the researcher gather data and develop theory by analyzing it usually of a qualitative nature . using deductive approach is associate with building and testing of hypothesis and is more concerned with achieving results which can be generalized ,usually of a quantative nature .(Saunders & Thornhill, 2007). This Study is based on deductive approach .

In this research, a simple random sampling was selected as the sampling method. The customers of Datis Khodro (Previous Purchaser) were sampled to respond to the questionnaires. the research is executed in Tehran as main and accessible province in Iran . To achieve a diverse response from a expand the scope of ideas, age, education, income and type of occupation used. According to (Fisher, 2007), the number of distributed questionnaires will have to be larger than the minimum required and the response rate of 30% is considered very well. In this study, 220 questionnaires were distributed online through <http://fa.datiskhodro.com/HomeS/CustomerClub> and 197 questionnaires were returned providing an 89.5 % response rate. There are two important concepts one should keep in mind when writing a report, validity, and reliability. Validity is the ability of a chosen instrument to measure what it is supposed to measure. Reliability is the extent to which research results would be stable or consistent if the same techniques were used repeatedly. The role of reliability is to minimize the errors and biases in a study In this research reliability were assessed by the method of alpha Cronbach. the internal consistency is calculated to 0.843. Since alpha Cronbach is more than 0.7; reliability of trust measure is acceptable. Indicator reliability means the extent to which a variable or set of variables is consistent regarding what it intends to measure the face validity and content validity is performed in this study.

4. Data Analysis and Interpretation

4.1 RQ1: To Determine the Most Influential Integrated Marketing Communication Techniques on Consumer Buying Behavior about Imported Cars by Datis Company

Table 5. Regression Model Summary For IMC In Datis Khodro

Model	R	R Square	Adjusted R Square	Sig
1	.723 ^a	.522	.516	.000
2	.835 ^b	.698	.690	.000
3	.900 ^c	.809	.802	.000
4	.950 ^d	.902	.897	.000
5	.983^e	.966	.964	.000
6	1.000 ^f	1.000	1.000	.016. ^g

e. Predictors: (Constant), Advertising, WOM, Internet Marketing, Direct Marketing, Public Relation

f. Predictors: (Constant), Advertising, WOM, Internet Marketing, Direct Marketing, Public Relation, Sales Promotion

Since the Sig value of all independent variables except the sale promotion is less than .005, therefore, all independent variable participate in predicting the dependent variable (IMC) in Dais Company. The IMC result can predict with Advertising, WOM, Internet Marketing, Direct Marketing, and Public Relation. The regression model summary proved that % 96.4 of IMC is completely depended on performing the precise techniques of Integrated marketing Communication .

4.2 RQ2: To Examine and analyze the advertisement influences outcome created by datis company to motivate customer to buy imported car in Iranian market .

Table 6. Advertisement Influences On Customers in Datis Company

Advertisement Influences		Percentage	Influencing Ranking
Datis Company	Reminder	15.0	4
	Effectiveness	31.0	1
	Intimate and valid	24.0	3
	Reasonable	26.5	2
	Confuse	2.0	5
	Total	98.5	

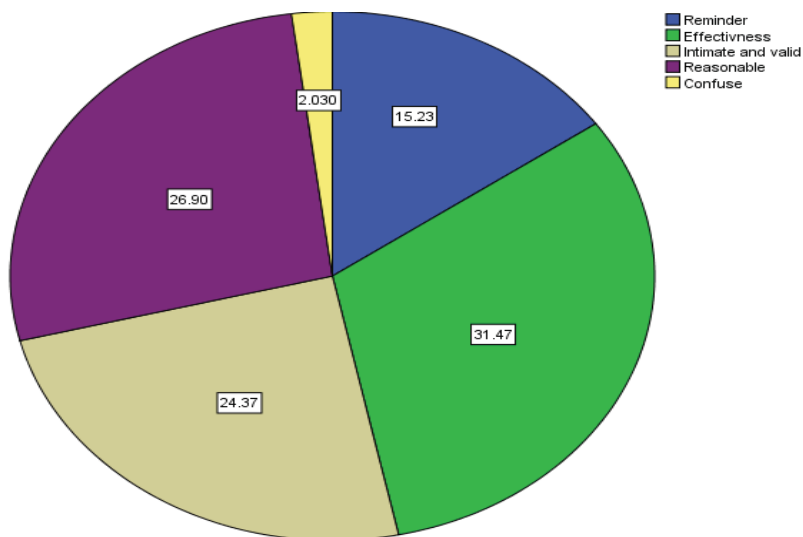


Figure 3. Advertisement Influences OutCome In Datis Copmany

The data would seem to suggest that effectiveness (% 0.31) followed by reasonable(%0.26.5) and intimate and valid(%0.24) are most important and essential outcomes of Advertising Campaign that Datis company should be executed since customer expect it from advertisement message from company to introduce new imported cars. It is generally accepted that the web and social network or online advertising(online Marketing Communication) (61 %), TV(16.7 %), News Paper and Magazine (8.7 %), Showroom (7.9%) and Billboard(5.6 %) are most important promotional places to advertise for current and new imported cars for datis company among the Iranian customers , furthermore the web and social network is the quickest best way to achieve USP from

advertisement message outcome whereas the TV is working to persuade customer to buy imported cars from Datis company. It is also worth mentioning that billboard is best tools to motivate customer to buy the Datis Company products. As matter of fact, the web and social network or online advertising is becoming the major place for any company if they really want to survive in the electronic and digital world.

4.3 RQ3: Determine the Customer Perception about Integrated Marketing Communication on Introducing New Imported Cars by Datis Company

Table 7. Priorities Of IMC Techniques

IMC Techniques	Mean Rank	Ranking Priorities	Customer Opinion
Direct Marketing	3.99	1	Very Strong
WOM	3.99	1	Very Strong
Internet Marketing	3.85	2	Very Strong
Advertising	3.63	3	Strong
Public Relation & Publicity	3.09	4	Moderate
Sales Promotion	2.45	5	Need To Improve A Lot

Needless to say, Sales promotion is vital fact nowadays, therefore Marketing Team of Datis Khodro should concentrate more on various methods of Sales promotion. Strictly Speaking, Datis consumer didn't observe any Sales promotion activities from the marketing team to attract, motivate or even persuade them to think about the New products or the new version of old products. More relevantly, WOM and Direct marketing and internet marketing are working really fantastic in Datis Company.

4.4 RQ4: To Highlight the Importance of Brand Awareness and Brand Association in Datis Company

Table 8. Brand Association and Brand Awareness Priorities In Datis Khodro

Brand Association	Mean Rank	Ranking Priorities	Brand Awareness	Mean Rank	Ranking Priorities
Special Advertisement	2.66	1	Datis Advertising Towards Informing	2.69	1
Favorable Advertisement	2.65	2	Advertisement Proved That We Know The Datis Products are Very Well-known	2.64	2
Advertising Towards Purchasing	2.62	3	Advertising z Showing highly security of Datis Products	2.35	3
Powerful Brand	2.07	4	Several Thoughts Towards Datis Advertisements	2.32	4

This table is quite revealing that Special advertisement that includes unique message has more priority in determining the Datis brand Association among the customer, whereas Iranian customers are interested in an advertisement with more informing knowledge in the Iranian market. The single most striking observation to emerge from data emphasizes on the Special advertisement to prevent customers from several thoughts from Datis company Advertisements.

5. Conclusions

Appropriate marketing communication is critical for the success of a product. Especially in high-tech markets, the adoption of new products is challenging, as customers' willingness to buy a product can be hindered by a lack of knowledge and experience. The results provide practical insights into the advertising of technologically advanced products in a high-tech market, namely automobiles, furthermore, it indicates the promotional places that are associated with a perception of Iranian customers towards the new Imported cars by Datis company. It is strongly demonstrated that online marketing Communication (OMC) or online advertising, website, social network and virtual environment are strongly supported by customers. what is so surprising is that TV and Showroom are less popular in compared to online advertising when Iranian customer is thinking about imported cars by Datis company. The findings of this study provide managerial implications for marketers for the advertising practice of technologically advanced products. The ambiguous results of the analysis suggest that companies should put more emphasis on the selection of the communicated information content of their advertisements. It emerges that Datis Marketing team should focus on effectiveness, reasonable and intimate and valid as an influential message out when they think about the creation of new advertisement. It is beyond doubt that IMC plays an essential role in motivating and persuading the customer to think or rethink about new imported cars by Datis company, therefore, they should concentrate on internet marketing as effective IMC tool among the target market and develop the reach techniques for the new customer in existing market for developing new products. There are grounds that for supporting that advertising has significant consequences on

consumer buying through virtual environment, for the matter, Datis customer proved as powerful brand association, moreover advertising and advertisement towards purchasing as strong brand awareness of this company. The current study found that highly security of Datis product is an essential feature that they can easily be highlighted in their advertisement to achieve trust among the target market. Despite its interesting results, the study has some limitations, which have to be taken into account. The focus of this study was placed on a single industry, narrowing the generality of the results. Future studies could, therefore, conduct a cross-industrial comparison integrating different product categories.

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The Effectiveness of Strategic Relationship Marketing: Exploring Relationship Quality towards Customer Loyalty

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Abstract

This study examines customer satisfaction, trust, control mutuality and communication as determinants of relationship quality and customer loyalty in relationship marketing. The study focuses on Malaysian telecommunication industry in the business-to-customer context. The structural equation modelling technique is used to empirically test the proposed hypotheses based on the sample size of 405 customers collected by a questionnaire survey. Trust had the greatest positive influence on relationship quality, followed by satisfaction. Subsequently, there was no significant effect of control mutuality and communication on relationship quality. Customer loyalty was significantly affected by relationship quality. The contribution of this paper is twofold. From a theoretical perspective, the social exchange theory is validated and it offers both a conceptual foundation and empirical-based evaluation of customer loyalty through the context of relationship quality. In the practical perspective, the findings proposed useful information to the telecommunication service providers in developing more effective relationship marketing strategies to build better relationship quality and customer loyalty.

Keywords: relationship marketing, relationship quality, customer loyalty, control mutuality

1. Introduction

Relationship marketing, defined as “to identify and establish, maintain and enhance relationship with customers and other stakeholders, at a profit so that the objectives of the partners interest are met; this is achieved by a mutual exchange and fulfillment of promise” (Grönroos, 1994). Relationship marketing has emerged in response to the challenging and competitive contemporary business environment. Relationship marketing is widely practice across many business-to-consumer contexts. Companies that strongly adopted and implemented effective relationship marketing have achieved remarkable organisational benefits in the aspects of greater profitability (San Martin, Jimenez & Lopez-Catalan, 2016), customer loyalty (Evans and Laskin, 2008; Marzo - Navarro, Pedraja - Iglesias and Rivera - Torres, 2004), achieving and sustaining competitive advantage (Catalina, 2013). Relationship quality is the key variable to achieve customer loyalty and successful relationship marketing (Prince, Palihawanada, Davies, Winsor, 2016; Jin, Line and Goh, 2013). Relationship quality is a consumer’s evaluation of the strength of his or her relationship with the service provider (Crosby, Evans and Cowles, 1990).

The telecommunication industry in Malaysia has achieved remarkable growth and plays an important role in the domestic economy development. According to the Malaysia Communications and Multimedia Commission (MCMC, 2016), there were a total of 43.9 million cellular telephone subscribers or consumers in Malaysia at the end third quarter of 2016. The strong consumer base in the telecommunication industry has resulted in the importance of building effective relationship marketing by the service providers towards their consumers. However, competition between the key telecommunication service providers such as Telekom Malaysia Bhd, Maxis, DiGi, Celcom, and U Mobile has been intensively strong. In the first quarter of 2017, Maxis, DiGi and Celcom continued to see declining number of subscribers, which resulted in their revenue contraction, while ongoing price wars as the players attempted to defend their market share suppressed margins (The Star, 2017). The presence of other competitors in the market have significantly affected the existing long time service providers’ market share. The intense price wars between the service providers have caused consumers to opt for better value packages at a lower price and customer loyalty is highly questionable in this case. Hence, the degree of customer loyalty towards the companies are influenced by the relationship quality perceived by the consumers in the aspect of satisfaction, trust, control mutuality and communication (Bojei and Alwie, 2016; Jin et al., 2013; Huang, 2001).

The primary objectives of this exploratory study are; 1) to investigate the effect of customer satisfaction, trust, control mutuality and communication on relationship quality and 2) to analyse the influence of relationship quality towards customer loyalty. The findings of this research will contribute to managerial and theoretical implications. In the aspect of managerial implications, the research findings will provide valuable information to the telecommunication service providers in developing more effective relationship marketing strategies to build better relationship quality and customer loyalty. In the theoretical perspective, the study has validated the social exchange theory concept. It has shown both a conceptual foundation and empirical-based evaluation of customer loyalty through the context of relationship quality.

2. Literature Review and Hypotheses Development

2.1 Social Exchange Theory

The Social Exchange Theory is developed to understand the social behavior of humans in economic situations (Homans, 1958). The exchange theory investigates the processes of establishing and sustaining reciprocity in social relations, or the mutual gratifications between individuals (Lee, Mohamad and Ramayah, 2010). Individuals evaluate their reward to cost ratio when deciding whether or not to maintain a relationship. The application of Social Exchange Theory in this study to investigate consumers' evaluation on their benefits to costs represented by relationship quality, and their decision to stay loyal with the service providers.

2.2 Relationship Quality

Relationship quality is a consumer's evaluation of the strength of his or her relationship with the service provider (Crosby, Evans and Cowles, 1990). Myhal, Kang and Murphy (2008) highlighted the six dimensions of trust, commitment, satisfaction, minimal opportunism, conflict, and communication in relationship quality. Caceres and Paparoidamis (2007) indicated that relationship quality consists of three dimensions of trust, commitment, and satisfaction. Hon and Grunig (1999a) proposed the six dimensions of trust, control mutuality, satisfaction, commitment, exchange relationships, and communal relationships.

This research focuses on satisfaction, trust, control mutuality and communication as the key dimensions of relationship quality. Hence, this study aim to bridge the research gaps as the four dimensions of satisfaction, trust, control mutuality and communication were not adequately covered by the past literature in the context of relationship quality, and its relationship with customer loyalty in the telecommunication industry.

2.3 Satisfaction

Relationship marketing is a long-term approach by focusing on providing superior customer lifetime value and the main success criterion is to develop long-term customer satisfaction (Kotler, Armstrong, Saunders and Wong, 1999). Satisfaction is customer's evaluation of their relationship experience with the service provider. Customer satisfaction was found to be a significant predictor of relationship quality in the Ethiopian mobile telecommunication industry (Negi and Ketema, 2013). Li, Green, Farazmand and Grodzki (2012) reported that relationship quality represented by customer satisfaction has influenced customer loyalty in the context of retail stores' shoppers.

H₁ There is a positive relationship between satisfaction and relationship quality.

2.4 Trust

Trust is the confidence level in the honesty and integrity of the other party (Crosby et al., 1990). Trust also signifies the belief of customer towards their service providers and the service that meets customer needs. According to Cerri (2012), high levels of mutual trust facilitate the effective exchange between the business partners and enhance relationship quality. Trust was found to be important for client-professional relationship quality in the financial planning environment (Hunt, Brimble and Freudenberg, 2011). Chu (2009) asserts that customers' trust is significant in building long-term relationship and achieving customer loyalty. Individual's level of trust is different significantly based on their personal decision-making habits and characteristics.

H₂ There is a positive relationship between trust and relationship quality.

2.5 Control Mutuality

Control mutuality is the degree to which parties in a relationship are satisfied with the amount of control they have in a relationship (Grunig, 2002). Huang (2001) reported that control mutuality had the greatest influence on successful organisational relationships in South Korea. Botha and Waldt (2010) highlighted that relationship outcomes of control mutuality is important indicators of successful relationships. Hence, their findings were consistent with the earlier findings by Hon and Grunig (1999b) that control mutuality is crucial in the strategies for maintaining organization-public relationships. Steyn (2007) states that stakeholders' involvement in

decision-making resulted in the stabilization of the organisational relationships.

H₃ There is a positive relationship between control mutuality and relationship quality.

2.6 Communication

Communication is one of the important factors in enhancing relationship development and maintenance (Finne and Grönroos, 2009). According to Coviello, Brodie, Danaher and Johnston (2002), communication is determined by the customers' assessment in the aspect of clarity, pleasantness, responsiveness, and language of the service provider. Communication have positive influence towards relationship quality in banking sector (Ruswanti and Lectari, 2016). In a study conducted on the service sector in Malaysia, Bojei and Alwie (2010) reported that communication is the weakest dimension of relationship quality to achieved customer loyalty. Doaei, Razeai and Khajei (2011) reported that interpersonal communication had influenced customer loyalty without relationship quality as mediating role.

H₄ There is a positive relationship between communication and relationship quality.

2.7 Customer Loyalty

Customer loyalty is defined as “a deeply held commitment to re-buy or re-patronize a preferred product or service consistently in the future, thereby causing repetitive same-brand or same brandset purchasing, despite situational influences and marketing efforts have the potential to cause switching behaviour” (Oliver, 1999). Hennig-Thurau, Gwinner, and Gremler (2002) assert that customer loyalty is the “primary goal” of relationship marketing. Bojei and Alwie (2010) reported that relationship quality positively influenced the customer loyalty was mainly due strong commitment given by the service provider to the customers. Ruswanti and Lectari (2016) also indicated significant positive relationship between relationship quality and customer loyalty. The service providers have delivered good services which met customer's expectation and goal, and satisfying, subsequently leads to good relational quality and customer loyalty. In contrast, Chen and Myagmarsuren (2011) found that direct relationship does not exist between relationship quality and customer loyalty in telecommunication services. However, it was concluded that relationship quality affect customer loyalty was mediated by relationship value.

H₅: There is a positive relationship between relationship quality and customer loyalty.

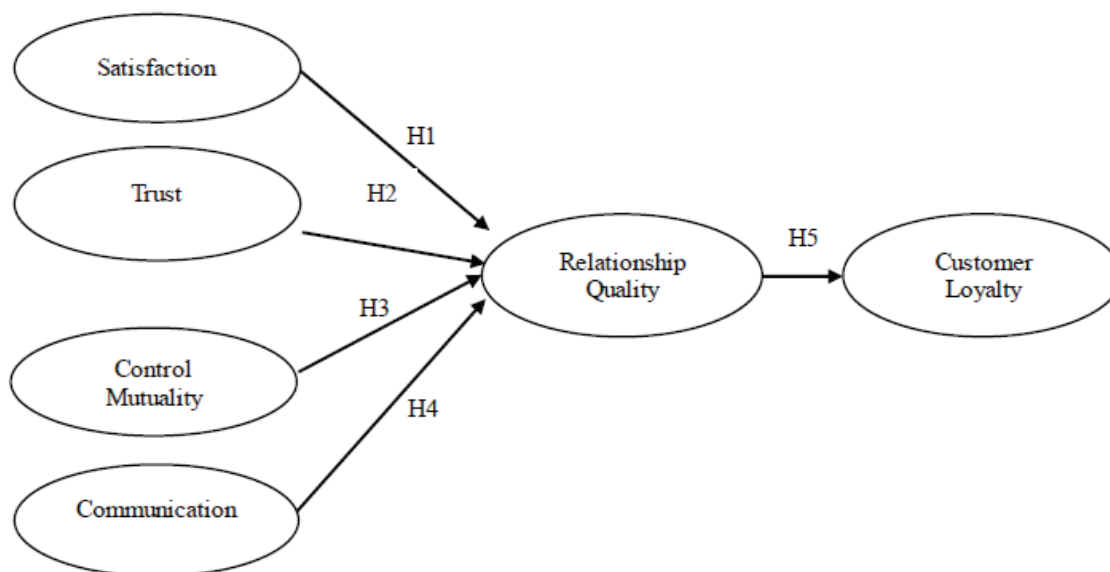


Figure 1. Conceptual framework

3. Research Methodology

3.1 Sampling and Measurement

This paper is based on data collected from a survey on the existing customers of local telecommunication service providers, namely Maxis, Digi and Celcom, in Kuala Lumpur and Selangor, Malaysia. A sample size of 405 was determined and non-probability convenience sampling method was adopted for this study. Self-administered questionnaires were distributed to the respondents who present at the selected Maxis, Digi and Celcom outlets in

Kuala Lumpur and Selangor. The survey instrument was designed with 28 items assessed by a six-point Likert scale (1: strongly disagree and 6: strongly agree). The Statistical Package for Social Sciences (SPSS) version 22 was used to perform descriptive analysis, validity and reliability analysis. Followed by, SPSS AMOS version 21 was used to perform the Structural Equation Modeling (SEM) analysis to test the hypotheses.

3.2 Validity and Reliability Assessment

The pilot study results indicated the factor loading for all the 28 proposed items is above 0.3 and thereby will be retained (Hair, Black, Babin and Anderson, 2010). The Cronbach's Alpha values for all constructs were above 0.7 which have shown a high level of internal consistency in the data (Pallant, 2007). The Cronbach's Alpha values were 0.951 (Satisfaction), 0.843 (Trust), 0.911 (Control Mutuality), 0.887 (Communications), 0.902 (Relationship Quality) and 0.877 (Customer Loyalty). Table 1 shows the results of Confirmatory Factor Analysis (CFA) for each item in the construct and the reliability test results. The pilot study results showed that all the constructs were valid and reliable for further inferential analyses.

Table 1. CFA results for the measurement model

Construct	Item	Statement	Factor Loading	Cronbach's Alpha
Satisfaction	S1	I am satisfied with the price offered by my service provider.	.841	.951
	S2	I am delighted with the performance of my service provider	.890	
	S3	The services offered meet my expectations.	.901	
	S4	My service provider offers flexible service packages that meet my needs.	.879	
	S5	My current service provider could provide me higher satisfaction than other service providers.	.852	
	S6	Overall, I am satisfied with my service provider.	.881	
Trust	T1	My service provide is reliable in providing their services.	.661	.843
	T2	My service provider has high integrity.	.726	
	T3	My service provider is trust worthy.	.709	
	T4	My service provider fulfill well their promises (i.e., price offers, marketing communications, etc).	.823	
	T5	My service provider has a good brand image.	.692	
Control Mutuality	M1	I am always open to give my suggestion for improvement of the service.	.766	.911
	M2	My service provider respected customer's feedback.	.935	
	M3	My service provider will involve customers in their promotional activities.	.914	
	M4	My service provider maintains two ways communication with the customers.	.796	
Communication	C1	I received regularly updates information on my current services from my service provider.	.707	.887
	C2	The staff are friendly and fulfilled my request at the outlet.	.910	
	C3	Latest promotional information are communicated clearly and timely manner to the customers.	.889	
	C4	My service provider effectively use email and social media to communicate with customers.	.771	
Relationship Quality	Q1	My service provider is consistent in providing quality service.	.752	.902
	Q2	My service provider emphasize on mutual relationship with customers.	.787	
	Q3	My service provider maintains good quality relationship with customers.	.883	
	Q4	I received recognition as a loyal customers.	.906	
	Q5	I am respected as a valuable customers.	.661	
Customer Loyalty	L1	I will stay loyal to my current service provider.	.882	.877
	L2	I will recommend my service provider to others.	.809	
	L3	My relationship with my service provider has a great deal of personal meaning to me.	.798	
	L4	I intend to purchase extra other service or package from my current service provider.	.771	

4. Results

4.1 Demographic Profile of the Respondents

From the total of 405 respondents, majority respondents are female (59%), followed by male (41%). As for the respondents' monthly income, 4.7 percent earned less than RM1500, 13.3 percent of the respondents have an income between RM1500– RM3000. Furthermore, 41.4 percent of the respondents have an income between

RM3000-RM6000 and 31.4 percent of the respondents belong to the income group of RM6000-RM10000. Respondents with an income above RM 10000 comprises 9.2 percent. Majority respondents are Chinese respondents (51.6%), followed by Malay (26.3%), Indian (13.5%) and others (8.6%). As for the respondents' age, 9.3 percent belong to the age group of 18-20, followed by 25.6 percent under the age group between 21 -38. Majority of 49.1 percent of the respondents under the age group of 39-49, and 16 percent belong to age group of 50 and above.

4.2 Model Compatibility Testing

SEM was applied to estimate the relationships between satisfaction, trust, control mutuality, communication, relationship quality, and customer loyalty using the maximum likelihood procedure. The research model has achieved a good fit as shown in Table 2. The *Chi-Square* value is 902.86 and according to Barrett (2007), chi square probability value greater than 0.05 indicates acceptable model fit. The ratio of χ^2/df was 2.66, lower than the value 3.0, as suggested by Byrne (2001). Incremental fit indices were greater than 0.9, with IFI of 0.93, CFI of 0.93 and TLI of 0.92. The absolute index with RMSEA of 0.064, achieved lower than 0.8 (Browne and Cudeck 1993).

Table 2. Goodness of Fit

Index	Level of Acceptance	Result	Model Evaluation
Chi-square	P>0.05	902.86	Good
Chisq/df	Chi Square / df <3.0	2.663	Good
RMSEA	RMSEA < 0.08	0.064	Good
IFI	IFI > 0.9	0.930	Good
CFI	CFI > 0.9	0.930	Good
TLI	TLI > 0.9	0.922	Good

The normality assessment was conducted and indicated that the data is normally distributed with value of skewness between -1.0 and 1.0, and kurtosis of between -3.0 and 3.0. Finally, the estimated path coefficients were derived and the research hypotheses were examined.

4.3 Model Causality Testing

The final structural model is shown in Figure 2.

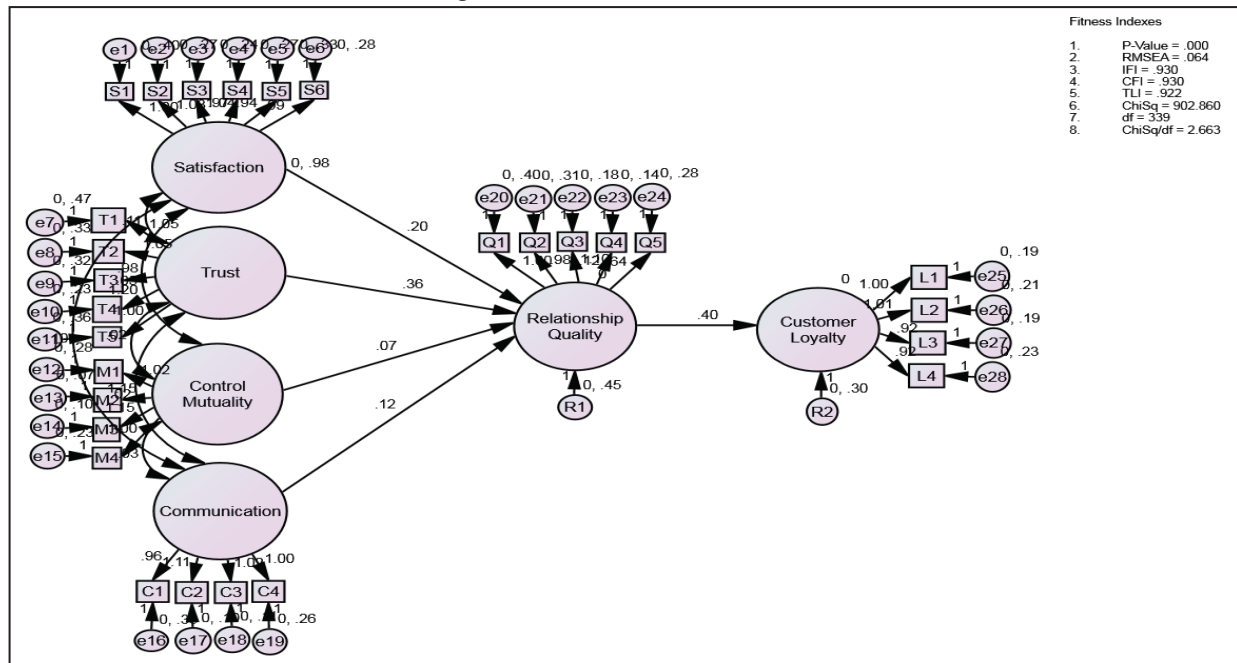


Figure 2. Final Structural Model

The regression weights and probability value which indicates its significance is shown in Table 3. The results concluded that satisfaction had significant positive effect (0.199) on relationship quality and H₁ is accepted. H₂ is accepted and trust has significant effect on relationship quality (0.359). The regression coefficient of the relationship between control mutuality and relationship quality is not significant (0.069). The regression coefficient of the relationship between communication and relationship quality is not significant (0.120). As a result, H₃ and H₄ is rejected. Subsequently, relationship quality had positive effect (0.403) on customer loyalty,

and H₅ is accepted.

Table 3. Regression Weights and the Probability Value which Indicates its Significance

Paths			Estimate	S.E.	C.R.	P	Result
Relationship quality	<--	Satisfaction	.199	.040	5.039	***	Supported
Relationship quality	<--	Trust	.359	.072	4.955	***	Supported
Relationship quality	<--	Control Mutuality	.069	.059	1.175	.240	Rejected
Relationship quality	<--	Communication	.120	.061	1.953	.051	Rejected
Customer Loyalty	<--	Relationship quality	.403	.046	8.684	***	Supported

5. Discussion and Conclusion

The social exchange theory is validated through the positive relationship found between relationship quality and customer loyalty. The result of this research found that satisfaction has significant effect on relationship quality. We can conclude that customers are generally satisfied with their current service providers. However, the satisfaction's correlation coefficient value of 0.199 still considered as weak according to "Guilford Rule of Thumb", with r value of below 0.4 (Guilford, 1956). The study also found that trust had the strongest correlation and positively correlated to relationship quality. The results obtained are consistent with the previous studies conducted by Cerri (2012) and Hunt, Brimble and Freudenberg (2011). The findings revealed that for long-term relationship success, relationship quality should focus on increasing customer satisfaction and trust through improvement of service delivery and introduce innovative new services to the customers.

In the price sensitivity consumer market in Malaysia, frequent reward and promotional offers would increase consumers' consumption level and loyalty. Furthermore, the service providers should be more focused in their segment-level strategies by offering different service packages to customers of different segments and value. Customers clearly prefer quality services with fair prices in the competitive market in order to meet their satisfaction and expectations. Attractive packages with better value-adds, for example, offer a bigger data pool to be shared between the principal and supplementary lines. Competition within the telecommunication service providers would have to evolve into greater product differentiation and novelty from the predominant price engagement currently.

Furthermore, the result of this research shown that control mutuality has no significant effect on relationship quality. Customers perceived the service providers have weak involvement of customers in their decision making for service innovation and promotional activities. The degree of control in the relationship that customers have are limited due to commitment and constraint in service contract imposed by the service providers. According to Grönroos and Voima (2013), companies should plan its resources and processes, as well as the competencies to manage them, toward supporting its customers' everyday processes such that the customers' goals are reached in a value-creating manner.

Communication has no significant effect on relationship quality. Although the number of subscribers is large and it can be quite challenging to maintain frequent contact with the customers. The service providers should improve on the credibility, accuracy, adequacy and completeness of the information, and source for more cost effective means of communication via email, sms, personal contact and social network with the customers. More focused and improved communication with the customers would avoid customers from switching to other competitors, and subsequently affect customer loyalty.

This study is confined to the telecommunication industry in Malaysia and limited to the four dimensions of customer satisfaction, trust, control mutuality and communication as determinants of relationship quality. Future studies should explore on other industries and other dimensions of relationship quality such as commitment, benevolence and conflict handling.

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Human Capital and Economic Growth in Morocco: Evidence from Bayesian Model Averaging

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Abstract

The paper investigates the relationship between human capital and economic growth in Morocco during the period from 1965 to 2015. In order to test this relationship we estimated a growth function using firstly the Johansen multivariate cointegration test and the Granger causality test. Secondly, we used the method of the Bayesian Model Averaging (BMA) that takes into consideration the uncertainty related to the specification of the model studied. In the theoretical literature, the difficulty of measuring human capital is often stressed. In order to overcome this problem, we use four proxies of human capital: first, we employ the average years of schooling. Second, we use the index of the gap in life expectancy between Morocco and developed countries. Third, we integrate the qualitative aspects of education and health by constructing two composite indicators of human capital using Principal Component Analysis (PCA) method.

The main results of regression analysis confirm that in the specification of determinants of GDP per worker the average years of total schooling, the life expectancy index and the indicator of quality of health affect positively and significantly level of GDP per worker. However, in the specification of determinants of the growth of the GDP per worker, we found there is no proxy of human capital that affects significantly the growth of the GDP per worker.

In addition, the results of Granger causality test show that only the indicator of quality of health that cause the GDP per worker. As well, these results show that the average years of total schooling and the indicator of quality of education cause the growth of GDP per worker. We suggest that the Moroccan authorities should make additional efforts to raise the level of quality of human capital especially in the health sector and increase the productivity of both public and private investment.

Keywords: human capital, economic growth, Bayesian Model Averaging (BMA), Principal Component Analysis (PCA)

1. Introduction

The importance of human capital into economic growth goes back to the works of (Smith, 1795) who stated that “training in its all forms improve productivity which contributes to economic expansion”

The debate on this relationship was developed, in the first place, thanks to the works of the designers of the theory of human capital ((Mincer, 1958), (Schultz, 1961), (Becker, 1962) and (Denison, 1962)), which they investigated the impact of human capital through its influence on the workers productivity. After that, the works of theorists of the models of endogenous growth enriched this debate ((Romer, 1986), (Lucas, 1988), (Barro, 1991), (Mankiw et al., 1992)), they integrate the human capital as determinant of economic growth.

The empirical studies related to models of endogenous growth confirm that differences in stock of human capital could explain differences of production growth between countries, see ((Barro, 1991), (Mankiw et al., 1992), (Barro & others, 2003))).

In the empirical studies, we detect three mechanisms by which human capital may influence economic growth:

1. The increase in the stock of human capital by promoting education and health can increase the workers productivity, which in turn increases the productive capacity of the national economy ((Schultz, 1961), (Mincer, 1974), (Mankiw et al., 1992)).

2. The increase in stock of human capital can influence the workers productivity by promoting innovation and using the new technologies ((Nelson & Phelps, 1966), (Romer, 1990), (Aghion & Howitt, 1992), (Benhabib & Spiegel, 1994)).

3. The stock of human capital can be an important determinant for the attraction of foreign direct investment inflows ((Noorbakhsh et al., 2001), (Koukpo, 2005), (Bouoiyour et al., 2009)).

However, with the improvement of data quality and the application of more sophisticated econometric methods, some authors concluded that the effects of the human capital on economic growth are negatives and sometimes not significant ((Islam, 1995), (Caselli et al., 1996), (Dessus, 2000), (Pritchett, 2001)).

Pritchett (2001) provided three interpretations to explain the controversial results on the effects of human capital in economic growth: First, he supposes that the institutional framework does not encourage positive externalities of human capital on economic performance. Second, he believes that the quality of education may be low despite of the increase in the years of education. Finally, he considers that low demand of educated workers could characterize the labor market, which reduces the expected human capital benefits.

In September 2000, as part of 189 countries that signed the United Nations Millennium Declaration, Morocco government has engaged to achieve eight development goals and developed countries are engaged to support poor countries to achieve these objectives. Among the eight objectives four are directly linked to human capital: to ensure primary education for all, to reduce child mortality, to improve maternal health, to defeat HIV/AIDS, malaria and other diseases, and the others objectives contribute to the improvement of human capital: reducing extreme poverty and hunger and promoting gender equality.

In order to achieve these objectives, Morocco has engaged in many reforms in the sectors of education and health. On the one hand, the reforms of the Moroccan educational system started by the adoption in 1999 of the National Charter for Education and training. After that, authorities take on the emergency program for the period from 2009 to 2012 and they launched in 2015 a new strategy of teaching called "vision 2030". On the other hand, authorities in health sector applied the basic medical coverage through the generalization of the medical assistance schema in 2012 and launching health strategy for next four years.

The main objective of this paper is to test first the long-run dynamic relationship between Moroccan economic growth and human capital by using Johansen multivariate cointegration test and the Granger causality test. Secondly, we use the method of (BMA) which takes into account the uncertainty related to the specification of the model studied.

We will organize the paper as the following: we will start by presenting a review of the empirical studies. Then we present the macroeconomic conditions and indicators of in Moroccan human capital after that we present the empirical approach, data sources and variables used. Afterward we discuss the results obtained finally we come up with conclusion.

2. Review of the Empirical Studies

Human capital is at the heart of empirical works that explain the determinants of economic growth. Aghion & Howitt (1998) point out that the authors follow two main approaches to quantify human capital and its impact on economic growth. Some authors consider human capital as flow variable in the process of accumulation is just as physical capital (((Lucas, 1988), (Romer, 1989), (Barro, 1991), (Mankiw et al., 1992))). Other authors consider it a variable stock and when it is high, the country's production processes could benefit from the positive externalities related using innovation and new technologies ((Barro & Lee, 1994), (Benhabib & Spiegel, 1994), (Bloom & Mahal, 1995)).

Recent works has followed three main research directions. In the first direction, authors have enriched the endogenous growth model by introducing in addition to the basic model variables other variables related to health conditions, institutions and free trade policy ((Berthélemy et al., 1997), (Abdouni & Hanchane, 2008), (Mansouri, 2009) and (Bouoiyour et al., 2009)). On the second research direction, some authors have used more sophisticated econometric methods because studies that rely on cross section data has been criticized (GMM panel data, Bayesian approach ...) ((Fall & Thiaw, 2012), (Leon-Gonzalez & Vinayagathan, 2015), (Fetahi-Vehapi et al., 2015) and (Mbulawa, 2015)). The authors of the third research direction have introduced the role of quality education in explaining growth ((Hanushek & Kimko, 2000), (Barro & Lee, 2001), (Altinok & Murseli, 2007), (Hanushek & Woessmann, 2012), (Altinok et al., 2014)).

The existing theoretical literature argues that human capital may interact positively and significantly to economic growth. However, several empirical studies obtained controversial results. Many authors like (Dessus, 2000), (Kruger & Lindahl, 2001), (De la Fuente & Doménech, 2002), (Altinok & Murseli, 2007), (Sunde & Vischer,

2011), (Schoellman, 2011) confirmed that many studies fail to measure the impact of human capital on the economic growth because they use weak proxies of different dimensions of human capital.

In the other hand, two categories of empirical studies characterized the Moroccan context: studies based on time series data and the studies based on the panel data as part of the countries of the region of MENA or countries of South Mediterranean.

Bouayad (1994) to investigate the relationship between the growth rate of GDP and social expenditures related to the education and health sectors using the tests of causality and cointegration. He shows that GDP reacted positively to changes in social spending for a period from 1950 to 1985.

Bouoiyour (2000) in a study that takes into account the data covering the period from 1958 to 1994 and approximating human capital by the rate of primary and secondary schooling, has concluded that there is bidirectional causality between education and growth in the short term but not confirmed in the long term.

Besides, Bouoiyour & Bennaghmouch (2002) in a study that considers the period from 1975 to 1995 and measuring human capital by the years of education at primary, secondary and higher level. They conclude the presence of a significant positive effect of education on economic growth. But, this effect reduces when the level of education increases.

Ibourk & Amaghouss (2013) in a study that covers the period from 1975 to 2010 and takes into account data from 15 countries in the MENA region fragmented into two categories: countries with high-income level and countries with an average income level estimated a growth function. They approximate human capital through several proxies including the literacy rate, primary, secondary and higher school enrollment, the average years of school at primary education and secondary, the number of students per teacher and life expectancy. They show that the impact of education on growth is positive but it depends on the level of group of countries studied income.

In addition, Sbaouelgi (2015) in a comparative analysis of three different countries including Morocco, Tunisia and Korea, she investigates the relationship between human capital and economic growth approximating human capital through three proxies: expenditure per student as a percentage of GDP per capita, the number of graduates in science and engineering and the gross rate of higher education enrollment. In addition, she applied the causality tests and co-integration between these indicators and economic growth. She concluded the absence of a long-term relationship for the cases of Tunisia and Morocco. Nevertheless, the case of South Korea is characterized by a long-term relationship, which justifies the development gap between these countries.

In sum, despite the variety of measures used to approximate the human capital in the Moroccan context, realized empirical work offers an assessment concluding that there is positive impact of human capital on economic growth.

3. Macroeconomic Conditions and Indicators of Human Capital in Morocco

Since independence, Morocco has implemented several social and economic policies to ensure the integration of the Moroccan economy in the way of development. We distinguish three periods of reforms: the period between 1965 and 1983, authorities made strong intervention in the economy to restructure the industrial sector and substitute products importation by local production. During the period between 1985 and 1999, the Moroccan economy has seen the introduction of the structural adjustment plan under the advices of international financial institutions, which made significant impact concerning the increase of the rate of growth, the control of inflation and the improving of trade terms. However, the expected results are insufficient in particular with respect to the reduction of poverty and inequality.

The period between 2000 and 2015 was marked by social and economic reforms focused on several levers: Improving working conditions with the new labor code established in 2003. Modernization of industrial, agricultural fabric and promotion of exportations because authorities implemented emergence plan in 2005 and applied the green plan since 2007. Improving well-being and social stability with the measures of the National Human Development Initiative¹ (NHDI) in 2005. Introduction of program of Assistance medical Obligatory (AMO) in (2005) and generalization of medical assistance scheme since 2011.

Besides, despite the vulnerability of agricultural production to climatic conditions ((Mansouri, 2009)). The Moroccan economy has grown steadily in the past two decades with an average growth rate, which reached 4.65% in the period 1996-2005 and 4,38% in the period 2006-2015. The inflation rate is at an average rate of 1.6 during

¹NHDI, which mean by French INDH: "Initiative National de Développement Humain".

the period between 2006 and 2015. The investments rate increased from 29, 4 % to 34, 2 also the rate of unemployment decreased from 12% to 9, 8% during the same period. Many economists agree that these performances are due to the emergence of new motor trades of growth including automotive, electrical and electronic, aeronautics industries and offshoring.

However, the Moroccan economy faces four constraints: first, the total external debt to GDP is high; it has decrease less from 41.82 to 32.98 on average during the last 10 years. Secondly, the trade deficit continued to extend going from -3.66% of GDP on average for 1996-2005 to -11, 34% of GDP on average for the period 2006-2015. Thirdly, despite increase of investment rate, this capital has less productivity and it is concentrated in just two sector industry and building sectors. In the end, Morocco suffers from a problem of unemployment, which is high.

As to conditions of human capital indicators, the proportion of the illiterate population in the population aged more than 15 years has decreased significantly. However, Morocco is characterized by the highest rate in the region of MENA with a percentage of 42.1% in 2015.

By examining the database of (Barro & Lee, 2016) from 1965 to 2015, we identify that the evolution of the average years of schooling in Morocco is characterized by a steady growth. It varied from 0.28 in 1965 to 3.41 in 2015 at the level of primary education, from 0.19 to 1.6 at the secondary education and 0.01 to 0, 37 at the level of higher education.

Also, the resources that have been allocated to the sector of education which were 4.51 percent of GDP during the period 1986-1990 they rose to 6.72 during the period 2011-2015; this increase is faster at the heading of personnel and material expenses.

Despite the progress made over the past two decades, the public offering of education in Morocco has many problems: first, the rate of alphabetization is the highest in the North Africa region with a percentage of 42, 1%. Second, according to (UNESCO, 2016), the rate of drop out and repetition rate in primary and secondary education is very high. Third, according to results of Mathematics and Science related to achievement tests the quality of education is very low comparing to other countries in MENA region.

In the health sector, comparing Morocco to Tunisia, Algeria, Jordan and Egypt in terms of indicators related to expenditure on health per capita and the infant mortality rate per 1 000 live births, we realize that Morocco needs much efforts to invest in this respect.

Moreover, according to (BAD, 2013), only 50% of Moroccans have the basic medical coverage. Besides, in the report of (CESE, 2013)² showed that the share of health expenditures directly supported by Moroccan households is 53.6%, which mean that an average amount of 802 dirham per capita annually. This amount does not include additional fees related to transportation and accommodation. Furthermore, the rate of infant mortality remains high, particularly in rural areas, (Rural 35.3 and Urban 25.3 per thousand born) and the maternal mortality rate in rural areas is two times higher than urban areas. This calls into question the quality of care offered by this sector.

By and large, we can conclude that despite the progress made over the past two decades, the public offering of health and education doesn't respond to the huge needs of people therefore, the stakeholders are called invest more so as to live up to citizens' expectations.

4. The Empirical Approach

To investigate the relationship between human capital and economic growth in Morocco we estimated a growth function relying in (Mankiw et al., 1992) specification. We propose to extend this equation in two steps: first, we take into account the effects of the health dimension, based on the works of (Knowles & Owen, 1995) and (Ram, 2007). Secondly, we take into account the effects of the qualitative dimension of human capital, based on the work of (Boccanfuso et al., 2009).

To measure impact of human capital in the economic growth, we propose to use the method of the Bayesian Model Averaging, which takes into account the uncertainty related to the specification of the model studied.

4.1 Specification of the Empirical Model

Mankiw et al. (1992) propose the Cobb Douglas production function developed by human capital following the form:

²Consul Economic, Social and Environment, which means by French CESE: "Conseil économique, social et environnemental (CESE)".

$$Y_t = K_t^\alpha H_t^\beta (A_t L_t)^{1-\alpha-\beta} \tag{1}$$

Where Y_t is gross domestic product at time t , α and β denotes the elasticity of production in relation to changes in the physical capital stock K_t and the stock of human capital H_t , A_t represents technological progress and L_t denotes the quantity of labor, considering :

$$y_t = \frac{Y_t}{A_t L_t} ; k_t = \frac{K_t}{A_t L_t} \text{ And } h_t = \frac{H_t}{A_t L_t}$$

We write the previous equation as follows:

$$y_t = k_t^\alpha h_t^\beta \tag{2}$$

With y_t corresponds to the quantity of output per effective unit of labor at period t . As in the Solow model, Mankiw et al. (1992) suppose that L_t and A_t progress to an exogenous growth rate n and g and the dynamics of factor accumulation are determined by:

$$\begin{cases} \dot{k}_t = s_k y_t - (n + g + \delta) k_t \\ \dot{h}_t = s_h y_t - (n + g + \delta) h_t \end{cases} \tag{3}$$

k_t is the rate of the physical capital stock growth while s_k is the share of income invested in physical capital, h_t is the rate of human capital stock growth whereas s_h is the share invested in human capital, n is the rate of the active population growth, which g is the rate of technological progress growth and δ is the rate of human capital depreciation identical to that of physical capital.

Considering that yields of production factors are decreasing ($\alpha + \beta < 1$), the level of human capital and physical capital in the steady state is:

$$\begin{cases} k^* = \left(\frac{s_k^{1-\beta} s_h^\beta}{n+g+\delta} \right)^{\frac{1}{1-\alpha-\beta}} \\ h^* = \left(\frac{s_k^{1-\alpha} s_h^\alpha}{n+g+\delta} \right)^{\frac{1}{1-\alpha-\beta}} \end{cases} \tag{4}$$

We substitute these two values into the production function and we introduce this latter to logarithm. Then, we obtain the following specification:

$$\ln \frac{Y_t}{L_t} = \ln A_0 + gt - \frac{\alpha+\beta}{1-\alpha-\beta} \ln(n + g + \delta) + \frac{\alpha}{1-\alpha-\beta} \ln(s_k) + \frac{\beta}{1-\alpha-\beta} \ln(s_h) \tag{5}$$

Mankiw et al. (1992) state that if we suppose that ($\alpha + \beta = 1$) the equation mentioned above is transformed to an endogenous growth function.

The rate of convergence towards the level of income per capita of steady equilibrium is given by:

$$\frac{d \ln(y_t)}{dt} = \frac{\dot{y}}{y} = \lambda [\ln(\hat{y}^*) - \ln(y_t)]$$

With

$$\lambda = (n + g + \delta)(1 - \alpha - \beta),$$

This implies that:

$$\ln(y_t) = (1 - e^{-\lambda t}) \ln(y^*) + e^{-\lambda t} \ln(y_0)$$

Consider subtracting $\ln(y_0)$ from each member of the above equation we find:

$$\ln(y_t) - \ln(y_0) = (1 - e^{-\lambda t}) \ln(y^*) - (1 - e^{-\lambda t}) \ln(y_0)$$

By substituting^{*}, we deduce:

$$\ln(y_t) - \ln(y_0) = -(1 - e^{-\lambda t})\ln(y_0) - (1 - e^{-\lambda t})\frac{\alpha + \beta}{1 - \alpha - \beta} \ln(n + g + \delta) + (1 - e^{-\lambda t})\frac{\alpha}{1 - \alpha - \beta} \ln(s_k) + (1 - e^{-\lambda t})\frac{\beta}{1 - \alpha - \beta} \ln(s_h) \quad (6)$$

By considering that:

$$\alpha_1 = -(1 - e^{-\lambda t}), \alpha_2 = -(1 - e^{-\lambda t})\frac{\alpha + \beta}{1 - \alpha - \beta}, \alpha_3 = (1 - e^{-\lambda t})\frac{\alpha}{1 - \alpha - \beta} \text{ and } \alpha_4 = (1 - e^{-\lambda t})\frac{\beta}{1 - \alpha - \beta}$$

The following test specification is obtained:

$$\ln(y_t) - \ln(y_0) = \alpha_0 + \alpha_1(y_0) + \alpha_2 \ln(n + g + \delta) + \alpha_3 \ln(s_k) + \alpha_4 \ln(s_h) + \varepsilon_t \quad (7)$$

This specification only takes into account the determinants of economic growth within the steady state. We tried to extend this specification by considering, first, the nature of the time-series data and in addition to the basic model variables we take other variables which may influence the Moroccan aggregate production relying on the empirical studies conducted by (Barro & others, 2003), (Bassanini & Scarpetta, 2002), (Boccanfuso et al., 2009), (Khan, 2015).

In fact, in order to test the relationship between human capital and economic growth of Morocco we use the two specifications as follows:

$$\ln(y_t) = \alpha_0 + \alpha_1 \ln(y_{t-5}) + \alpha_2 \ln(n + g + \delta) + \alpha_3 \ln(s_k) + \alpha_4 \ln(s_h) + \alpha_5 \ln(\text{Open}) + \alpha_6 \ln(\text{R_agr}) + \alpha_7 \ln(\text{Inf}) + \varepsilon_t \quad (8)$$

$$\ln(y_t) - \ln(y_{t-1}) = \alpha_0 + \alpha_1 \Delta \ln(y_{t-5}) + \alpha_2 \Delta \ln(n + g + \delta) + \alpha_3 \Delta \ln(s_k) + \alpha_4 \Delta \ln(s_h) + \alpha_5 \Delta \ln(\text{Open}) + \alpha_6 \Delta \ln(\text{R_agr}) + \alpha_7 \Delta \ln(\text{Inf}) + \varepsilon_t \quad (9)$$

Where y_t refers to the Gross Domestic Product by worker, y_{t-5} represents the Gross Domestic Product by worker in date $t - 5$, n_t is the growth rate of the active population, g means the growth rate of technological progress and δ is the depreciation rate of human capital, s_k represents the stock of physical capital, s_h refers to the stock of human capital, $OPEN$ is the trade openness index, R_agr is the agriculture production index, Inf is the price increases index and ε_t is the error term.

4.2 Bayesian Model Averaging Method

The empirical studies that examine determinants of economic growth suggest many potential explanatory variables, for example, (Durlauf et al., 2005) distinguish 43 models and 145 variables that determine economic growth. This context related to the lack of consensual theory that guides the choice of determinants of economic growth raise uncertainty about the true set of explanatory variables to use in model studied.

The BMA method overcome this problem in terms of uncertainty about the true set of explanatory variables by joining prior probabilities to alternative sets of explanatory variables and then update these probabilities using data collected. (Ciccone & Jarocinski, 2008).

Like (Zeugner, 2011), if we suggest this equation of determinants of economic growth:

$$y = \alpha_\gamma + X_\gamma \beta_\gamma + \varepsilon \\ \varepsilon \rightarrow N(0, \sigma^2.I)$$

Where y referring to the dependent variable β_γ is the vector of coefficients of explanatory variables X_γ and ε is the error term with variance σ^2 .

If $\{X\}$ has K potentials variables that means there are 2^K potentials models. These models are depended to β_γ where $M_\gamma : \gamma = 1, 2, \dots, 2^K$.

as well, "the Bayesian approaches use Bayes theorem to convert the density of the data conditional on the model

³The introduction of parameter Gross Domestic Product by worker in date $t - 5$ in specification is debatable. Some authors made estimations without introducing this variable. (Boccanfuso et al., 2009), (Ibourk & Amaghous, 2013), (Khan, 2015),...). However, many authors introduced in their estimations (Mankiw et al., 1992), (Islam, 1995), (Berthélemy et al., 1997), (Ram, 2007)...). Following the previous authors, we decided to use this parameter in our estimation. In addition, we suppose that it reflect beginning of the government mandate in Morocco.

(the marginal likelihood) into a posterior probability of the model conditional on the observed data” (Ciccone & Jarocinski, 2008) as follows:

$$\rho(M_\gamma/y, X) = \frac{\rho(y/M_\gamma, X)\rho(M_\gamma)}{\rho(y/X)} = \frac{\rho(y/M_\gamma, X)\rho(M_\gamma)}{\sum_{\gamma=1}^{2^k} \rho(y/M_\gamma, X)\rho(M_\gamma)}$$

Where $\rho(M_\gamma/y, X)$ refers to posterior model probability which is proportional to marginal likelihood of the model $\rho(y/M_\gamma, X)$ and a prior model probability $\rho(M_\gamma)$, $\rho(y/X)$ correspond to the integrated likelihood which is steady over all models. (Zeugner, 2011)

Knowing that $\int \rho(M_\gamma/y, X)dM_\gamma = 1$, we get the function marginal likelihood of models:

$$\rho(y/X) = \int \rho(y/X, X)\rho(M_\gamma/X)dM_\gamma$$

Therefore, the model weighted posterior distribution of the coefficients of explanatory variable is as follows:

$$\rho(\theta/y, X) = \sum_{\gamma=1}^{2^k} \rho(\theta/M_\gamma, y, X)\rho(y/M_\gamma, X)$$

For our model the formula is:

$$\rho(\beta_\gamma \neq 0/y, X) = \sum_{\beta_\gamma} \rho(M_\gamma/y, X)$$

This posterior probability measure the intensity of relation between the dependent variable and explanatory variables. However, in order to determine the posterior distribution of model coefficients we need to specify the prior on model parameters, which refer to weight of potential explanatory variable.

In order to determine the posterior distribution of model, we suppose like (Fernandez et al., 2001) and (Bodman et al., 2009)), the equal prior probabilities for all models or « unit information prior ».

Most authors used a common prior g specified by (Zellner, 1986) where:

$$\beta_\gamma/g \sim N(0, \sigma^2 \left(\frac{1}{g} X_\gamma' X_\gamma\right)^{-1})$$

4.3 The Unit Root Testing

The unit root testing allows both to detect the existence of trend and to determine the order of integration of series studied. These tests are important since they preclude the risk of spurious regression.

The literature review distinguishes several tests; the most widely used tests are the Dickey-Fuller augmented (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS). We use the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to detect the presence of unit roots.

The tests of ADF establish the alternative hypothesis $|\phi_1| < 1$, which ascertain the estimation by the Method of Ordinary Least Square of the three equations:

$$\Delta x_t = \rho x_{t-1} - \sum_{j=2}^{\rho} \phi_j \Delta x_{t-j+1} + \varepsilon_t$$

$$\Delta x_t = \rho x_{t-1} - \sum_{j=2}^{\rho} \phi_j \Delta x_{t-j+1} + c + \varepsilon_t$$

$$\Delta x_t = \rho x_{t-1} - \sum_{j=2}^{\rho} \phi_j \Delta x_{t-j+1} + c + b_t + \varepsilon_t$$

The estimation of the standard deviation coefficients of the models by the OLS provides t_{ϕ_1} , which is analogous to the student statistic (coefficient on standard deviation) if $t_{\phi_1} \geq t_{tabulated}$, then we accept the hypothesis H_0 ;

which implies the variable has unit root, so the process is not stationary. Besides, Phillips & Perron unit root tests conducted from a regression similar to that of the Dickey and Fuller test. (Bourbonnais, 2005)

4.4 Tests of Cointegration

The theory of cointegration was initiated by (Granger, 1981), then later developed and popularized by (Engle & Granger, 1987), (Johansen, 1988). The two-step (Engle & Granger, 1987; Barro & Lee, 2016) test only allows the identification of the number of cointegration relationships in the case of two variables. Johansen & Juselius (1990) modified this test to study multiple variables.

They proposed two tests: the maximum eigenvalue test and the trace test.

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^N \ln(1 - \hat{\lambda}_i)$$

$$\lambda_{trace}(r, r+1) = -T \ln(1 - \hat{\lambda}_r)$$

Where r is the number of cointegration vectors under the null hypothesis and $\hat{\lambda}_i$ is the estimated value of the i th eigenvalue of the matrix. In the statistic λ_{trace} we suppose the null hypothesis where the number of cointegration vectors is less than or equal to r against the alternative hypothesis in which the number is greater than r (for the test of the maximum eigenvalue, $H_0: R = r$ against $H_1: R = r + 1$) (Vangu & Boboy, 2013).

4.5 Test of Causality

The causality, in the sense of Granger (1969) between X_t and Y_t means that the prediction of Y_t based on both the perception of the joint past of X_t and Y_t is better than the prediction based only on the past knowledge of Y_t .

The Granger causality test for the case of the two variables Y_t and X_t implies the estimation of the following autoregressive vector model (VAR):

$$Y_t = \alpha_1 + \sum \beta_i X_{t-1} + \sum \gamma_j Y_{t-j} + \varepsilon_{1t} \text{ and } X_t = \alpha_2 + \sum \theta_i X_{t-1} + \sum \delta_j Y_{t-j} + \varepsilon_{2t}$$

The test can lead to three results: bidirectional causality, unidirectional causality or no variable (X or Y) causes the other.

5. Data, Empirical Results and Interpretations

5.1 Presentation of Data and Variables Selections

In the context of the above empirical studies, the GDP per worker in constant 2005 US\$ is used as dependent variable. We have measured human capital by four proxies, of which two are quantitative and two qualitative, firstly the average years of schooling at the level of primary, secondary and higher education calculated by the methodology of the permanent inventory developed by (Nehru et al., 1995).

Secondly, the index of Morocco's life expectancy gap compared to developed countries, as measured by (Knowles & Owen, 1995). We integrate the qualitative aspects of education and health by constructing two composite indicators of human capital using method of Principal Component Analysis (PCA). The choice of the methodology of Nehru et al., 1995 was because it takes into accounts the effects of repeating and dropping out of school.

The authors presume that children enter in school at the age of 6, then, they get into the labor market at the age of 15 and leave it at the age of 64, also in Moroccan primary education there is six grades g . Therefore, the equation for primary level is writing as follows:

$$S_{PA} = \sum_{T-58}^{T-9} \sum_{g=1}^6 E_{g,T-g-1}^*$$

Where:

$$E_{gt}^* = E_{gt} (1 - r_{gt} - d_{gt})$$

E_{gt} is the gross enrollment level of education adjusted by repetition rates (r_{gt}) and drop-out rate (d_{gt}). The same approach is used to calculate secondary and tertiary education.

To measure the health dimension, Authors used several indicators: Food intake, life expectancy, infant mortality rate and public health expenditure. Nevertheless, in most empirical studies, life expectancy is used as a health proxy, see ((Nadiri, 1972), (Hicks, 1980), (Anand & Ravallion, 1993), (Knowles & Owen, 1995), (Bloom et al., 2004)).

We suggest approximating the health dimension by the following index:

$$\text{Health case indicator} = - \ln(80 - \text{lifeExp}_t)$$

This indicator takes into account the "shortfall" in terms of years of life to reach the level of the most developed countries that corresponds to 80 years.

Finally, to capture the qualitative aspects of human capital, we have extended the methodology developed by (Boccanfuso et al., 2009) who used the techniques of multivariate analysis to construct synthetic indicators of the quality of the education system⁴.

According to Berthélemy et al. (1997) and Abdouni & Hanchane (2008), the effects of human capital in economic growth depend to the public policy of country particularly the policy of openness and economic stability. We consider a composite index of openness policy⁵ and we use cereal yield (kg per hectare) and the rate of inflation as proxies of economic stability in Morocco⁶.

5.2 Results of Unit Root Tests and Johansen Co-integration Test

As can be seen from the Table 1, the results of unit root tests leads to the conclusion that only the variables Δ IGDP, $\text{Lin}v\text{GDP}$, $\text{L}(n+g+\$)$, $\text{LGDP}(t-5)$, lmyscho , Llifeexpind , inf et Lr-agricul are stationary and that the variables eduqualind , healqualind and openness are non-stationary in level but stationary in first difference.

The results show the possibility of a cointegration relationship between the variables: the growth rate of GDP per worker, the rate of investment, the growth of active population, the GDP in date($t - 5$), the average years of education of the labor force, life expectancy, the indicator of agriculture and the rate of inflation.

Before starting the cointegration test, we determine the number of delays of our VAR model based on the information criteria of (Akaike, 1974), (Schwarz & others, 1978) and (Hannan & Quinn, 1979). As result, we identify one number of retard in the first specification and Zero retard in the second specification. (See Table 2 and Table 3)

As in the Table 4, the results show that there are four linear co-integration relationships in the (Mankiw et al., 1992) specification, which shows the existence of a long-run relationship between GDP per worker and human capital approximated by the average years of study. However, we found that there is no linear co-integration relationship when we integrate the health dimension, ((Ram, 2007) specification) and the results show three linear co-integration relationships when we has introduced the qualitative dimension of human capital resulting from (PCA), ((Boccanfuso et al., 2009) specification).

As in the Table 5, the results show that there are more than five linear co-integration relationships, which shows the existence of a long-run relationship between the growth of the GDP per worker and human capital.

⁴Boccanfuso et al., (2009) consider only the qualitative aspects of education; we propose to introduce the qualitative aspects of health. We take into account the following variables: life expectancy, birth rate, gross (per 1,000 persons), infant mortality rate (per 1,000 live births), maternal mortality rate (per 1,000 live births), the number of physicians per capita, total health expenditure (% of GDP) and student-teacher ratio in primary, secondary and tertiary education.

⁵The composite index of openness results in applying PCA to these variables: Exports and imports of goods and services, personal remittances received, international tourism receipts, total foreign direct investment (FDI) inflows, net official development assistance received, investment in telecoms with private participation and external debt. All these variables reported as percentage of GDP and we added insurance and financial services as a percentage of commercial service exports.

⁶The choice of cereal yield (kg per hectare) as indicator of economic stability due to vulnerability of agricultural production to climatic conditions (Mansouri, 2009).

Table 1. Results of Augmented Dickey Fuller (ADF) and Phillips and Perron tests for unit root

Variables	Augmented Dickey Fuller (ADF) test						Phillips and Perron test					
	Test without both constant and trend		Test with constant		Test with both constant and trend		Test without both constant and trend		Test with constant		Test with both constant and trend	
	T-stat	Pval	T-stat	Pval	T-stat	Pval	T-stat	Pval	T-stat	P val	T-stat	P val
Δ IGDP	- 7.53	0.00	- 10	0.00	- 9.92	0.00	- 7.53	0.00	- 10	0.00	- 9.92	0.00
LinvGDP	- 1.89	0.06	-	0.00	- 7.82	0.00	- 1.89	0.06	-	0.00	- 7.82	0.00
L (n+g+ ξ)	- 0.26	0.78	-	0.01	- 4.07	0.01	- 0.26	0.78	-	0.01	- 4.07	0.01
LGDP (t-5)	3.35	0.01	-	0.59	- 3.23	0.08	3.35	0.01	-	0.59	- 3.23	0.08
Lmyscho	- 2.36	0.02	-	0.01	- 4.4	0.01	- 2.36	0.02	-	0.01	- 4.4	0.01
Llifeexpind	- 11.98	0.00	5.66	1.00	- 2.11	0.54	- 11.98	0.00	5.66	1.00	- 2.11	0.54
eduqualind	- 0.79	0.43	-	0.83	- 3.5	0.04	- 0.79	0.00	-	0.83	- 3.5	0.04
Δ eduqualind	- 6.64	0.00	- 6.8	0.00	- 6.74	0.00	- 6.63	0.72	- 6.8	0.00	- 6.73	0.00
healqualind	- 1.17	0.25	-	0.69	- 2.67	0.25	- 1.17	0.25	-	0.69	- 2.67	0.25
Δ healqualind	- 9.00	0.00	-	0.00	- 9.5	0.00	- 9.00	0.00	-	0.00	- 9.5	0.00
openness	- 1.77	0.08	-	0.41	- 2.43	0.36	- 1.77	0.08	-	0.41	- 2.43	0.36
Δ openness	- 8.53	0.00	- 8.5	0.00	- 8.45	0.00	- 8.53	0.00	- 8.5	0.00	- 8.45	0.00
Inf	- 2.02	0.05	-	0.04	- 3.46	0.04	- 2.02	0.05	-	0.04	- 3.46	0.04
Lr-agricul	- 0.17	0.87	-	0.08	- 7.77	0.00	- 0.17	0.87	-	0.08	- 7.77	0.00

Table 2. VAR lag order selection criteria (Dependent variable LGDP)

Specifications	(Mankiw et al., 1992)			(Ram, 2007)			(Boccanfuso et al., 2009)		
	AIC	HQIC	SBIC	AIC	HQIC	SBIC	AIC	HQIC	SBIC
Number de retard 0	-4.95	-4.84	-4.67	-5.40	-5.29	-5.11	-4.43	-4.31*	-4.11*
1	-6.31	-6.19	-5.98*	-6.31	-5.99	-5.99*	-6.27	-6.13	-5.91
2	-6.29	-6.15	-5.92	-6.28	-5.91	-5.92	-6.31	-6.17	-5.83
3	-6.26	-6.11	-5.86	-6.26	-5.86	-5.86	-6.27	-6.11	-5.78

Table 3. VAR lag order selection criteria (Dependent variable DIGDP)

Specifications	(Mankiw et al., 1992)			(Ram, 2007)			(Boccanfuso et al., 2009)		
	AIC	HQIC	SBIC	AIC	HQIC	SBIC	AIC	HQIC	SBIC
Number de retard 0	-5.17*	-5.07*	-4.89*	-5.17	-5.07*	-4.89*	-5.22	-5.10*	-4.90*
1	-5.14	-5.03	-4.82	-5.15	-5.03	-4.83	-5.21	-5.08	-4.85
2	-5.10	-4.97	-4.74	-5.10	-4.97	-4.74	-5.17	-5.02	-4.77
3	-5.09	-4.96	-4.71	-5.10	-4.96	-4.71	-5.10	-5.02	-4.74

Table 4. Results of Unrestricted co-integration rank test: (Dependent variable LGDP)

H_0	Specifications H_1	(Mankiw et al., 1992)		(Ram, 2007)		(Boccanfuso et al., 2009)	
		Rank test	5% crit. val.	Rank test	5% crit. val.	Rank test	5% crit. val.
$r = 0$	$r \geq 1$	446.15	156.00	359.76	124.24	465.21	156.00
$r \leq 1$	$r \geq 2$	303.35	124.24	221.67	94.15	323.36	124.24
$r \leq 2$	$r \geq 3$	210.36	94.15	142.45	68.52	239.55	94.15
$r \leq 3$	$r \geq 4$	151.06	68.15	90.10	47.21	172.21	68.15
$r \leq 4$	$r \geq 5$	100.45	47.21	43.60	29.68	117.59	47.21
$r \leq 5$	$r \geq 6$	55.41	29.68	11.01*	15.41	68.74	29.68
$r \leq 6$	$r \geq 7$	18.69	15.41	4.04	3.76	34.01	15.41
$r \leq 7$	$r \geq 8$	1.44*	3.76			1.94*	3.76

Table 5. Results of Unrestricted co-integration rank test: (Dependent variable DIGDP)

H_0	Specifications H_1	(Mankiw et al., 1992)		(Ram, 2007)		(Boccanfuso et al., 2009)	
		Rank test	5% crit. val.	Rank test	5% crit. val.	Rank test	5% crit. val.
$r = 0$	$r \geq 1$	323.65	156.00	353.97	156.00	260.80	192.89
$r \leq 1$	$r \geq 2$	208.13	124.24	239.69	124.24	191.36	156.00
$r \leq 2$	$r \geq 3$	136.20	94.15	173.11	94.15	127.77	124.24
$r \leq 3$	$r \geq 4$	88.15	68.52	116.54	68.52	77.47*	94.15
$r \leq 4$	$r \geq 5$	4 5.20*	47.21	76.32	47.21	49.76	68.52
$r \leq 5$	$r \geq 6$	21.51	29.68	47.15	29.68	30.27	47.21
$r \leq 6$	$r \geq 7$	7.54	15.41	20.64	15.41	16.61	29.68
$r \leq 7$	$r \geq 8$	2.15	3.76	5.87	3.76	0.34	15.41

5.3 Regression Analysis

As seen in Table 6, we investigate the determinants of LGDP. If we refer to the criteria of (Raftery, 1995) which suggests that the posterior probabilities should be higher than 0.5. We distinguish five variables that affect significantly GDP per worker where three are proxies of human capital: The average years of total schooling that affects positively and significantly GDP per worker with the probability of 0.9976. Also, these results show that the life expectancy index affects positively and significantly GDP per worker with the probability of 0.6312 and the quality index of health resulting from the PCA method affects positively and significantly the growth of GDP per worker with the probability of 0.8496. However, the quality index of education resulting from the PCA method affects negatively and not significantly GDP per worker.

These results confirm that the economic growth is affected by degree of growth of human capital measured by growth of average years of total schooling and health indicator used.

These results could be explained in two ways: either the Moroccan economy is characterized by the low level of quality of education, as shown by (Pritchett, 2001) or the stock of human capital is allocated in low productivity sectors (Murphy et al., 1991).

In addition, we found that the indicator of openness resulting from the PCA method and the agricultural production index has positive and significant impact on GDP per worker respectively with the probability of 0.8338 and 0.9864.

These results could be explained by the fact that the policy of openness made by Morocco promoted the economic growth by insuring transfer of qualifications and new technologies. However, the Moroccan authorities need to make additional efforts to obtain much opportunities related to this policy. In addition, the agricultural production index affects positively and significantly the GDP per worker that confirms the dependence of Moroccan economic growth on agricultural production: The agriculture sector contributes to more than 14% of GDP and creates employment of more than 75% of population in rural areas.

As seen in Table 7, we investigate the determinants of the growth of GDP per worker, we found that only the growth of physical capital and growth of active that affects significantly the growth of GDP per worker. As for the four proxies of human capital, they affect positively but not significantly the economic growth of Morocco.

As in the Table 8 and the Table 9, the results of Granger causality test show first that only the indicator of quality of health that cause the GDP per worker. Secondly, these results show that the average years of total schooling and the indicator of quality of education cause the growth of GDP per worker and the growth of GDP cause the growth of the quality index of health.

Table 6. Results of Bayesian Model Averaging method data from 1965 to 2015: (Dependent variable LGDP)

Independent variable		Bayesian regression results				
Description	Name	Posterior Inclusion Probability	Posterior Mean	Conditional Posterior Standard Deviation	Sign Probability	
Human capital	Average years of schooling	lmyscho	0.9976	0.8607	0.1666	1.0000
	life expectancy index	Llifeexpind	0.6312	0.2183	0.2042	1.0000
	Quality index of education	eduqualind	0.2664	-0.0331	0.0687	0.0000
	Quality index of health	healqualind	0.8496	0.2506	0.1448	0.9999
	Physical capital	LinvGDP	0.1057	-0.0015	0.0102	0.0448
	Growth of active population	L(n+g+ δ)	0.1359	-0.0035	0.0154	0.0978
	Convergence affect	LGDP(t-5)	0.1232	0.0086	0.0301	0.1843
	Index of openness policy	openness	0.8338	0.0957	0.0583	1.0000
	Inflation	Inf	0.1279	-0.0022	0.0002	0.2121
	agricultural production index	Lr-agricul	0.9864	0.0962	0.0282	1.0000
Observations	51					
Number of potential variables	1024					
The mean of variables to include	5.0578	(addition of Posterior Inclusion Probability)				

Table 7. Results of Bayesian Model Averaging method data from 1965 to 2015: (Dependent variable DIGDP)

Independent variables		Bayesian Regression Results				
Description	Name	Posterior Inclusion Probability	Posterior Mean	Conditional Posterior Standard Deviation	Sign Probability"	
Humain capital	The growth of the average years of schooling	Dlmyscho	0.3681	0.0866	0.1369	1.0000
	life expectancy index	Dllifeexpind	0.0933	-0.0001	0.0414	0.4345
	Quality index of education	Deduqualind	0.2548	-0.0495	0.1057	0.0000
	Quality index of health	Dhealqualind	0.1448	-0.0184	0.0693	1.0000
	Physical capital	DlinvGDP	0.8413	0.3185	0.1847	1.0000
	Growth of active population	DI(n+g+ δ)	0.5461	-0.1617	0.1780	0.0000
	Convergence affect	DIGDP(t-5)	0.09537	0.0021	0.0421	0.6842
	Index of openness policy	Dopenness	0.1815	0.0292	0.0833	1.0000
	Inflation	Dinf	0.1028	0.0062	0.0458	1.0000
	agricultural production index	Dlr-agricul	0.1004	0.0051	0.0461	0.8557
Observations	51					
Number of potential variables	1024					
The mean of variables to include	2.7288	(addition of Posterior Inclusion Probability)				

Table 8. Results of Granger causality test (Dependent variable LGDP)

Indicators of human capital	the average years of total schooling		the index of the gap of life expectancy		the quality index of education		the quality index of health	
	F-test	Prob	F-test	Prob	F-test	Prob	F-test	Prob
Null hypothesis								
Human capital does not cause LGDP.	1.07	0.43	1.56	0.21	0.63	0.43	4.12	0.04
LGDP does not cause Human capital.	0.04	0.95	0.56	0.45	1.17	0.28	19.01	0.00

Table 6. Results of Granger causality test (Dependent variable DIGDP)

Indicators of human capital	the average years of total schooling		the index of the gap in life expectancy		the quality index of education		the quality index of health	
	F-test	Prob	F-test	Prob	F-test	Prob	F-test	Prob
Null hypothesis								
Human capital does not cause DIGDP.	11.15	0.001	1.55	0.69	6.23	0.01	1.59	0.21
DIGDP does not cause Human capital.	0.73	0.79	0.16	0.69	0.24	0.62	6.1	0.08

6. Conclusion

Human capital is at the heart of empirical works that explain the determinants of economic growth. Although, many authors argue that human capital may affect positively and significantly the economic growth several empirical studies obtained controversial results.

This paper investigates the relationship between human capital and economic growth in Morocco during the period from 1965 to 2015. In order to test this relationship, we firstly use the Johansen multivariate cointegration test and the Granger causality test. Secondly, we use the method of the Bayesian Model Averaging which takes into consideration the uncertainty related to the specification of the model studied. In order to measure human capital, we have used four proxies of human capital: first, the average years of total schooling, second the index of the gap in life expectancy between Morocco and developed countries and third we integrate the qualitative aspects of education and health by constructing two composite indicator of human capital using method of Principal Component Analysis (PCA).

The main results confirm that in the specification of determinants of GDP per worker the average years of total schooling, the life expectancy index and the indicator of quality of health affect positively and significantly level of GDP per worker. However, in the specification of determinants of the growth of the GDP per worker, we found there is no proxy of human capital that affects significantly the growth of the GDP per worker.

In addition, the results of Granger causality test show that only the indicator of quality of health that cause the GDP per worker. As well, these results show that the average years of total schooling and the indicator of quality of education cause the growth of GDP per worker. We suggest that the Moroccan authorities should make additional efforts to raise the level of quality of human capital especially in the health sector and increase the productivity of both public and private investment.

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An Analysis of how Financial Ratios of Companies in Turkey Are Affected by National Standards, and IFRS

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Abstract

Adoption in 2005 of IAS/IFRS by Turkish listed companies resulted in changes in classification, valuation and disclosure of financial items. This paper makes accessible to non-Turkish speakers a detailed investigation of the results from previous ratio analysis studies identified by Balsari & Varan (Balsari & Varan, 2014), in addition to presenting a more extensive analysis than Cengiz (Cengiz, 2014). Eight financial ratios have been analysed before and after implementation of international standards. One set of results compares the periods 2002-2003 with 2005-2006; and the other 2004 with 2005. The companies investigated are substantially the same in both analyses, but different versions of national standards are compared against international standards. Significant differences in average Book Value of Equity per Share are found after implementation of international standards for both sets of comparisons; and for one set only, at a lower confidence level, significant differences are indicated in the leverage ratio. The major contribution of the paper is the analyses of the differences during the pre and post implementation of international standards.

Keywords: financial reporting standards, financial performance, financial structure

1. Introduction

The records of similar accounting activities under the application of different national accounting standards cause different results in the financial statement. Adoption of international accounting standards is essentially for countries who aim towards an open market strategy. Listed companies in Turkey that have traded Borsa Istanbul (BIST) have adopted International Accounting Standards since 2005. On the other hand, listed companies were allowed voluntary adoption of IAS/IFRS in 2003 and 2004 by Capital Markets Board of Turkey.

The International Accounting Standards Board is an authority for the development and publication of International Financial Reporting Standards (IFRS), including the IFRS for Small and Medium Size Enterprises. The Board aims to develop a single set of high-quality, understandable, enforceable and globally accepted accounting standards. IFRS Standards are said to bring transparency, accountability and efficiency to financial markets around the world ("IFRS," 2017).

The Turkish accounting system comprises mainly Tax Procedure Law, General Communiqué on Accounting System Application Turkish Commercial Code and Turkish Accounting Standards. The regulatory and supervisory authority is the Capital Markets Board of Turkey (CMB) in charge of the securities markets in Turkey.

Tax Procedure Law (No.213) is the main regulation of tax accounting. It was enacted in 1961 but was amended if needed. Law requires that accounting and the related records must be kept for tax and taxable income determination (Simga-Mugan, 1995). The "General Communiqué on Accounting System Application" has been the main source of accounting application since 1994. It was enacted to accounting principles and uniform financial statements by Ministry of Finance. All companies except banks, brokerage firms and insurance companies are required to observe the guidelines stated in the communiqué (Simga-Mugan, 1995). The communiqué which contains name of accounts to be used, accounting methods, financial statements, financial statements format, principles and rules has arranged structure of accounting applications (Bilginoglu, 1996).

Turkish Commercial Code (No.6102) has regulated the commercial life since July 2012. Turkish Commercial Code accepts Public Oversight, Accounting and Auditing Standards Authority as an authority to set and issue accounting standards. Accounting standards are voluntary for SMEs but mandatory for listed companies, banks, mutual funds, investment companies and portfolio management companies. The mandatory companies operate under the supervision of CMB.

Public Oversight, Accounting and Auditing Standards Authority was established by Decree Law ("Public Oversight, Accounting and Auditing Standards Authority's Organization and Responsibilities Decree Law," 2011) in 2011. The Authority set and issue Turkish Accounting Standards compliant with the international standards, to ensure uniformity, high quality and confidence in statutory audits, to set the auditing standards, to approve statutory auditors and audit firms and to inspect their audits, and perform public oversight in the field of statutory audits ("Public Oversight, Accounting and Auditing Standards Authority," 2016).

The first set of financial accounting standards were developed in January 1989 by the Capital Markets Board (CMB) to come into effect for fiscal years starting on or after 1 January 1989 (Communiqué, 1989). These financial accounting standards, Serial XI No.1, which control the preparation and presentation of financial statements of publicly traded companies, insurance companies, banks and brokerage firms, are comparable with international accounting standards (Simga-Mugan, 1995). Another set of financial standards, Serial: XI, No: 21, was issued to apply after 2003 by CMB (Communiqué, 2001).

Capital Markets Board of Turkey issued Serial: XI, No: 25 in 2003 (Communiqué, 2003) for the listed companies on stock exchange. The first Turkish Accounting Standards was issued by the Capital Markets Board. Mainly these standards were translation form of international standards. Listed companies started mandatory application of IAS / IFRS from 1 January 2005. Voluntary application of international standards was possible for financial reports from 31 December 2003.

The Turkish Accounting Standards Board was authorized to publish the financial reporting standards instead of Capital Markets Board in 2008. (Communiqué, 2008). The board issued Turkish Accounting Standards and Turkish Financial Reporting Standards. These standards translated from IAS/IFRS for Turkish companies.

The Public Oversight, Accounting and Auditing Standards Authority is an authority to set and issue Turkish Accounting Standards in compliance with the international standards in order to ensure relevance, transparency, reliability, understandability, comparability and consistency of financial statements of the parties who are liable to keep books in accordance with the laws they are subject to ("Public Oversight, Accounting and Auditing Standards Authority's Organization and Responsibilities Decree Law," 2011). Before this authority, Capital Markets Board of Turkey and The Turkish Accounting Standards Board were the authority to set and issue the standards.

The Public Oversight, Accounting and Auditing Standards Authority was established ("Public Oversight, Accounting and Auditing Standards Authority's Organization and Responsibilities Decree Law," 2011) instead of the Turkish Accounting Standards Board. Standards Board transferred all legally enforceable rights to Public Oversight, Accounting and Auditing Standards Authority. The authority issued Framework, 15 TFRS, 28 TMS and, 25 implementation guidance.

2. Literature Review

Lantto and Sahlström (Lantto & Sahlström, 2009) investigated changes in accounting standards and financial ratios after conversion from domestic accounting standards (DAS) to IFRS for listed companies on the Helsinki Stock Exchange in Finland. They used financial ratios which were current ratio, equity ratio, gearing ratio, operating profit margin, price to earnings ratio, quick ratio, return on equity and, return on invested capital. The adoption of IFRS changed the profitability ratios, gearing ratio, quick ratios, equity ratios and price/earnings ratio.

Callao et al. (Callao, Jarne, & Laínez, 2007) investigated significant differences in key financial ratios under the basis of Spanish and international accounting standards. Listed companies, was used for analyse. The results of the study indicate that the financial ratios of listed Spanish companies, IBEX 35, differed significantly when IFRS rather DAS were applied in the preparation of financial information for the first half of 2004. These were cash ratio, solvency and indebtedness, return on assets per operating income, return on equity per ordinary income and net income.

Goodwin et al. (Goodwin, Ahmed, & Heaney, 2008) examined the effect of Australian equivalents to IFRS on the accounts and accounting quality changes of financial ratios under DAS and IFRS for 1,065 listed firms. They found that under IFRS, mean liabilities increase; mean equity decreases; there were more decreases to earnings

than increases; and the leverage ratio. Also application of IFRS was increased total liabilities, decreased equity and more firms had earnings.

Balsari and Varan (Balsari & Varan, 2014) identify studies evaluating the effect of IAS / IFRS adoption on Turkish companies, with the following using ratio analysis:

Celik et al. (Celik, Aygoren, & Uyar, 2007) analysed 43 companies to specify the impact of IFRS adoption in Turkey. The financial statements of these companies for the year 2004 were prepared using domestic Turkish standards, while the 2004 comparatives in the 2005 financial statements were restated using IFRS. Thus application of differing standards to the same underlying transaction data could be evaluated. The fixed assets equity ratio, debt-equity ratio and long term debt ratio, were statistically significantly different under DAS and IFRS. Alkan and Doğan (Alkan & Doğan, 2012) calculated ratios before and after implementation of IFRS firstly over the period of transition 2004-2005, and secondly for the long term between 2000-2009. Significant differences were found in Long Term Debt Ratio and Total Assets to Equity ratio in the transitional period. For the long term period significant differences were found in Current Ratio, Acid Test Ratio and Asset Turnover Ratio.

Terzi et al. (Terzi, Oktem, & Sen, 2013) investigated companies listed on the Borsa Istanbul (BIST) operating in the manufacturing sector. Significant differences were identified in Cash Ratio, Receivables Turnover, Asset Turnover, Fixed Asset Turnover, Equity Turnover, Short Term Liabilities to Total Debts and Short Term Liabilities to Total Assets. Sub- sectors did not all completely reflect these differences, except for the Cash Ratio which was significantly different across all sub-sectors.

Cengiz (Cengiz, 2014) tested differences of financial ratios under DAS and IFRS. For this aim fifteen financial ratios were analysed for listed companies in Istanbul Stock exchange for the period from 1997 to 2003 when DAS was in use; for the period from 2005 to 2010 when IFRS was in use. In the analysis a statistical relationship was found for return on equity, return on assets, ratio of assets to equity, ratio of liabilities and equity, ratio of liabilities to assets for different periods under DAS and IFRS.

The present paper contributes to the literature on results of international accounting standards application by testing mandatory and voluntary application. Financial ratios were analysed for transition period and short term period before and after international standards.

3. Methodology

The paper was conducted to investigate whether financial ratios are statistically changed after conversion from National Standards (NS) to IFRS. For this, financial ratios were calculated from financial statements which were prepared according to NS and IFRS. The companies investigated were those listed on the BIST, excluding the banking sector. Two sets of comparison were made. The first set compares financial statements under the national accounting standards of Turkey Serial XI, No: 1 to IFRS, where results were compared for 2002-2003 against 2005-2006. The second set compared financial statements under the national accounting standards of Turkey Serial XI, No: 21 to IFRS, where results are compared for 2004 against 2005.

Eight different ratios of companies were chosen to examine the impact of international standards adoption on measures of profitability, financial structure and value of companies:

- Book value per share (BVPS)
- Pre-tax income margin,
- Return on equity,
- Return on fixed assets,
- Return on assets,
- The ratio of assets to equity,
- The ratio of debts to equity,
- Leverage ratio (total debts /total assets).

These six ratio was used in previous study (Cengiz, 2014) that were return on equity, return on fixed assets, return on assets, the ratio of assets to equity, the ratio of debts to equity and leverage ratio was found significant relation except for return on fixed assets.

Paired sample *t*-test was used in the analyse to determine whether two groups financial ratio were significantly different from NS to IFRS

4. Data

Listed companies on BIST reported financial statements according to set of accounting standards, Serial XI No:1, for the analyse period of 2002-2003. Another set of accounting standards were in use in 2004. On the other hand voluntary adoption of IAS/IFRS was possible the years of 2003 and 2004 but the adaption of intentional standards was mandatory in 2005. In the analyse companies were separated according to both set of accounting standards and years in Table 1.

Table 1. Accounting Standards in Turkey (2002-2006)

Rules	Years				
	2002	2003	2004	2005	2006
National Standard (Serial: XI, No:1)	x	x			
National Standard (Serial: XI, No:21)			X		
IFRS/IAS (Serial: XI, No:25)		x	X	x	x

4.1 First Group Data – National Accounting Standards (Serial: XI, No:1) against IAS / IFRS

Listed companies on the stock exchange were allowed to voluntarily choose IFRS instead of national standards for the years of 2003 and 2004. For the first group data, national standard period (2002-2003) and international standard period (2005-2006) are compared. Financial statements of 2004 are not included, because in this year companies reported their financial reports according to another version of national standards. Financial ratios of 42 companies listed on stock exchange (BIST) are calculated for these years except for banking sector.

Descriptive statistics that are standard deviation, minimum and maximum values are showed Table 2.

Table 2. Summary Statistics

Panel A: Summary Statistics when NS were applied

Financial Ratio	Std Dev	Min	Max
BVPS	0.22	-0.01	1.43
Pretax Income Margin	120.35	-100.92	775.25
Return on Equity	99.25	-280.81	563.93
Return on Fixed Assets	32.80	-100.01	100.64
Return on Assets	8.11	-17.20	19.15
Assets/Equity	20.53	-123.53	5.99
Debts/Equity	17.55	-103.71	3.76
Leverage Ratio	0.36	0.02	2.17

Panel B: Summary Statistics when IFRS/IAS were applied

Financial Ratio	Std Dev	Min	Max
BVPS	17.75	0.09	90.04
Pretax Income Margin	21.71	-19.79	84.41
Return on Equity	32.76	-62.07	195.33
Return on Fixed Assets	15.12	-19.08	50.61
Return on Assets	7.66	-10.58	25.64
Assets/Equity	9.68	-49.62	8.23
Debt/Equity	9.30	-47.97	7.23
Leverage Ratio	0.21	0.03	0.94

Panel C: Differences between NS and IFRS/IAS

Financial Ratio	Std Dev	Minimum	Maximum
BVPS	17.76	-0.01	89.98
Pretax Income Margin	120.23	-764.35	92.73
Return on Equity	79.50	-368.60	311.06
Return on Fixed Assets	31.85	-90.90	101.89
Return on Assets	9.19	-21.21	25.45
Assets/Equity	13.58	-14.83	73.91
Debts/Equity	11.31	-14.83	55.74
Leverage Ratio	0.25	-1.24	0.39

4.2 Second Group Data – National Accounting Standards (Serial: XI, No:21) against IAS / IFRS

Financial ratios of 45 same companies listed on stock exchange (BIST) are calculated for the years of 2004 and 2005 except for banking sector. For the year of 2004, companies which were not adopted IFRS were included in the analysis. However for the year 2005, companies which were adopted IFRS were included in the analysis.

In the analysis, results of financial performance were tested whether the mean difference between two sets of observations is zero.

5. Results

5.1 Results 1 – National Accounting Standards (Serial: XI, No:1) against IAS / IFRS

Financial results of national accounting standards and international accounting standards are tested for the period 2002-2003 and 2005-2006. Eight financial ratios are used to measure financial results. Summary of paired sample test and financial ratios are showed Table 3.

For the test paired sample t test are conducted to find mean differences

Table 3. Summary of Paired Samples Statistics

Financial Ratios	Standards	Mean	N	Std. Deviation
BVPS	IFRS	11.46	42	17.97
	NS	0.05	42	0.22
Pretax Income Margin	IFRS	11.91	42	21.98
	NS	23.50	42	121.81
Return on Equity	IFRS	12.28	42	33.16
	NS	17.91	42	100.46
Return on Fixed Assets	IFRS	10.89	42	15.30
	NS	16.56	42	33.20
Return on Assets	IFRS	5.27	42	7.75
	NS	4.82	42	8.21
Assets / Equity	IFRS	-0.01	42	9.80
	NS	-2.64	42	20.78
Debts / Equity	IFRS	-1.11	42	9.41
	NS	-3.19	42	17.77
Leverage Ratio	IFRS	0.38	42	0.21
	NS	0.46	42	0.36

Paired sample correlations are showed below at Table 4. As a results, return on equity, the ratio of total assets to equity, the ratio of total debts to equity and leverage ratio have correlation (confidence level - 99%); return on assets has correlation (confidence level - 95%).

Table 4. Paired Samples Correlations

Financial Ratios	Standards	N	Correlation	Sig.
BVPS	IFRS	42	-0.03	0.85
	NS			
Pretax Income Margin	IFRS	42	0.01	0.55
	NS			
Return on Equity	IFRS	42	0.71	0.00
	NS			
Return on Fixed Assets	IFRS	42	0.30	0.06
	NS			
Return on Assets	IFRS	42	0.32	0.04
	NS			
Assets / Equity	IFRS	42	0.83	0.00
	NS			
Debts / Equity	IFRS	42	0.82	0.00
	NS			
Leverage Ratio	IFRS	42	0.74	0.00
	NS			

Table 5. Paired Samples t Test

Financial Ratios	Mean	Std. Deviation	Sig. (2-tailed)
BVPS	11.41	17.98	0.00
Pretax Income Margin	-11.59	121.69	0.54
Return on Equity	-5.63	80.46	0.65
Return on Fixed Assets	-5.67	32.23	0.26
Return on Assets	0.45	9.31	0.76
Assets / Equity	2.63	13.75	0.22
Debts / Equity	2.08	11.45	0.25
Leverage Ratio	-0.08	0.25	0.05

Averages and value of significance are showed at Table 6 according to accounting standards (NS, IFRS). When NS was in use BVPS at 11.46; when IFRS was in use BVPS at 0.05 (confidence level - 99%). When NS was in use debt to total assets at 0.46; when IFRS was in use debt to total assets at 0.38 (confidence level - 95%).

Table 6. Averages and Significance

	IFRS	NS	DIFFERENCE	t	df	Sig (2-tailed)
BVPS	11.46	0.05	23.45	4.11	41	0.00
Pretax Income Margin	11.91	23.50	-5.59	-0.62	41	0.54
Return on Equity	12.28	17.91	-1.35	-0.45	41	0.65
Return on Fixed Assets	10.89	16.56	-11.74	-1.14	41	0.26
Return on Assets	5.27	4.82	-7.46	0.31	41	0.76
Assets/Equity	-0.01	-2.64	-0.55	1.24	41	0.22
Debts /Equity	-1.11	-3.19	3.65	1.18	41	0.25
Leverage Ratio	0.38	0.46	-0.46	-1.99	41	0.05

5.2 Results 2 – National Standard (Serial: XI, No:21) against IAS / IFRS

Summary of paired sample statistics are showed in Table 7.

Table 7. Summary of Paired Samples Statistics

Financial Ratios	Standards	Mean	N	Std. Deviation
BVPS	IFRS	11.34	45	16.92
	NS	0.49	45	2.74
Pretax Income Margin	IFRS	14.55	45	25.27
	NS	28.04	45	90.35
Return on Equity	IFRS	18.57	45	59.31
	NS	10.45	45	58.64
Return on Fixed Assets	IFRS	9.96	45	14.35
	NS	16.23	45	46.62
Return on Assets	IFRS	4.77	45	7.04
	NS	4.81	45	7.98
Assets / Equity	IFRS	-2.20	45	21.28
	NS	3.07	45	4.37
Debts / Equity	IFRS	-3.22	45	20.46
	NS	1.84	45	4.05
Leverage Ratio	IFRS	0.41	45	0.24
	NS	0.42	45	0.24

Paired sample correlations are showed below at Table 8. As a results, pre-tax income margin, return on equity, return on fixed assets, ratio of total assets to equity, ratio of total debts to equity, leverage ratio have correlation (confidence level - 99%).

Table 8. Paired Samples Correlations

Financial Ratios	N	Correlation	Sig.
BVPS	45	-0.099	0.518
Pretax Income Margin	45	0.383	0.010
Return on Equity	45	-0.556	0.000
Return on Fixed Assets	45	0.346	0.020
Return on Assets	45	0.199	0.190
Assets / Equity	45	-0.856	0.000
Debts / Equity	45	-0.882	0.000
Leverage Ratio	45	0.915	0.000

Results of Paired Samples t Test, Book Value of Equity per Share are statistically significant differences at 99% confidence level (Table9).

Table 9. Paired Samples t Test

Financial Ratios	Mean	Std. Deviation	Sig. (2-tailed)
BVPS	10.850	17.401	0.000
Pretax Income Margin	-13.492	83.994	0.287
Return on Equity	8.118	104.031	0.603
Return on Fixed Assets	-6.274	43.773	0.342
Return on Assets	-0.042	9.530	0.977
Assets / Equity	-5.274	25.126	0.166
Debts / Equity	-5.062	24.106	0.166
Leverage Ratio	-0.004	0.100	0.789

Averages and value of significance are showed at Table 10 according to accounting standards (NS, IFRS). When NS was in use BVPS at 11.34; when IFRS was in use BVPS at 0.49 (confidence level - 99%).

Table 10. Averages and Significance

Financial Ratios	IFRS	NS	Sig. (2-tailed)
BVPS	11.34	0.49	0.00
Pretax Income Margin	14.55	28.04	0.29
Return on Equity	18.57	10.45	0.60
Return on Fixed Assets	9.96	16.23	0.34
Return on Assets	4.77	4.81	0.98
Assets / Equity	-2.20	3.07	0.17
Debts / Equity	-3.22	1.84	0.17
Leverage Ratio	0.41	0.42	0.79

When the previous studies were analysed, recurrent themes emerge, but without complete consistency.

Celik et al. and, Alkan and Doğan (Alkan & Doğan, 2012; Celik, et al., 2007) (for transitional comparisons only) and Terzi et al. (Terzi, et al., 2013) all identify some significant difference in long term debt, if it is compared to one or another statement of financial position values such as equity, fixed assets or short term debts. However, Alkan and Doğan (2012) do not find a significant relationship in the Long Term Debt Ratio in the long term comparison.

Asset turnover is found significantly different by Alkan and Doğan (Alkan & Doğan, 2012) (for long term comparisons only) and by Terzi et al. (Terzi, et al., 2013) in the manufacturing sector. However, Celik et al. and Alkan and Doğan (Alkan & Doğan, 2012; Celik, et al., 2007) (for transitional comparisons) do not find a significant difference.

The findings of this study are that Book Value Per Share is significantly different between IFRS and national standards application for both sets of comparison investigated, at a confidence level of 99%. Further, for the comparison of results produced using national standards Serial: XI, No:1 against IAS / IFRS the leverage ratio is also significantly different, at a confidence level of 90%. However, for the comparison of results produced using national standards Serial: XI, No: 21 against IAS / IFRS a significant difference was not found in the leverage ratio.

6. Summary and Conclusions

With the use of international financial reporting standards in listed companies having been made mandatory in Turkey, together with other EU countries, since 2005, there may be said to be use of a common language in accounting. Financial ratios of listed companies on Turkish stock exchange (BIST) are evaluated for the transition period of International Financial Reporting Standards. To evaluate this period paired sample t-test is conducted. The results of the study, there is statistically significant difference for book value of equity per share.

This suggests that while financial statements remain internally consistent a shift of value, or a shift in the number of shares, has occurred in absolute terms. Although not tested for, it seems unlikely that there would be a change in the number of shares across the whole of the companies surveyed.

At a lower 90% confidence level, and for one only of the two groups of comparisons, significant difference was also indicated for the leverage ratio. This tends to support findings from the other ratio analyses of a significant difference in long term debt when compared to other statement of financial position elements (Alkan & Doğan, 2012; Celik, et al., 2007; Terzi, et al., 2013), although this finding was not universal (Alkan & Doğan, 2012).

Taking the two findings above together, the significant changes in gearing reflected in changes in assets and liabilities reported in other studies, may be seen to be reflected in the significant change in the absolute value of equity measured using book values.

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The Influence of Virtual Communities in Marketing Decision

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Abstract

Purpose – The introduction and growth of the Internet and modern technology has had a strong impact on the structures of companies and led to a change in the decisional processes. In the new economic scenarios, with the growth of social networks and Web 3.0, technologies go through developments and transformations that are of vital importance to ensure the competitiveness of companies.

Methodology – The study analyzes the possibility of applying social networks to the new business models, underlining their importance not only with regard to managers but also, and especially, to crowdsourcing processes.

Implications – The objective of the study is to focus on the impact that web 3.0 and social networks have on management and marketing decisions, underlining certain processes in order to improve the competitive advantages of companies.

Keywords: communication technologies, competitive strategies, crowdsourcing and social network

1. Introduction

The advances in corporate communication, multimedia technologies, Internet, websites, etc., are guiding a fast innovation in various sectors, pushing a new business-based business style (Garrigos, 2010), where it is important to set up business networks and other subjects becomes crucial. The new networks and the introduction of the Web 3.0 technology can change not only corporate structures but also and especially value chains and networks, with the consequent change in the decisional processes of managers.

The paper examines how social networks are important about business models, what are the effects on the Web. Finally, how these new technologies influence management and marketing decisions, what are the benefits for companies. In particular, it focuses on the importance of the community manager and on the importance of the crowdsourcing process to cope with the new changes.

2. Literature review

2.1 Social Networks and Virtual Communities

The new tools of social networks and virtual communities are fundamental to modern societies due to the combined effect they have on the behavior of organizations. Although in different contexts, social networks can assume different meanings, we want to define them like Boyd & Ellison (2007) did, as *Web-based* services allowing users to:

- 1) build a public or semipublic profile within a limited system;
- 2) organize a list of other users with whom they share a connection;
- 3) see the lists of their own connections and other people's connections within the system.

A virtual community is defined as a "group of people who can or cannot meet face-to-face and who share words and ideas through the mediation of the Web"(Rheingold, 1993).

The potential of the Web, constantly enhanced and updated, "drives all the society and companies to work faster, and create and manage more interdependences in order to operate in global markets" (Kalpic & Bernus 2006, page 41). All of these new trends facilitate the creation of virtual communities and promote business

competitiveness, acting in all business areas (Garrigos et al., 2011). In particular recent years, the growth of virtual communities such as Facebook, Twitter or Youtube has been remarkable and it has had a very strong and more and more widespread impact not only on a social level but also influencing the management and marketing decisions (Granata, 2016).

They have also led to an increase in the innovation in all stages of the value chain, facilitating management activities and decisional processes in all types of organizations.

Surely social networks have proven to be essential for the creation and sharing of knowledge, and for learning as well. As Lin & Hsueh (2006) underline, in the age of the Internet, in order to shorten the learning cycle, people can take advantage of other people's experiences to expand their own experiences, which can be achieved through sharing on the Internet.

However, their function goes beyond the management of the knowledge of organizations, since they are capable of allowing significant changes in the value chain and in the structures of all types of companies. Today, making use of the concepts related to the value chain of Porter in order to try to understand the elements of distinction and strength (value creation) of the companies operating in a given market/sector, very often turns out to be an outdated evaluation system. Ever more often it becomes necessary to talk of value network rather than value chain, since, almost always, "*value is co-created by a combination of players in a network*" (Pepparde & Rylander, 2006, p. 131).

In an ever more Internet-based society and with the advent of the powerful Web and of the more user-friendly applications (Moor & Weigand, 2007), the new communication platforms are capable of creating multiple and different channels. They can also improve the channels among customers and this will affect the various decisions on the manager side.

In this way, the recent innovations cause a change in the organization of work and processes, both inside and outside the companies, heavily affecting competitiveness and so transforming the technologies concerning production, promotion and sale of products, and improving customer retention as well. In this scope, the knowledge about how new technologies and key elements of change can be used is fundamental. Therefore, it is crucial that companies cope with these new management forms and adopt them, also transforming, when necessary, their structures in accordance with the new innovations (Teo & Piang, 2004; Wirtz et al, 2010), if they want to take advantage of the new opportunities that the market will offer to them, and obtain an effective and efficient organization of the management. In order to better understand the development of these new technological platforms, it is therefore of crucial importance to get into the functioning of the so-called Web 3.0.

2.2 The Use of the Web 3.0 to Create a Virtual Community

Over the last years, the technologic advances of the different types of the Web from 1.0 to 2.0, the emergence of the new technologies of the semantic Web and, mainly, the development of social networks, have created new forms of competition among companies, leading to a new way of managing the Web: the 3.0. With Web 3.0 we can mean "*the new technologies of the Semantic Web integrated with applications on a large scale*" (Hendler, 2009, page 111), digitally developed on the Web and supporting smart technologies (Fuchs et al., 2010). This new system of the Web is capable, through the manipulation of web services (reading-writing-execution), of helping companies to quickly react to changes, through the integration of data and applications coming from various different resources, providing "*the capability of identifying relations through the data in different applications or in different parts of the same application*" (Hendler, 2009, p. 112).

The Web 3.0 revolution is not only in the use of semantics, but also in the use of images, sound, space and feelings, affirming a concept in which the traditional Web becomes a very interactive tool. In this new scenario, intelligent tools and machines can do many things, such as reading, correlating, manipulating data in cyberspace, adapting to different companies and users according to their needs.

Thanks to the new technologies that allow listening, understanding, sharing between businesses and between customers or between any other subject that can be treated differently, based on preferences.

With the new technologies, in the age of the Web 3.0, companies can use the information collected before, during or after their contact with the customers, through the most innovative techniques such as data warehousing, data mining or customer relationship management, and also using various information coming from social networks or from the Web in general. These information are now essential for adapting to the personalization of products, brands and services from and to different users or companies according to their needs (doing what the user wants you to do and behaving like the user wants you to behave). In summary you get a radical transformation that involves changing technologies resulting once again, a complex and evolving business models revolution.

(Rohrbeck 2010; Garrigos et al., 2011). The creation and dissemination of networks, the technological development, the development of Web 3.0 can only be the case if the involvement and participation of people who interact, share, learn, and create content on social networks is there.

In this context, the source of competitive advantage is through personal relationships with the environment, interactions with other people sharing the same areas.

So social networks are very important and crucial to the development and improvement of marketing, and to improving the company's strategic management. They are of fundamental importance to promoting cooperation with Espert, customers and suppliers and to acquire all the necessary information by drawing on social networks. The most important change that the web deals with is the change of ambience and the subjects that exchange information. Finally, they are needed to acquire different information from the world of the network, what consortia are exchanging, what competitors are doing, what are the bad guys and what not. The latter are also of vital importance, having influence and participating in debates for the creation and promotion of the corporate image. The administration of social networks for managing the knowledge is proven to be essential, as networks are capable of promoting creativity, sharing and learning, are able to innovate and create creativity, because different stakeholders add value to the process of managing them. Then it becomes necessary to transform the customer from active to active to participate in all production processes through social networks. This method is costing companies to change their approach to the market by creating an interactive connection. One example of a company that has implemented this kind of transformation as a starting point for these transformations, we could use the information system which enabled the success of companies such as the Spanish Desigual, with its own fast-fashion retail sale network it collects information regarding products from the customers that buy from it every day. The company is able to design and manufacture, offering new products, displaying them in its own shops all over the world within a time frame of just 15 days, then it stores the specific data and the last trends of customer preferences (Ferdows et al, 2004;. Sull & Turconi, 2008).

For example, Desigual is capable of adapting to the fast evolution of markets and estimate the sales of a given product in a given shop during a period of elaborations of the estimates of the demand. Another example is Carrefour's policy (Yoon & Zhou, 2011), which allows customers to manage their loyalty cards (see spend, store history, check accumulated earnings, create shopping lists, share with friends, or others, etc.). It also allows sharing and interaction between customers and companies. This information from the network can be used by businesses to get feedback on products, to understand customer needs, and to prepare new products.

These examples make us understand that the evolution of the web is based on promoting sharing and participation in business development through all business partners: employees, customers, partners and all stakeholders. Throughout the social networks play an essential role in getting everyone involved in the interesting business, improving the company's reputation, marketing reputation, and enhancing innovations that enable the creation of new business management models, valorization of already existing. It is therefore fundamental to concentrate on specific strategies in networks that could improve the participation and collaboration of the employees, of the customers and of the other interested parties, by using appropriate instruments such as the community manager and the adoption of crowdsourcing techniques.

This perspective is fundamental as it can enable the efficient outsourcing of various processes, allowing companies to become more competitive since they can free resources and human capital and focus on customers and their needs. In the new framework, in order to strengthen and consolidate these goals, we can underline the importance of participating in two of the main innovations for companies:

- 1) improve customer trust and corporate reputation and image through an appropriate use of social networks and figures like the "Community Manager";
- 2) enhance the participation of the Internet users through website personalization and through the promotion of the community manager and crowdsourcing, which will be examined below.

3. The Manager of Virtual Communities

The specific task of the community manager, concerning the creation, management and enhancement of the participation and collaboration in virtual communities and social networks, is of vital importance for the companies. We call community managers those managers of virtual communities who operate through multiple types of social networks and communities and are responsible for the daily functioning of said communities (Arnone et al., 2009), operating as a connection between companies and online communities, and ensuring a good relationship between them. (Michlmayr, 2009). In general, the most well-known tasks are creating, maintaining, facilitating, making dynamic, enhancing and generally ensuring and improving the dialogue and relationship of a company with customers and with the other interested subjects in the Web. However, their

function goes further and includes important management and marketing aspects, pursuing three goals.

Firstly, they have to improve the commercialization, organization, promotion of products and events and improve the reputation of the company. In this sense, they have to improve the encounter, the participation and the collaboration of a series of interested subjects related to the online communities that are oriented also to the requirements and opinions of customers and of the other interested parties, trying to monitor and control the activity, in particular the word of mouth.

Second, they communicate the conditions of the community also taking on a management function, building metrics and analyzing the data and the key factors for success in order to help companies plan their strategies.

Finally, the community leader must promote the goal of improving some crowding processes at various points in the value chain, promoting the participation and collaboration of the involved people as described below. In this area companies, even if they focus on the use of social networks, they are not yet satisfied with the objectives achieved (Chui et al., 2009).

Most innovative businesses entrust community managers to increase performance and visibility. Almost everyone has entered the main social networks, some of which have created a social network like Ford, Pepsi, Adidas, Nike. The key element to keep in mind is that companies need to be aware of the importance of the community manager. This manager, in addition to improving marketing activities, also improves the company's management.

4. Discussion

The participation system involving the various stakeholders for the enterprise within the business process is fully realized through the "crowdsourcing" that is, in the era of Web 3.0, one of the best models of business development. Crowdsourcing, also known as "massive outsourcing" or "voluntary outsourcing", is conceived in this study as the entrustment of a task or a work to a large group of people or to a community (crowd or mass) via Internet, through an open invitation. The expression was coined by Jeff Howe in the issue of June 2006 of the computer magazine *Wired*, and it has also been defined as "the outsourcing of tasks to the broad Internet audience in general" (Kleemann et al., 2008, p. 5). It describes a new Web-based business model that exploits the creative solutions of a distributed network of people through what is equal to an open invitation to present proposals (Brabham, 2008, p. 75), with the purpose of "animating people to give a free contribution to the production process of the company" (Kleemann et al., 2008). This has been mainly developed through the expansion of social networks, which has enabled the work for public outsourcing (Corney et al., 2009), with various types of remunerative processes and motivations for the participants.

Brabham (2008, page 79) underlines that the public can contribute to designing products, it produces advertisements and memorable images, it outperforms the fastest and most affordable companies and even the best minds in these scopes. Geiger et al. (2011) analyses 46 crowdsourcing examples, with 19 different types of processes. By developing its use, Kleemann et al. (2008, pp. 12-14) have described and shown examples of the main types of crowdsourcing: the participation of consumers in the development and configuration of the product; design of the product; competitive offers regarding tasks or specifically-defined problems; permanently open invitations; a community for reporting; evaluation of the product from the consumer side, and consumer profiles. However, the process could be much broader and might include everything, from the designing of a product or a process up to the resolution of problems of technical or other nature, from the creation of R&D contents to advertising, and up to quality control.

5. Conclusions

This document has tried to analyze the influence of the so-called Web 3.0 and the development of social networks with regard to marketing and management and, more specifically, with regard to the decisional processes of companies. The study examines the former literature that concentrates on the development of social networks and virtual communities. The paper describes also the transformation of technologies and the new business of the models emerging in the new framework of the Web 3.0, and its influence on company competitiveness.

The paper also highlighted the importance of scheduled use of networks and the management of participation and sharing of the web. The study concludes by highlighting how participation, reputation, cooperation and image are important elements for managing community managers in order to improve and enhance the competitiveness of businesses. With regard to the community manager, the document analyses their functions, summarizing their role with three main points:

- ✓ improvement in marketing and promotion;

- ✓ increase in company reputation;
- ✓ improvement in company management through the realization of metrics for the communities and networks, interpreting the key factors for success in order to help companies to plan products and process strategies;

Lastly, the promotion of the participation of the parties interested in collaborating, in order to improve the crowdsourcing processes in various points of the value chain and of the value networks. The study also underlines the importance of crowdsourcing and how it can be used by companies.

Surely the paper appears to be the first step to study how new technologies impact on business and more specifically on the marketing and management decisions. We recognize that there are several limitations to the search conscious that the exploratory analysis and it will require and the fact more in-depth analysis. One example, future research should focus on the aspects and the impact that a virtual community can have on businesses and specific functions, such as sales, marketing, etc.

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A Bi-objective Simulation-optimization Approach for Solving a No-wait two Stages Flexible Flow Shop Scheduling Problem with Rework Ability

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Abstract

The paper suggests a new rule; called no-wait process. The rule has two stages, and is a flexible flow shop scheduling. The process is the subject to maximize tardiness while minimizing the makespan. This hybrid flow shop problem is known to be NP-hard. Therefore, we come to first, Non-dominated Sorting Genetic Algorithm (NSGA-II), then, Multi-Objective Imperialist Competitive Algorithm (MOICA) and finally, Pareto Archive Evolutionary Strategy (PAES) as three multi-objective Pareto based metaheuristic optimization methods. They are developed to solve the problem to approximately figure out optimal Pareto front. The method is investigated in several problems that differed in size and terms of relative percentage deviation of performance metrics. The conclusion, developed by this method is the most efficient and practicable algorithm at the end.

Keywords: multi-objective optimization, no wait, flexible flow shop, NSGA-II, MOICA, PAES

1. Introduction

Scheduling is arranging and planning sequence of event to complete the work. The goal is to utilize the resources optimally while reaching targets. This field has been attracted by many scholars during recent years (Mosheiov and Sidney 2010, Vallada and Ruiz 2011, Shafaei *et al.* 2011, Rabiee *et al.* 2012, Jolai *et al.* 2013, Ullrich 2013, Jolai *et al.* 2014, Yang *et al.* 2014, Tayebi Araghi *et al.* 2014, Xu *et al.* 2015, Rabiee *et al.* 2016, Nesello *et al.* 2017). The flow shop problem is an important subject in scheduling. One of the reasons is that most of the manufacturing systems follow batch shops, flow shop or semi flow shop routings (Baker 1974, Johnson 1954, Lin *et al.* 2006). Flexible flow shop or hybrid flow shop, is the one of the most important classes of scheduling which also defined as a flow shop with parallel machines and flexible flow line. For a literature review in this area, the readers are referred to those of (Richard and Zhang 1999, Ruiz and Vazquez-Rodriguez 2010, Ribas *et al.* 2010)

In a no-wait flow shop, the jobs are processed from one machine to the next one without waiting time (Huang *et al.* 2009). Suppose there are some sequences of jobs, some specified procedures in each that are processed by machine in disciplinary order. No pause or interruption is supposed to occur in the line. In other word, when the process starts, there is no stop for object before or after each machine. No repetition is allowed, one job at a given time by a machine. Therefore, when needed, the start of a job on the first machine must be delayed in order to meet the no-wait requirement (Tasgetiren *et al.* 2007). Nagano *et al.* (2013) examines the m machine no-wait flow shop problem with setup times of a job separated from its processing time. The performance measure considered is the makespan. The hybrid metaheuristic Evolutionary Cluster Search (ECS_NSL) is employed to solve this scheduling problem. Nagano *et al.* (2015) addressed the problem of scheduling jobs in a no-wait flow shop with sequence-dependent setup times with the objective of minimizing the total flow time. As this problem is well-known for being NP-hard, they presented a new constructive heuristic, named QUARTS, in order to obtain good approximate solutions in a short CPU time. Samarghandi and ElMekkawy (2012) studied the problem of no-wait flow shop and proposed two frameworks based on genetic algorithm and particle swarm optimization to deal with the problem. Samarghandi and ElMekkawy (2014) proposed PSO algorithm to solve the problem of scheduling a no-wait flow-shop system with sequence-dependent set-up times. The application of this problem can be found in industries such as chemical industry, steel production, just-in-time manufacturing process,

service industries, etc (Rajendran 1994, Grabowski and Pempera 2000, Raaymakers and Hoogeveen 2000, Aldowaisan and Allahverdi 2004). A detailed survey of the research and applications on this topic has been given by Nagano et al. (2016).

Most of literatures about no wait hybrid flow shop scheduling problem have mainly focused on a single objective. For example, Liu *et al.* (2003) suggests an algorithm known as Least Deviation (LD) in which the focus is on only one machine in each station. The key performance indicator in this point of view is the makespan. The performance is thus high using this algorithm. Also the algorithm is easier in computation and implementation. Having created such values, this is considered favourable.

Xie *et al.* (2004) suggests a new heuristic algorithm named Minimum Deviation Algorithm (MDA) to minimize makespan in a similar method. MDA also performs better than partition method, partition method with LPT, Johnson's and modified Johnson's algorithms. Huang *et al.* (2009) considered a no-wait two stage flexible flow shop with setup times and with minimum total completion time key performance indicator. The author represents an enhanced programming as well as an Ant Colony approach. The solution was satisfactory with the approach and the results were efficient.

To best use of resources, Jolai *et al.* (2009) introduced no-wait flexible flow line scheduling problem with time windows and job rejection which is, in turn, an extension of production and delivery scheduling. He presented a similar method known as integer-linear programming model and genetic algorithm process as well.

In comparison with LINGO, studies show that the GA is a better solution in a computational time. Jolai et al. (2012) introduced a new hybrid algorithm with sequence-dependent setup times to minimize the total completion time. They suggest three algorithms. One, Population Based Simulated Annealing (PBSA), second, Adapted Imperialist Competitive Algorithm (AICA) and finally, hybridization of Adapted Imperialist Competitive and Population Based Simulated annealing (AICA+PBSA) for the problem. All the studies support the hybrid algorithm against the others which are applied in literature for related production scheduling problem. Rabiee et al. (2014) proposed the problem with respect to unrelated parallel machines, sequence-dependent setup times, probable reworks and different ready times to actualize the problem. What they proposed is based on imperialist competitive algorithm (ICA), simulated annealing (SA), variable neighborhood search (VNS) and genetic algorithm (GA) to solve the problem. The result revealed the advantages of our algorithm. To reduce makespan, Ramezani *et al.* (2013) suggested no-wait scheduling problem focused on set up time which is anticipatory and also sequence dependent in a flexible flow shop environment with two sets of same machines in parallel. They introduced it as a novel method since it was NP-hard. Their meta-heuristic method was about invasive weed optimization, adjustable neighborhood exploration and simulated strengthening to attack of the problem. The result showed, hybrid-metaheuristic outperformed in comparison with singular ones.

As said before, most of studies concentrated on single objective problem. But in reality, there is no single objective at all and we need to consider a batch of goals at once. However, there are also some studies working on multi objective in no wait flow shop scheduling problem. Allahverdi and Aldowaisan (2004) suggested a method in no wait flow shop scheduling problem in with sum of makespan is important and also the maximum delay as a measure. Their methods for comparison were hybrid simulated annealing and a hybrid genetic heuristics. Also they suggested a dominance relation (DR) and a branch-and-bound algorithm. Herein also, after computation, the heuristic method performs higher and better in comparison with existing heuristics if the makespan and maximum lateness is considered significant. Also the dominance relation and branch and bound algorithm were totally effective. Aiming to minimize average of tardiness and time, Rahimi-Vahed *et al.* (2008) offered a bi-criteria no-wait flow shop scheduling problem. What they suggest is a new method named multi-objective scatter search as a metaheuristic algorithm for finding near optimal Pareto frontier. They were looking for effectiveness of this approach by solving some experimental problems in comparison with SPEA-II. Here also the better performance was appeared in multi-objective scatter search.

Multi-objective immune algorithm also proposed by Tavakkoli-Moghaddam *et al.* (2007) to minimize two goals as weighted average completion time and weighted average tardiness for a no-wait flow shop scheduling problem. He compared the algorithm with a conventional multi-objective genetic algorithm, i.e., SPEA-II. The generic algorithm won the game especially for significant and big problems. Pan *et al.* (2009) offered another algorithm called discrete differential evolution (DDE) for solving the no-wait flow shop scheduling problems with makespan and maximum tardiness measures. The results based on the famous benchmarks and statistical performance comparisons showed that DDE algorithm is much more efficient in comparison to the hybrid differential evolution (HDE) algorithm proposed by Qian *et al.* (2009). For the same objective, i.e. to minimize makespan and tardiness, Khalili (2012) proposed a multi-objective no-wait hybrid flow shop scheduling problem

and suggested a novel Multi-Objective Electromagnetism Algorithm (MOEA) to solve the problem. He formulated the problem with mixed integer-linear programming models and proposed an effective Multi-Objective Electromagnetism Algorithm (MOEA) to reach the goal.

As far as multi-objective approach is considered, there are a few studies about no wait flexible flow shop problem. The author presented three multi-objective based algorithms to discover a no wait two stage flexible flow shop scheduling problem with a number of machines in each stage. The goals were minimizing makespan (i.e. C_{\max}) and maximum tardiness (i.e. T_{\max}).

In the next section; section 2, the multi objective terms are discussed. Then the author wrote about the bi-criteria no wait two stages flexible flow shop. Then in section 3, the multi-objective optimization search techniques are considered. Investigating the proficiency of suggested multi-objective metaheuristic approaches is presented next section. And at last, the outcome of the research is induced and directions for further researches are depicted in section 5.

2. Multi-objective No-wait Two-stage Flexible Flow Shop Optimization

Now we turn to the problem statement. That is the concept of the multi objective optimization and also the structure of the problem.

2.1 Multi-objective Optimization

A multi-objective optimization problem formula is as below:

$$\min_{x \in X^{n_x}} f(x) = \{f_1(x), f_2(x), \dots, f_M(x)\} \quad (1)$$

$$s.t. \quad g(x) \leq 0, \quad h(x) = 0 \quad (2)$$

Wherein $g(x) \leq 0$, $h(x) = 0$ shows the possible solution in n_x dimensional search space and $f(x)$ is a M dimensional vector of objective values. Map between decision variables of $x \in X^{n_x}$ and objective space of $f \in F^M$ is determined by objective functions. In reality, the aim of a multi-objective optimization is to figure out the entire non-dominated solutions of the problem (any solution that is not able to develop an objective function with no effect on other objective).

If any of below conditions are met in an optimization problem with minimum objectives, solutions x_1 dominates solution x_2 .

- (1) For every single objective $f(x_1) \leq f(x_2)$.
- (2) At least in one objective $f(x_1)$ has a lower value compared with $f(x_2)$.

Having defined the dominant solutions, the optimal solution of a multi-objective optimization problem is defined as set of non-dominated solutions known as Pareto-optimal set which forms the Pareto front (CoelloCoello *et al.* 2002).

2.2 The Statement of Bi Criteria No-wait two Stage Flexible Flow Shop Problem

The no-wait two stage flexible flow shop scheduling problem is shown below: Given the processing time P_{ij} of job j on stage $i(i=1, 2)$, each of n job will be sequentially processed in stage 1, 2 respectively. At each stage there are m_i machines. Also at a given time, each machine can process maximum a single job. Likewise, each action needs to be processed on one machine. Once the order of the action at the first stage is cleared the similar order is done for the second stage. To meet the no-wait boundaries, the end time of a job on a machine must be similar to the start time of the job on the next machine. This way, there is no elapse time in the entire operation. The aim here is, reduction of makespan (C_{\max}). The matching fitness function is considered at below:

$$C_j = \text{Completion time of job } j \quad (3)$$

$$\text{Makespan} = C_{\max} = \max(C_j) \quad (4)$$

$$\min z_1 = C_{\max} \quad (5)$$

Next aim is reduction of maximum tardiness which is calculated below:

$$\min z_2 = T_{\max} \quad (6)$$

Wherein T_i is the tardiness of job i , equal to $\max(0, C_i - d_i)$, and d_i is the due date of job i .

3. Possible Approaches to Find Solution

There are many classical approaches to solve multi-objective problems among them includes embracing goal programming, integer programming, e-constraint method and weighted sum method. The main features of the classical methods can be described as follows (Deb 2001, CoelloCoello *et al.* 2002):

1. Changing the problem from multi-objective to single objective
2. Experimentally, the methods might be applied randomly to find out the best solution
3. Each typical method includes some user-defined parameters that are not easy to set in an arbitrary problem. Some meta-heuristics have been developed to eliminate such deficiencies. They are genetic algorithms and evolutionary computation. The ability to figure out a reasonable estimate of Pareto frontier in one operation and good computational time, is one of the benefit of this method.

This paper offers three multi-objective metaheuristic methods to solve the problem; NSGA-II (Non-dominated Sorting Genetic Algorithm), MOICA (Multi-Objective Imperialist Competitive Algorithm) and PAES (Pareto Archive Evolutionary Strategy). They are to examine the output of the algorithms in solving the no-wait two stages flexible flow shop problem.

Metaheuristic algorithms are generally, based on a searching system which is random. Here, the problem altered from a phenotype into a genotype that is informally called chromosome. To discover the best solution, it uses intensification as well as diversification where the first intends to use local search area and the second explores the optimal solution globally. The chromosome, fitness evaluation, related operators and structures of applied system are described elaborated respectively:

3.1 Solution Representation and Fitness Evaluation

Some random values that are equals to the number of jobs in length is generated from 0 to 1. This is to show the chromosome. The jobs then are tossed by finding the increasing order of values in vector. See figure 1.

Chromosome	0.45	0.63	0.13	0.33	0.77
Job sequence	3	4	1	2	5

Figure 1. An example of chromosome representation and its job sequence

After calculation of jobs, procedure of machine assignments is done using a heuristic method. It means in each stage, to assign a job to the machines, the earliest available time machine is chosen and the job with the highest importance is assigned to that machine. If there are two important jobs at the same time, one is chosen randomly. The pseudo code of heuristic procedure is shown in Figure 2.

3.1 Genetic Operators

3.1.1 Crossover

The process in which tow chromosomes are prevented from coupling making progeny is called crossover. The process aims to find a better solution by mixing the chromosomes. The study uses a uniform crossover that first creates a random binary mask with the similar extend as the chromosomes and then substitutes relative gene material of parent chromosome based on created binary mask. This crossover results in a good exploitation of solution space (Syswerda 1989).

3.1.2 Mutation

After crossover, we perform an exchange mutation. For exchange mutation, two different arbitrary genes of the parent chromosome choose and swap the allele values. (Eiben and Smith. 2003).

```

Set  $Q = \emptyset, t_{1i} = 0$  ( $i = 1, 2, \dots, m_1$ ),  $t_{2j} = 0$  ( $j = 1, 2, \dots, m_2$ )  $\min(t_{2j}) = T_2$ ,
 $\min(t_{1i}) = T_1$  and  $T = T_2 - T_1$ 
Set  $\pi = \{\pi_1, \pi_2, \dots, \pi_n\}$  as job sequence and add  $q$  to set of scheduled jobs
While  $\pi = \emptyset$ 
  For  $k = \pi_1 : \pi_n$ 
    If  $k = \pi_1$ 
       $t_{1i} = t_{1i} + sdst(\pi_{k-1}, \pi_k, 1)$ ;
       $t_{2j} = t_{2j} + sdst(\pi_{k-1}, \pi_k, 2)$ ;
      Else
        If  $p_{1,\pi_k} - T \geq 0$ 
           $t_{1j} = t_{1j} + p_{1,\pi_k}$ ;
          While  $rand \leq P_{n1,\pi_k}$ 
             $t_{1j} = t_{1j} + r t_{1j}$ ;
          End-While
           $t_{1j} = t_{1j} + sdst(\pi_{k-1}, \pi_k, 1)$ ;
           $t_{2j} = t_{2j} + p_{2,j}$ ;
          While  $rand \leq P_{n2,\pi_k}$ 
             $t_{2j} = t_{2j} + r t_{2,\pi_k}$ ;
          End-While
           $t_{2j} = t_{2j} + sdst(\pi_{k-1}, \pi_k, 2)$ ;
          Else
             $t_{1j} = t_{2j}$ ;
            While  $rand \leq P_{n1,\pi_k}$ 
               $t_{1j} = t_{1j} + r t_{1,\pi_k}$ ;
            End-While
             $t_{1j} = t_{1j} + sdst(\pi_{k-1}, \pi_k, 1)$ ;
             $t_{2j} = t_{2j} + p_{2,\pi_k}$ ;
            While  $rand \leq P_{n2,\pi_k}$ 
               $t_{2j} = t_{2j} + r t_{2,\pi_k}$ ;
            End-While
             $t_{2j} = t_{2j} + sdst(\pi_{k-1}, \pi_k, 2)$ ;
          End-If
        End-For
       $\pi \leftarrow \pi - \{j\}$  and add  $j$  to  $q$ ;
    End-While
  End-While

```

Figure 2. Pseudo code of simulator

3.3. Multi-objective Algorithms

3.3.1 Non-dominated Sorting Genetic Algorithm (NSGA-II)

Probability of gaining Pareto-optimal solution using GAs are high, since they work with body of points. This makes it a strong tool for MOOPs too. The Non-dominated Sorting Genetic Algorithm (NSGA-II) is a well-known and extensively used algorithm based on its predecessor NSGA and proposed by Deb et al (2002). Essentially, NSGA-II differs from non-dominated sorting Genetic Algorithm (NSGA) implementation in a number of ways. First, NSGA-II uses an elite-preserving mechanism, thereby assuring the preservation of previously found good solutions. Second, NSGA-II uses a fast non-dominated sorting procedure. Third, NSGA-II does not require any tunable parameter thereby making the algorithm independent of the user (Sivakumar et al, 2011). NSGA-II is a fast and very efficient Multi-objective evolutionary algorithm (MOEA), which incorporates the features of an elitist archive and a rule for adaptation assignment that takes into account both the rank and the distance of each solution regarding others. Salazar and Kishor have applied and compared the efficiency of NSGA-II with existing methods for reliability optimization problems (Kishor et al, 2008).

NSGA-II is an elitist multi-objective evolutionary algorithm which carries out an approximation of the Pareto front, based on the non-dominance concept. For achieving different Pareto fronts, a ranking procedure is performed at each generation. Also, this algorithm takes advantage of an operator called crowding operator for its diversification. NSGA-II starts from a randomly generated population of chromosomes (solutions), P_0 of size N . The population is sorted based on non-domination. Each solution is assigned a fitness (or rank) equal to its non-domination level (1 is the best level) the minimization of the fitness being assumed. A children population (Q_0) of size N is then created by applying the genetic operators: binary tournament selection, recombination, and mutation (Furtuna, et al, 2011). NSGA-II has been used in several prior studies like: Minella et al. (2008), Behnamian et al (2009), Zandieh and Karimi (2011) and Rabiee et al (2012), Asefi et al. (2014). The crossover and mutation operators in this algorithm are as mention in NSGAI. The framework of the proposed NSGAI is generally illustrated in the following pseudo code (Figure 3).

```

Begin
Input :  $N, P_c, P_m, Max\_Gen$ ;
Generate  $Init\_Pop(P)$ ;
Repair  $Init\_Pop(P)$ ;
Evaluate fitness values of the  $Init\_Pop$ ;
Assign rank base on pareto dominance sort;
for  $i = 1$  to  $Max\_Gen$  do
    for  $j = 1$  to  $round[(P_c \times N) / 2]$ 
        Select two individuals:  $(X_1, X_2)$ ;
        Select one scenario for crossover operation;
        perform one point crossover :  $(X_1, X_2) \rightarrow (X'_1, X'_2)$  ;
    endfor
    for  $j = 1$  to  $round[(P_m \times N) / 2]$ 
        Select an individual:  $X$ ;
        Select one scenario for mutation/ neighborhood operation;
        Select one case between (swap, reversion, insertion);
        perform mutation :  $X \rightarrow X''$  ;
    endfor
    Repair  $New\_Pop(P)$ ;
    Combime offsprings and parents  $\{P \cup Q\}$ 
    Assign rank based on pareto dominance sorting algorithm;
    Calculate the crowded distance of individuals in each front;
    Select the best  $N$  individual base on rank and crowded distance;
end for
Output : Extract the best pareto front;
end

```

Figure 3. Proposed NSGA-II algorithm in pseudo code

3.3.2 PAES Algorithm

The study suggests a simple multi-purpose metaheuristic algorithm called PAES. Offered by Knowles and Corne (1999, 2000), the algorithm applies a local search development strategy to a non-dominated solution in a pool of solutions that already applied. Hereunder, the most alternates of PAES which is (1+1) development strategy is discussed.

A solution is randomly generated, evaluated and saved in archived. Here is when the algorithm starts. Procedure at iteration t is continued with creating a new solution by transform current solution and compare it to current solution for dominance. The one with more dominance is accepted. If both solutions have same dominance priority, the new one is compared to archived solution which is archived. The accepted solution in the archive

added there and removes the rejected one. Otherwise the new solution replaced by one of the archive member. At last, if there is no dominate member in the archive and archive has still vacancy, the new solution is added to archive. If there is no space in solution pool, the solution in the busiest area is removed and the new one is added. In when considering intricacy of problem to find non-dominated solutions, we consider a limitless archive scope to maintain non-dominated solutions. This is to obtain more Pareto solutions. The structure of proposed PAES is shown in Figure 4.

```

Begin
Input : MaxIteration;
Generate Init_Sol and set it as Current_Sol;
Evaluate fitness value of the Current_Sol;
Add Current_Sol to archive ;
for  $i = 1$  to MaxIteration do
    Generate New_Sol by mutation of Current_Sol;
    Evaluate fitness value of the New_Sol;
    if New_Sol dominates Current_Sol
        Set New_Sol as Current_Sol;
        Update _Archive;
    elseif Current_Sol dominates New_Sol
        Discard New_Sol;
    else Current_Sol and New_Sol don't dominate each other;
        Update _Archive using New_Sol;
        Randomly select next Current_Sol between New_sol and Current_Sol ;
    end if
end for
Output : Extract nondominated solution as pareto front;
end

```

Figure 4. PAES algorithm

3.3.3 Multi-objective Imperialist Competitive Algorithm (MOICA)

3.3.3.1 Creating Primary Empires

Every single solution in the imperialist competitive algorithm simulates as an array. The arrays include different values that need to be adjusted. What is called chromosome in GA terminology, is named country here. In an N-dimensional optimization problem, a country is a $1 \times N$ array. This array is defined by: $country = [p_1, p_2, p_3, \dots, p_N]$, where p_i is the variable to be optimized. Each variable in a country denotes a socio-political characteristic of a country. From this point of view, the algorithm searches for the best country that is the country with the best combination of socio-political characteristics, such as culture, language and economic policy (Atashpaz-Gargari and Lucas 2007). After country development, a non-dominance technique and a crowding distance are used to shape the fronts and rank member of each front, respectively. At that point, the members of front one are archived. Non-dominance technique and crowding distance described as below:

1: Non-dominance technique: imagine that there are r objective functions. When the following conditions are satisfied, the solution x_1 dominates another solution x_2 . If x_1 and x_2 do not dominate each other, they are placed in the same front.

- (1) For all the objective functions, solution x_1 is not poorer than another solution x_2 .
- (2) For at least one of the r objective functions x_1 is exactly better than x_2 .

Solutions that are not dominated by others, constitute in front number 1. Meanwhile, the solutions that are only dominated by solutions in front number 1, organize front number 2. The same order applies to create the other fronts which is shown in Figure 5.

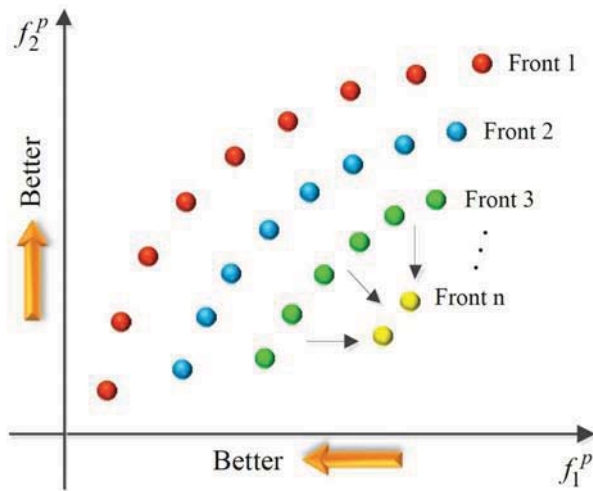


Figure 5. Non-dominance technique

2. Crowding distance: this is a tool to show the quantity of solutions in each step. See below figure. This is an estimate of the solution mass around a given solution.

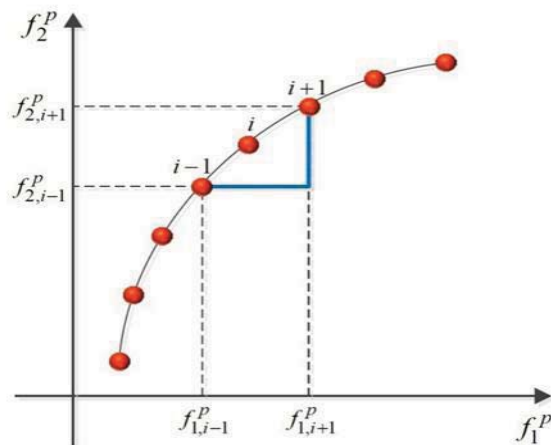


Figure 6. Crowding distance

The crowding distance measure which is used in MOICA is shown in equation (7). The solutions having a lower value of the crowding distance are prioritized over solutions with upper value of the crowding distance.

$$CD_i = \sum_{k=1}^r \frac{f_{k,i+1}^P - f_{k,i-1}^P}{f_{k,total}^{P,max} - f_{k,total}^{P,min}} \tag{7}$$

Where:

- the number of objective functions, $f_{k,i+1}^P$ is the k-th objective function of the (i+1)-th solution
- $f_{k,i-1}^P$ is the k-th objective function of the (i-1)-th solution after sorting the population according to crowding distance of the k-th objective function
- $f_{k,total}^{P,max}$ and $f_{k,total}^{P,min}$ are the maximum and minimum value of objective function k, respectively.

Next, the prioritized solution is selected in the mass in terms of non-dominance and crowding distance. The selected solution is imperialists and the rests are colonies.

In order to compute the cost of prioritized solution (the imperialist), each target function is calculated. After that each target function is calculated:

$$cost_{i,n} = \frac{|f_{i,n}^p - f_i^{p,best}|}{f_{i,total}^{p,max} - f_{i,total}^{p,min}} \quad (8)$$

Where:

- $cost_{i,n}$ is the normalized value of objective function i for imperialist n
- $f_{i,n}^p$ is the value of the objective function i for imperialist n
- $f_i^{p,best}$, $f_{i,total}^{p,max}$ and $f_{i,total}^{p,min}$ are the best, maximum and minimum values of objective function i in each iteration, respectively.

At last, the total value of each imperialist is calculated through:

$$Total\ Cost_n = \sum_{i=1}^r cost_{i,n} \quad (9)$$

Where:

- r is the quantity of target function

After calculation the cost, the strength of each imperialist is obtained as well as the colonies distributed among the imperialist according to power of each imperialist country.

$$P_n = \frac{Total\ Cost_n}{\sum_{i=1}^{N_{imp}} Total\ Cost_n} \quad (10)$$

At this point, the primary quantity of colonies is calculated as below:

$$NC_n = round\{P_n \cdot N_{col}\} \quad (11)$$

Where:

- NC_n is the primary quantity of colonies of the n -th imperialist
- N_{col} is the number of all colonies

NC_n colonies are selected randomly and assigned to one imperialist. Apparently, the greater quantity of colonies, the stronger imperialist and the less quantity of colonies, the poorer imperialist.

3.3.3.2 Total Strength of an Empire

Imperialist country has the major impact on the total strength of an empire. But the strength of its colonies does not have such effect. Therefore, the equation of the total power of an empire is shown below. (Karimi et al. 2010, Shokrollahpour et al. 2011).

$$TP\ Emp_n = (Total\ Cost(imperialist_n) + \xi mean\{Total\ Cost(colonies\ of\ empire_n)\})(1 - QE_n) \quad (12)$$

Where:

- $TP\ Emp_n$ is the total power of the n th empire
- zeta (ξ) is a positive number which is considered to be less than 1
- Total cost of imperialists and colonies are calculated by Eq.8 and Eq.9.
- QE_n is the quality of empire n th

QE_n is determined as below:

First: all of the imperialists and colonies are accumulated and then the non-dominated solutions are chosen. The percentage of the non-dominated solution belonging to each empire is calculated as QE_n .

Remember that, the total strength of the empire to be determined by just the imperialist when the value of ξ is small and increasing it will increase the role of the colonies in determining the total power of an empire.

3.3.3.3 Moving the Colonies of an Empire toward the Imperialist (Assimilating)

Having distributed colonies among imperialists, the imperialist and relevant colonies go together. Figure 7 shows the movement. There, d is the distance between imperialist and colony. X is a random variable with a uniform (or any proper) distribution between 0 and $\beta \times d$ and β is a number greater than 1. Direction of the movement is shown by θ , which is a uniform distribution between $-\gamma$ and γ .

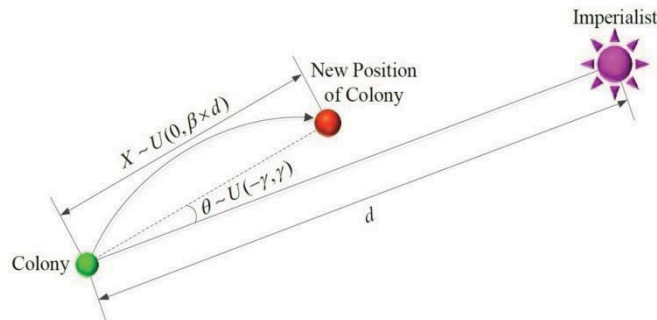


Figure 7. Moving colonies toward the imperialist with a random angle

3.3.3.4 Information Sharing between Colonies

To improve their position, the colonies share their information. To do so, in this part, one of these operators including one-point, two-point and continuous uniform crossover shown in Figure 8 are selected randomly. The mass part that are sharing information are shown by Pc . Those colonies with stronger position have more opportunity to share their information since the selection here is by a competition that is describe below:

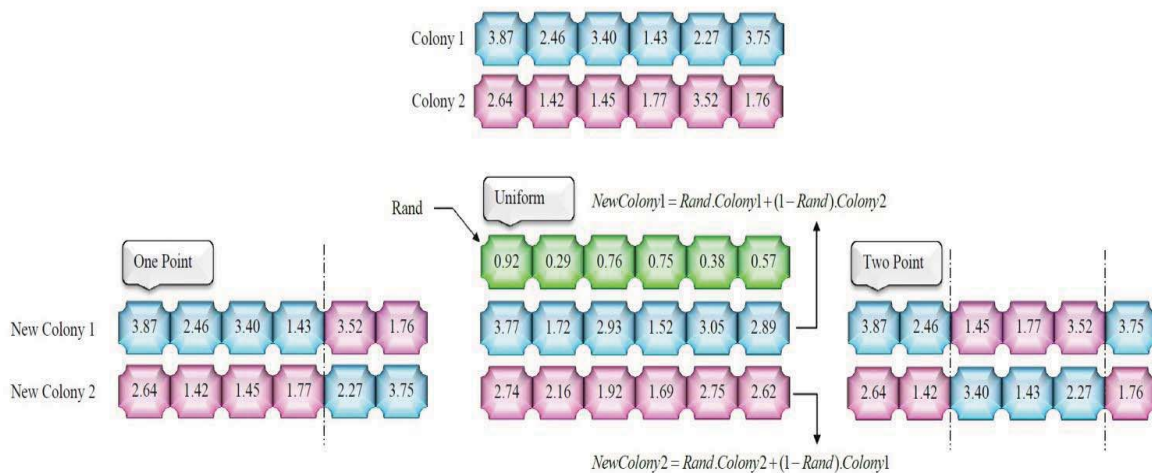


Figure 8. Operators for information sharing between colonies

How come a selection is done?

A binary competition process is used to find out the best solution for both crossover and mutation operators in this way:

Step 1: choose two solutions with the same size

Step 2: the lowest front number needs to be chosen if both populations are from different fronts.

If both of them are in same front, choose the solution with highest crowding distance.

3.3.3.5 Revolution

Some revolutions have been done during last decades on the colonies. To do so, one of the famous policies, swap, reversion and insertion, exchange and local search is randomly chosen. The operators' structures are elaborated

as follows: (*Pr* is the revolution rate)

- Swap: a colony's initial numbers are chosen randomly (numbers 1.46 & 2.27 in Figure 9) and their substitute each other.

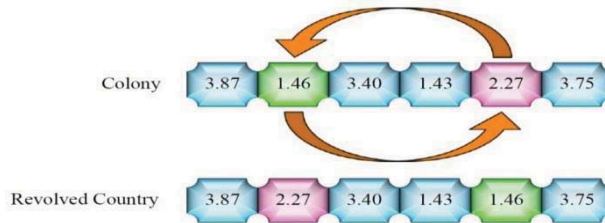


Figure 9. Swap operator

Reversion: in the current strategy, in addition to conducting substitution, the number that is placed between the substituted numbers are also changed.

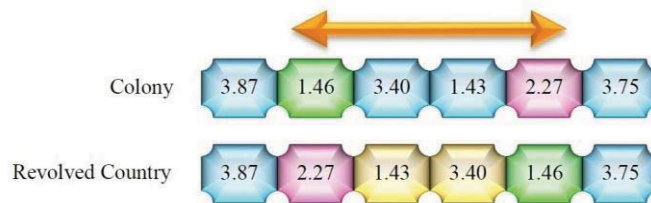


Figure 10. Reversion

Insertion: for the insertion strategy, like substitution, two numbers of a colony is chosen by chance (Numbers 1.46 & 2.27 in Figure 11). After that, the next number is places approximate to the number in the first position. The other number is moved right side consequently.

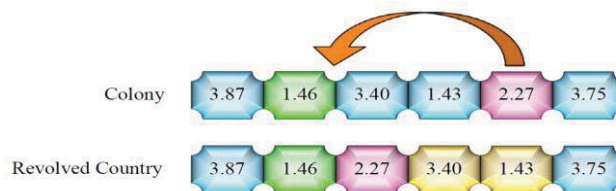


Figure 11. Insertion

Perturbation: in perturbation strategy, one number is chosen by chance, and another number is generated by chance. Then these two are substituted.

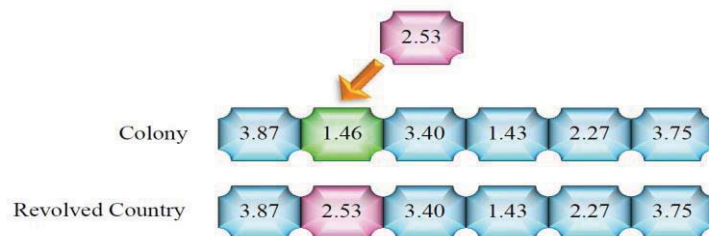


Figure 12. Perturbation

Local search: the strategy refers to randomly selection of the iteration. After that all of the two-point exchanges are investigated.

3.3.3.6 Improve Imperialist

Using the rules describe earlier, the step involves in producing some neighborhoods around each imperialist considering its total power. The less imperialist power, the more neighborhood generation. Similarly, the more

imperialist power, the less neighborhood generation. In other word, the quantity of neighborhoods directly depends on the power of the given imperialist. This is a leaner formula ranged between Ne_{min} and Ne_{max} . that is illustrated below:

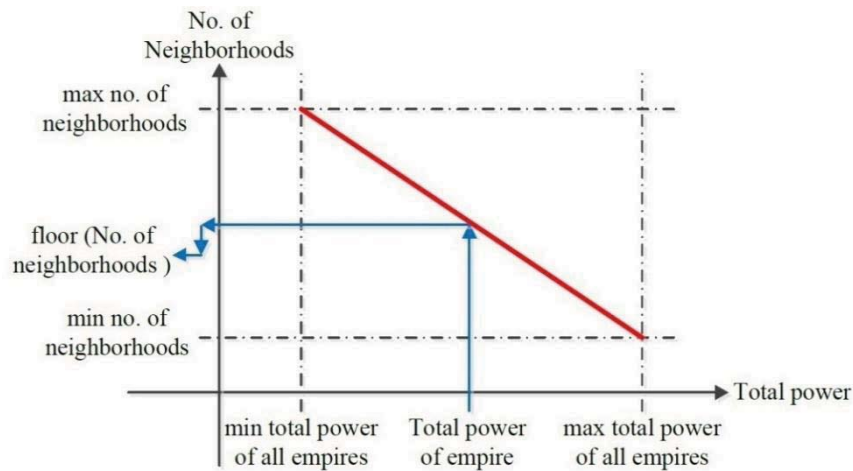
$$Ne_n = floor(Ne_{min} + \frac{(Ne_{max} - Ne_{min})(TP Emp_{worst} - TP Emp_n)}{(TP Emp_{worst} - TP Emp_{best})}) \tag{13}$$

Where:

- $TP Emp_{best}$ is the value of total power the most power empire
- $TP Emp_{worst}$ is the value of total power of the weakest power empire.

How the number of neighborhood and power are related are shown below:

Figure 13. The relationship between power of each imperialist and number of neighborhoods



3.3.3.7 Colonies Updated

The primary mass of colonies, assimilating, information sharing among colonies, revolution and improve imperialist are combined all together in each decades to shape the empire that is called combined mass. Then, based on combined mass, the archive is updated. Then, for any of the imperialists, the best colony is chosen according to non-domination sorting and crowding distance by size of mass of colonies for a given empire ($NC(i)$).

3.3.3.8 Archive Adaption

For the combined mass, the classification is done using non-dominated and crowding distance. To archive, the front one members are chosen. At last, these members are retained and after classifying the solutions in archive, the other members are removed. Meanwhile, the size of archive equals $n Archive$.

3.3.3.9 Exchanging Positions of the Imperialist and a Colony

In this step, the total cost of each imperialist is updated. Next, the best imperialist and colony are combined. Then, this mass is arranged by the non-dominated sorting and crowding distance. At last, the best mass is chosen as imperialist. The step is illustrated below.

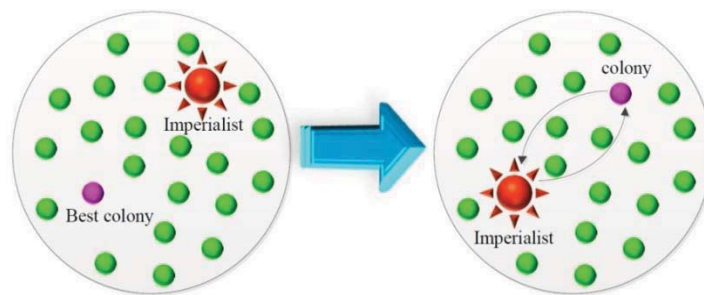


Figure 14. Exchanging positions of the imperialist and a colony

3.3.3.10. Imperialistic Competition

This term refers to a match among imperialist in which the weaker the territories, the more reduction of power would be and the more powerful the territories, the more power it gains. The competition is to take the hegemony of the weakest colony of the weakest territory. The competition is started by first choosing one or more colonies that are the weakest. Then the hegemony of these weak colonies is taken by a stronger territory through the competition. So far, this does not necessarily mean that the strongest territory is the winner. This means that those that are stronger keep more hegemony. This competition is modeled by just selecting one of the weakest colonies of the weakest territory to formulate the hegemony of each territory first is obtained the normalized total cost as follows.

$$NTP Emp_n = \max \{ TP Emp_i \} - TP Emp_n \tag{14}$$

Where:

- NTP_n is the normalized total power of nth empire
- TP_n is the total power of nth empire

After calculating normalized total power, the hegemony probability of each territory is obtained by:

$$PP_n = \left| \frac{NTP Emp_n}{\sum_{i=1}^{N_{imp}} NTP Emp_i} \right| \tag{15}$$

Next, to allocate the abovementioned colony to a territory, a so called roulette wheel method is used that is shown below:

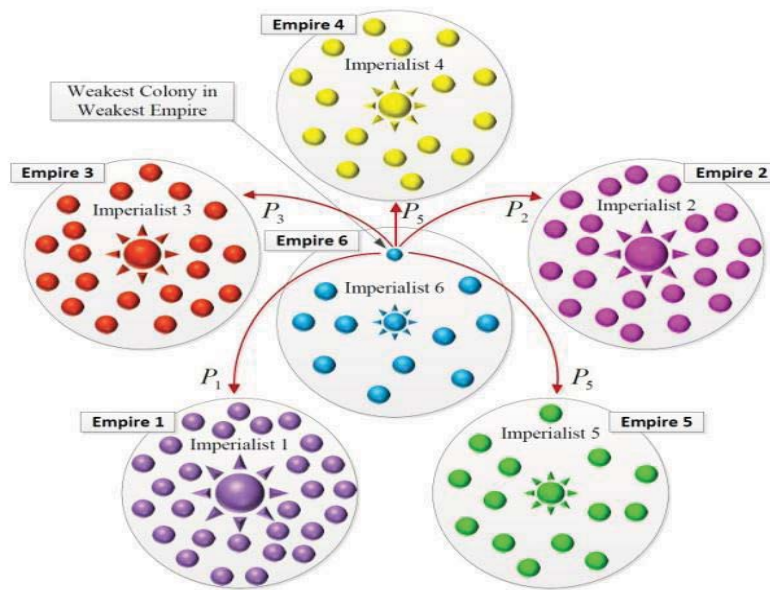


Figure 15. Imperialistic competition

3.3.3.11 Eliminating the Powerless Empires

Through the competition, weak territories will ruin and their members disperse among other territories. The study refers to this ruined territory as collapses as shown below:

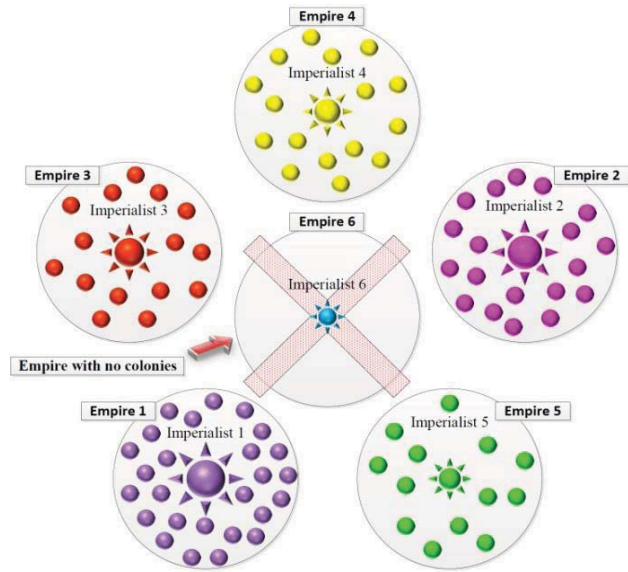


Figure 16. Eliminating the powerless empires

3.3.3.12 Stopping Criteria

The stopping point in competition, in this study, refers to the situation where there is only one territory remained among all countries. The process of territories purification is shown in three spectrums below:





Figure 15. Convergence of algorithm

The process that the study is offered is concisely illustrated below:

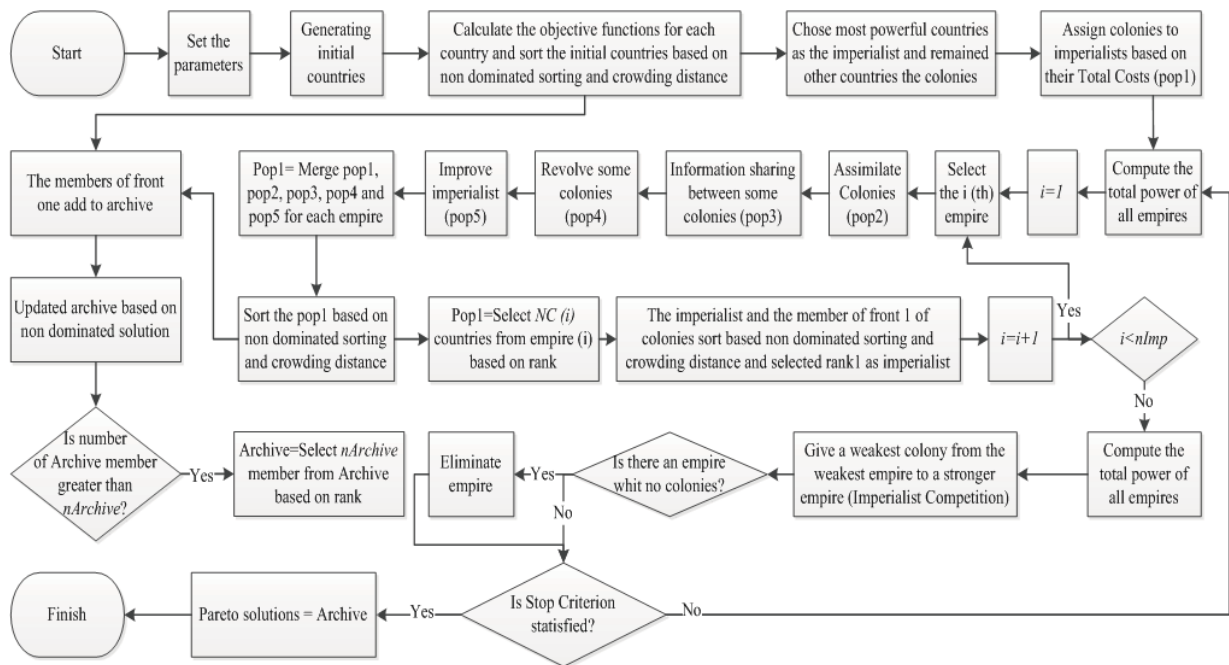


Figure 16. Flowchart of MOICA

4. Computational Experiments

4.1 Problem Design

The paper investigates the influence of some approaches for 36 test problems. Data are classified in three segments; quantity of operations, quantity of machines in first and second stages and, the dissemination of operation time in those stages. On the other hand, the abovementioned problems has been classified in two major segments; small and large problems. Table 1 depicts the quantity of operations and machine in small and large scale.

Table 1. Factors and their levels

Factors	Levels
Number of jobs (N)	Small:8,10,14,16,20,24 Large:72, 80, 88, 108, 120, 132
No. Machines (in both stages)	M1=3,M2=4; M1=2,M2=2; M1=3,M2=2 M1=8,M2=10; M1=10,M2=10; M1=12,M2=10
Processing times ($p_{i,j}$)	$U(4, 40)$
Sequence dependent setup times (S_{jki})	$U(4, 40)$
Probability of rework (P_{re})	Exponential distribution ($\lambda e^{-\lambda}$) with mean equal to 0.05
Rework times ($RT_{i,j}$)	$Round(U(0.3,0.6) \cdot \frac{1}{\lambda} p_{i,j})$

In addition the due dates are generated using the following formula:

$$(p_{1j} + p_{2j}) + round\left(\frac{U(0, \sum_{j=1}^n (p_{1j} + p_{2j}))}{(m_1 + m_2)}\right) \tag{16}$$

4.2 Parameter Setting

To evaluate the performance the suggested process, we need to set some key success factors. To come to this conclusion, some operations are simulated for both sizes of problems. Table 2 shows the tuned values of the proposed algorithms' values.

Table 2. Tuned values of the parameters of the algorithms

algorithm	parameter	problem size	
		small	large
NSGAI	population size	100	200
	max generation	200	500
	crossover rate	0.8	0.8
	mutation rate	0.2	0.2
	MOICA	Pop Size	150
	N_{imp}	5	10
	$Maxdc$	250	400
	S	0.4	0.4
	P_{AS}	0.2	0.3
	P_R	0.2	0.3
PAES	max iteration	50000	200000

4.3 Performance Measures

The so-called Pareto based multi-objective optimization algorithm aims to find an estimate of non-dominated front. The key performance indicators of these methods are different from the single-purpose method. Hence, another method is needed to evaluate the key performance indicators of this algorithm. Then to evaluate the output of multi-purpose algorithms quantitatively, below evaluation methods are applied:

Number of Pareto solutions (NPS): in this method, the number of non-dominated solutions resulted by an algorithm is computed.

Mean ideal distance (MID): The approximation between Pareto solutions and ideal point is defined. The calculation of MID is:

$$MID = \frac{\sum_{i=1}^n c_i}{n} \tag{17}$$

Where n is the quantity of non-dominated solutions and $c_i = \sqrt{f_{1i}^2 + f_{2i}^2}$. The lower the value, the better performance the MID has.

- *Diversification metric (DM)*: This performance metric shows the range of solutions resulted by algorithms and is calculated as follows:

$$DM = \sqrt{(\max f_{1i} - \min f_{1i})^2 + (\max f_{2i} - \min f_{2i})^2} \tag{18}$$

- *The spread of non-dominance solutions (SNS)*: Regarding to MID, this computes the range of non-dominated solutions. The SNS is defined as follows:

$$SNS = \sqrt{\frac{\sum_{i=1}^n (MID - c_i)^2}{n-1}} \quad (19)$$

- *% Domination*: this key performance indicator applies a constructed Pareto combination set. Then the percentage of the solution belonging to each algorithm is calculated.

4.4 Experimental Results

This section refers to the result of experiments that are done through all the algorithms. The effectiveness of each algorithm is presented and compared in terms of key performance indicators. All algorithms were coded using MATLAB 2013a and run on personal computer with a 2.66 GHz CPU and 4 GB main memory.

The efficiency of the algorithms was stated by solving 36 variant problems of which 18 are small and 18 are large in scale. The outputs of three algorithms regarding the five key performance indicator for both size are compared and shown in Table 3 to 7 respectively.

Relative Percentage Deviation (RPD) is applied for the best solutions in terms of the key performance indicator. The calculation is shown below:

$$RPD = \frac{|Method_{sol} - Best_{sol}|}{Best_{sol}} \times 100 \quad (20)$$

Where

- $Method_{sol}$ is value of method
- $Best_{sol}$ is the best value between the algorithms

Table 4, 5 and 6 show the output with 95% sureness for the percentage of domination, DM and MID key performance indicator for small size respectively. Deep analysis shows that MOICA beats the others in terms of domination percent. Concerning DM, there is no considerable difference between NSGAI and MOICA. Yet the MOICA still beats PAES. The presented facts disclose that for MID key performance indicator, the three algorithms are similar and there is no considerable variance.

Table 7 presents the output of large scale problems. Alike the small scale problems, MOICA beats NSGAI and PEAS. The more size of the problem, the more considerable the advantages are.

Table 8, 9 and 10 also shows the outputs of algorithms in terms of domination percent in which DM and MID are shown consequently. By a glance at the table 8, MOICA's superiority in terms of performance in comparison to the next two. Outputs of DM are also illustrated in table 9 and disclose that the performance of NSGAI and MOICA identical and both of them outperform PAES. Moreover, when MID is considered, MOICA beats NSGAI and PEAS as shown in table 10.

Table 3. The simulation results for small size problems

R o w	N ₁	M 1	M 2	NPS ₁			DM ₁			% Domination ₁			MID ₁			SNS ₁		
				MOI CA ₁	NSG AII ₁	PA ES ₁	MOI CA ₁	NSG AII ₁	PA ES ₁	MOI CA ₁	NSG AII ₁	PA ES ₁	MOI CA ₁	NSG AII ₁	PA ES ₁	MOI CA ₁	NSG AII ₁	PA ES ₁
1.	3.	4.	2.	2.	1.	29.0	29.0	0.	100.	100.	0.	81.1	81.1	90.	2.98	2.98	0.	
2.	8.	2.	2.	4.	3.	2.	36.5	40.4	39.	100.	25.	0.	121.	122.	131	0.74	2.44	9.9
3.	3.	2.	3.	4.	2.	16.1	21.2	9.2	100.	66.	33.	117.	121.	120	2.79	6.99	1.1	
4.	3.	4.	1.	1.	1.	0.	0.	0.	0.	100.	0.	103.	101.	104.	0.	0.	0.	
5.	1	2.	2.	5.	3.	3.	14.2	10.7	7.2	100.	20.	0.	155.	157.	161	3.43	4.91	1.6
6.	3.	2.	2.	3.	2.	15.0	10.2	5.0	50.	50.	0.	22.	14.	152	0.15	4.62	0.1	
7.	3.	4.	3.	3.	1.	73.0	3.60	0.	100.	0.	0.	117.	109.	114	12.7	1.50	0.	
8.	1	2.	2.	9.	5.	2.	46.1	45.3	3.1	88.8	11.1	0.	168.	169.	184	2.41	3.33	0.0
9.	3.	2.	5.	3.	5.	97.3	6.32	40.	57.1	42.8	0.	147.	136.	153	12.8	0.91	2.2	
10.	3.	4.	19.	13.	3.	55.9.	63.6.	25.	68.7	31.2	0.	150.	150.	153	2.93	5.10	2.2	
11.	1	2.	2.	18.	9.	2.	43.1	46.5	17.	66.6	33.3	0.	227.	231.	243	4.11	10.8	6.5
12.	3.	2.	9.	9.	5.	67.0	72.2	26.	100.	0.	0.	184.	188.	187	5.24	6.59	6.2	
13.	3.	4.	8.	3.	5.	106.	27.0	64.	85.7	14.2	0.	185.	179.	196	11.4	0.	7.0	
14.	2	2.	4.	6.	5.	37.1	70.0	11	20.	80.	0.	49.	32.	89.	2.96	7.80	18.	
15.	3.	2.	2.	3.	4.	6.08	10.7	11.	100.	0.	0.	236.	240.	241	0.56	1.38	3.6	
16.	3.	4.	9.	9.	6.	80.2	63.5	37.	0.	100.	0.	327.	209.	222	11.2	5.21	9.3	
17.	2	2.	9.	6.	5.	93.0	10.6	73.	100.	0.	0.	211.	321.	352	7.66	1.58	13.	
18.	3.	2.	6.	4.	4.	23.4	6.40	74.	100.	0.	0.	266.	266.	299	1.48	1.59	13.	
AVERAGE ₁				6.55	4.94	3.2	46.6	29.8	30.	74.2	37.4	1.8	179.	178.	190	4.76	3.77	5.3
N _{opt}				14.	8.	2.	10.	7.	4.	14.	5.	0.	13.	6.	0.	5.	8.	5.

Table 4. 95% confidence interval for % domination in small size problems

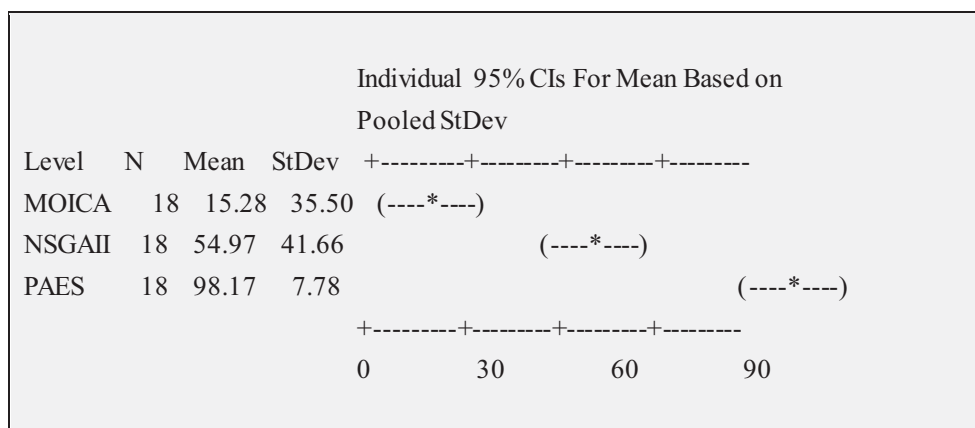


Table 5. 95% confidence interval for DM in small size problems

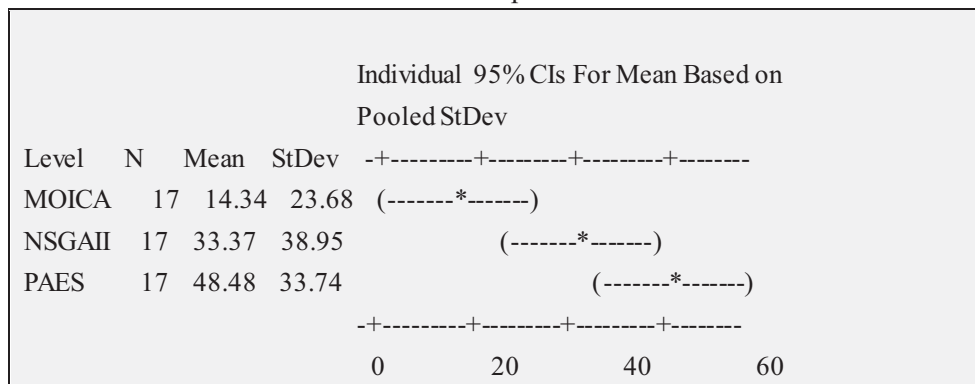


Table 6. 95% confidence interval for MID in small size problems

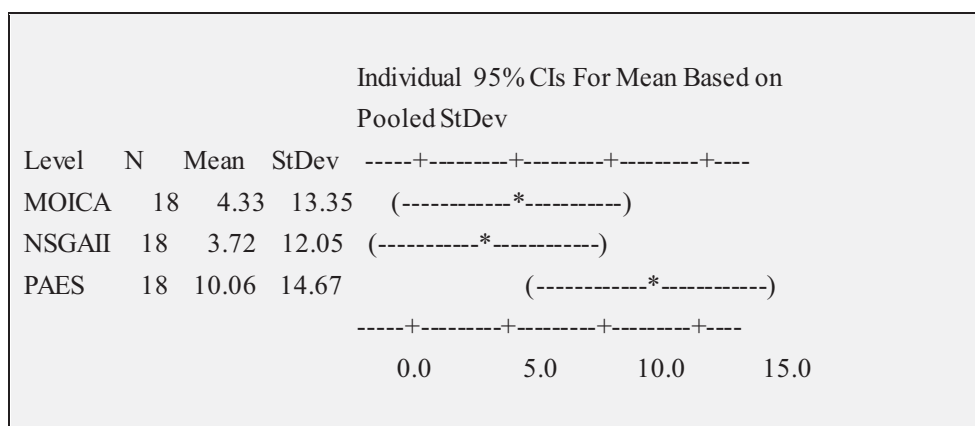


Table 7. The simulation results for large size problems

R o w s	N	M		MO ICA	NPS			DM			% Domination			MID			SNS		
		1	2		MO ICA	NS GAI I	PA ES	MO ICA	NS GAI I	PA ES	MO ICA	NS GAI I	PA ES	MO ICA	NS GAI I	PA ES	MO ICA	NS GAI I	PA ES
1	7	8	0	13	5	2	69.6	19.7	1.4	91.6	8.33	254	255	261	6.46	2.21	0.3		
2	2	0	0	7	6	3	39	98	25	100	0	0	95	54	05	35	71	92	
3	2	0	0	8	4	2	30.6	25.3	4.1	100	0	0	187	199	229	6.65	6.67	2.2	
4	8	8	0	2	4	3	1.41	7.21	7.6	100	0	0	241	257	296	0.56	0.90	2.4	
5	0	0	0	2	7	2	31.7	31.9	4.1	100	0	0	206	226	239	4.89	3.72	0.5	
6	2	0	0	5	4	2	22.8	7.81	4.1	100	0	0	198	204	218	8.75	0.59	2.4	
7	8	8	0	7	10	3	39.5	39.4	6	100	0	0	289	303	305	2.57	3.67	1.2	
8	8	0	0	2	4	2	8.06	28.2	3.1	100	0	0	238	260	270	0.34	3.26	1.6	
9	2	0	0	9	7	2	23.7	44.3	1.4	100	0	0	232	243	241	6.88	3.52	0.3	
10	1	8	0	5	6	4	19.4	32.7	10	100	0	0	359	383	386	1.93	3.23	3.5	
11	0	0	0	5	6	2	12.8	14.1	1.4	100	0	0	297	329	328	3.06	2.97	0.3	
12	8	1	1	4	4	2	32.3	19.7	2.2	100	0	0	269	298	293	1.55	2.61	1.0	
13	1	8	0	7	5	3	84.5	36.4	4.2	100	0	0	421	425	451	12.1	4.18	0.6	
14	2	0	0	1	8	3	9	01	43	100	0	0	58	95	1	22	24	54	
15	0	1	1	5	8	1	19.4	21.9	0	100	0	0	342	371	397	0	46	44	
16	3	8	0	5	10	1	30.6	26.8	0	100	0	0	430	480	475	1.41	3.26	0	
17	2	0	0	5	6	2	130	19.2	12	66.6	33.3	389	365	383	22.0	4.30	7.4		
18	2	0	0	4	6	3	13.4	19.2	16	100	0	0	338	365	383	2.53	4.30	3.5	
AVERAGE				5.33	6.11	2.3	33.8	26.6	6.9	97.6	2.31	289	306	317	5.04	3.33	2.2		
N _{opt}				7	12	0	9	8	1	18	0	0	17	1	0	9	6	3	

Table 8. 95% confidence interval for % domination in large size problems

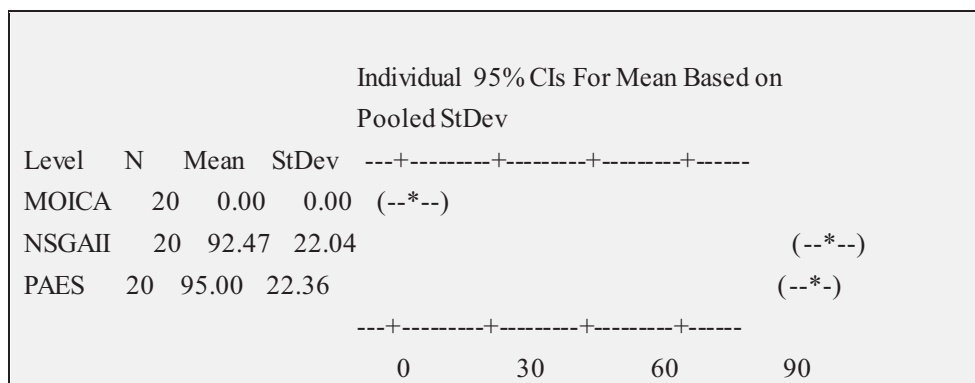


Table 9. 95% confidence interval for DM in large size problems

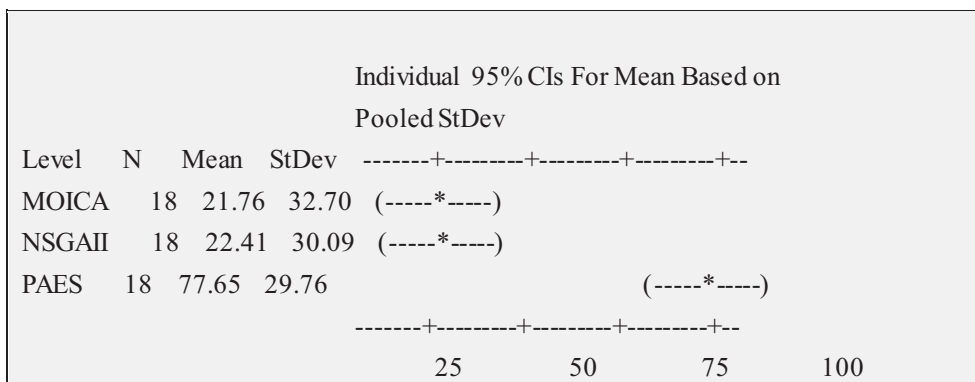
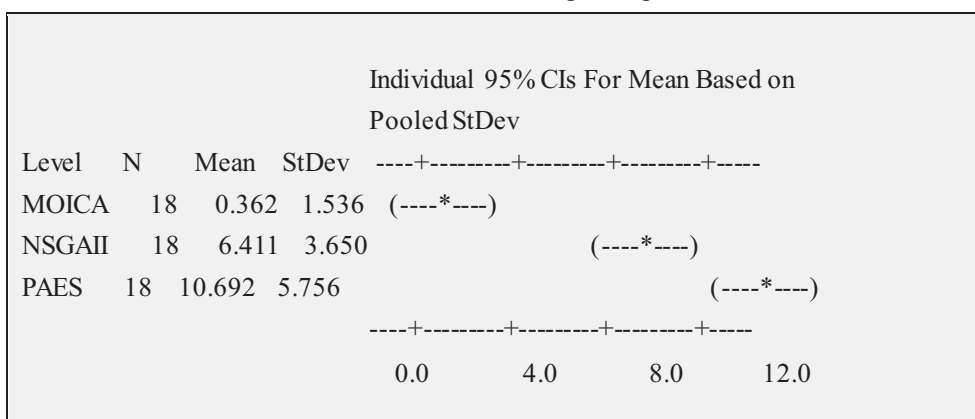


Table 10. 95% confidence interval for MID in large size problems



5. Conclusion and Further Researches

The study presents two criteria flow shop that is called two stage flexible flow shop. It aims to shorten the makespan and increase lateness of operations. The paper modeled Pareto optimal solutions and based the process on its similarity. NSGAI, MOICA and PEAS were suggested as the main three metaheuristic Pareto based multi-purpose algorithms. To estimate the efficiency of them, 36 problems, large and small, were answered. In multi-purpose norms, five key performance indicators, NPS, MID, DM, SNS and percentage domination were suggested to disclose the algorithms’ efficiency. With similar efficiency, NSGAI beats PAES in both small and large scale of problem, in terms of DM. hence, MOICA is the best algorithm in case of efficiency for all the studied problems.

To Guidance for researchers in similar cases, using other effective metaheuristic algorithm like multi-purpose and colony optimization or multi-purpose invasive weed optimization are suggested to work on. Also there would be valuable result if the stages increase for more than two.

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Value Co-creation in the Health Service Ecosystems: The Enabling Role of Institutional Arrangements

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Abstract

The health care service system is currently undergoing a profound revolution that has put the patient at the core of health outcome co-creation. Patient-centered care could be associated with Service Dominant Logic that looks at co-creation process as a dynamic resources' integration between actors. From this standpoint, the need for a broader vision of value creation process towards a service ecosystem perspective is emerging. This paper includes an overview of the scientific literature and reports on a narrative case study analysis concerning the "International Consortium for Health Outcomes Measurement" in an attempt to nourish the debate on the different ways that multiple actors can collaboratively shape a health service ecosystem. Findings reveal that co-creation practices, involving multiple actors who belong to different ecosystem levels, led to mutual adjustments and to on-going shared changes. These processes directly influenced health outcome creation, which is reframed in light of patients' needs, expectations, and experiences. Therefore, patients are assuming the role of health outcome "co-creator", interacting with all other ecosystems actors (e.g. physicians, institutions, NGOs, health managers, ICTs providers etc.). This study represents a first and preliminary attempt to investigate a real example of dynamic resources' exchange, based on the contribution of multiple interacting actors and on the role of interdepend and interacting institutions in value practices.

Keywords: health service ecosystem, co-creation practices, health outcome, case study

1. Introduction

1.1 The Evolving Health Care Arena

The Health care sector across Europe is undergoing a profound revolution, which is ultimately aimed at making it fitting with people (Erwin & Krishnan, 2016). On the one hand, the health care service system absorbs a large share of national budgets (Palumbo, 2017_a); on the other hand, health care organizations have been variously argued to be unable to effectively meet the special needs of patients (Porter and Tiesberg, 2004; Palumbo, Annarumma, & Musella, 2017). Several scholars have claimed that this situation has been the by-product of the focus of health policies on costs and efficiency improvements (Wenzl, Naci, & Mossialos, 2017; Wildavsky, 2018).

In the last few years, the scientific literature patronized the emergence of a value-based view in the health care service system, where the key issue is increasing value for patients (Porter, 2010). In other words, "...It's not the number of services provided or the volume of services delivered that matters, but the value" (Kaplan and Porter, 2011, p. 49). Drawing on these insights, outcomes are considered to be more important than output and performance, even though they are more difficult to be assessed (Palumbo, 2017_b). The critical role of value in health care is also influenced by the shift from a paternalistic and illness-centered approach towards a patient-centred approach (Porter, 2010; McCormack et al., 2011; Porter & Lee, 2013; Frank et al., 2014), according to which patients are considered as active partners of the health care providers, who are able to deeply contribute in the design and delivery of care (Farmer, Taylor, Stewart, & Kenny, 2017). In light of these considerations, both scholars and practitioners agree on the need for promoting the establishment of a co-creating patient-provider relationship in the health care service system (Michie & Williams., 2003; Quaschnig et al., 2013; Braithwaite & Schrodt, 2014).

In spite of both the success of the reconceptualization of patients as partners of the health care professionals (Michie & Williams, 2003; Ostrom et al., 2010 and Mirzaei et al, 2013) and the importance attached to value co-creation in the health care service system (Ostrom, 2010), it could be assumed that a real patient involvement is yet to come (Wilson, et al., 2017). In fact, patient involvement is prevented by a prevailing bio-medical approach to care, which considers the patient a passive target of medical services and information (Berry and Bendapudi, 2007; Payne et al., 2008; Coulter, 2012). This traditional understanding of health services' provision neglects that patient-provider interactions are at the core of value co-creation processes (Epstein & Street, 2011). In other words, the bio-medical approach to care overlooks that the patients play a crucial role in enhancing the health outcomes which could be achieved through their engagement in the provision of care (Street, et al., 2009). This interaction contributes to co-create "...a patient-centered health regimen to improve patient outcomes" (Cox and Agee, 2012, p. 1).

1.2 The Rise of the Ecosystem Perspective in the Health Care Service System

In the health care realm, value co-creation process is intended to foster the value of the provided services, the quality of care, and patients' psycho-physical wellbeing, merging professional expertise and patients' experience (McCull-Kennedy et al., 2012). Sticking to the Service-Dominant Logic (S-DL) principles, value co-creation should be understood as a dynamic process, in which multiple actors are concomitantly involved, sharing and integrating their resources through a mutually agreed value proposition that shapes a network of dense relationships (O'Grady et al., 2008; Frow et al., 2016). Beyond the social and physical environment, personal features (*inter alia*, culture, values and motivation) are argued to play a deep influence on the way resources are exchanged and integrated among the actors. Indeed, several recent contributions emphasized that value co-creation ultimately relies on the establishment of a positive and comfortable experience for patients (Helkkula et al., 2012; Sandstrom et al., 2008; Russo-Spena & Mele, 2012). However, value co-creation does not merely concern the patient-provider dyad; rather, it involves other interacting actors, such as informal caregivers and social workers, enacting an overlapping between different value co-creation processes (Hardyman, et al., 2015).

This paves the way for a systemic approach to co-creation (Wieland, et al., 2012), which offers a more dynamic understanding of the way multiple actors share, integrate and create those resources which are able to improve the quality of care (Chughtai & Blanchet, 2017). Embracing an ecosystem perspective, it is possible to represent health care system as a set of multiple interacting actors that share and re-combine their resources at all ecosystem levels to create mutual value (Rowe & Hogarth, 2005). This approach has pushed health care to go beyond the traditional and linear interaction at the root of patient-provider dyad (Gummesson, 2009), in an attempt to put at the core of its sustainability the evolving adaptiveness to complex and unpredictable environments (Palumbo, Cosimato, & Tommasetti, 2017). Health outcomes rise from the above-mentioned adaptation, that is actors' ability and disposition to share, exchange and create new resources, through the implementation of specific and collaborative practices. Obviously, this process may contribute to an on-going improvement in health services' quality and effectiveness.

1.3 Research Aims and Contents

This paper aims at examining "in action" the value co-creating dynamics which characterize a health care service system, pointing out how the interactions between the patients, the providers of care, and the other entities which populate the health care system contribute in the generation of a unique value. The article is organized as follows. In the second section, the theoretical framework on which the study rely is presented: for this purpose, an overview of the prevailing scientific literature dealing with S-D Logic is depicted, in order to: 1) figure out the distinguishing attributes of the service ecosystem perspective; 2) discuss its suitability to the health care service domain; and 3) stress the importance of co-creation practices in shaping a lively and sustainable health care service ecosystem. The third section depicts the research design and methods: a case study approach was taken, in order to collect first hand data about value co-creation practices in the health care service ecosystem. Findings are included in the fourth section of the manuscript, which includes the narration of co-practices arising from the case study. The fifth section critically discusses the findings, suggesting conceptual and managerial implications, as argued in the sixth and concluding section of the article.

2. Theoretical Framework

2.1 The Conceptual Evolution of S-DL

S-D Logic is an evolving construct (Vargo & Lusch, 2008), which has rapidly moved from its early conceptualization by Vargo and Lusch (2004) to a wide array of coexisting theoretical advancements (Joiner & Lusch, 2016). In an attempt to provide a systematization of the pillars of S-D Logic, it is possible to summarize its ten Foundational Premises (FPs) suggested by Vargo and Lusch (2004, 2008) into five key axioms (Greer et al.

2016) which are the cornerstone of a consistent conceptual framework (Vargo and Lusch, 2016). The following bullet points report the five axioms on which the S-D Logic relies:

- *Axiom 1*: Service is the fundamental basis of exchange;
- *Axiom 2*: Value is co-created by multiple actors, always including the beneficiary;
- *Axiom 3*: All social and economic actors are resource integrators;
- *Axiom 4*: Value is always uniquely and phenomenologically determined by the beneficiary;
- *Axiom 5*: Value co-creation is coordinated through actor-generated institutions and institutional arrangements.

In other words, S-D Logic focuses on the dynamics at the roots of value co-creation processes (Payne et al., 2008) and the concept of value-in-use, which could be also reframed as a value-in-context (Chandler and Vargo, 2011) and, consequently, as a value-in-social-context (Edvardsson et al., 2011). From this point of view, S-D Logic embraces an extensive service-based ecosystem perspective (Vargo and Lusch, 2011, 2016), which is fitting to different service environments, including: logistics, health care, information technology, sports, tourism, and others.

Lusch and Vargo (2014, p. 24) defined a service ecosystem as “...a relatively self-contained, self-adjusting system of resource integrating entities that are connected by shared institutional logics and mutual value creation through service exchange”. The service ecosystem is established on the joint contribution of several different actors, who are linked together in a dense network of relationships, which pave the way for the integration of internal and external resources. Some essential processes shape a service ecosystem (Lush and Nambisan, 2015), such as:

- 1) the establishment of a shared view, which intertwines a set of cognitively distant actors;
- 2) the design and the implementation of a participative architecture aimed at coordinating these actors;
- 3) and the facilitation of interaction among actors themselves.

A service ecosystem is built upon multiple, but deeply nested levels (Chandler and Vargo, 2011; Akaka et al., 2013), defined as micro, meso, and macro. The micro-level arises from dyadic interactions between firms and customers. These interactions represent the building blocks of the meso-level, where the collaboration and cooperation of organizations and communities push towards its evolution in a macro-level. Here, several institutions and associations design and disseminate shared norms, culture, language, and rules to foster the proper functioning of both the micro and the meso levels. The different ecosystem levels are merged through specific value propositions, that make the actors who populate the service ecosystem able to access and combine the resources needed for their viability. The dynamic nature of service ecosystems relies on actors' disposition to share and apply their resources, influencing their availability and offering attractiveness, as well as the ability of the ecosystem itself to adapt its configuration to a complex and ever-changing environment.

In a critical domain such as health care, the service ecosystem perspective offers an extensive interpretation of both value co-creation practices and co-creating interactions between the actors who operate at the different health care service ecosystem levels. Recognizing the inner complexity of service encounters, the scientific literature (Vargo and Lusch, 2010, 2016; Akaka et al., 2013; Greer et al., 2016) is still calling for a better understanding of the way co-creation practices contribute to the shaping of a service ecosystem through the interconnection, interaction and collaboration among and between different actors. This is especially true in the health care service system, which show several peculiarities as compared with other service environments (Palumbo, 2016).

Among others, Frow et al. (2016) recently conceptualized the health care service system in light of a service ecosystem perspective, identifying the micro-, meso- and macro-levels as depicted in Figure 1. Going more into details, different institutional actors interact at the macro-level, such as state health authorities, professional associations, labour unions, health insurers; differently, the main interacting actors at meso-level are hospitals, clinics, local health support agencies, and care home and hospice. At micro-level, the dyadic and/or triadic interactions occurring between patients, informal caregivers, and health care providers, are relevant. An additional ecosystem level – the mega-level – could be included among the layers of the health care service ecosystem (Chandler & Vargo, 2011). At this level, co-creation practices involve – among others – government agencies, health funding bodies, regulatory bodies, and media (Frow et al., 2016).

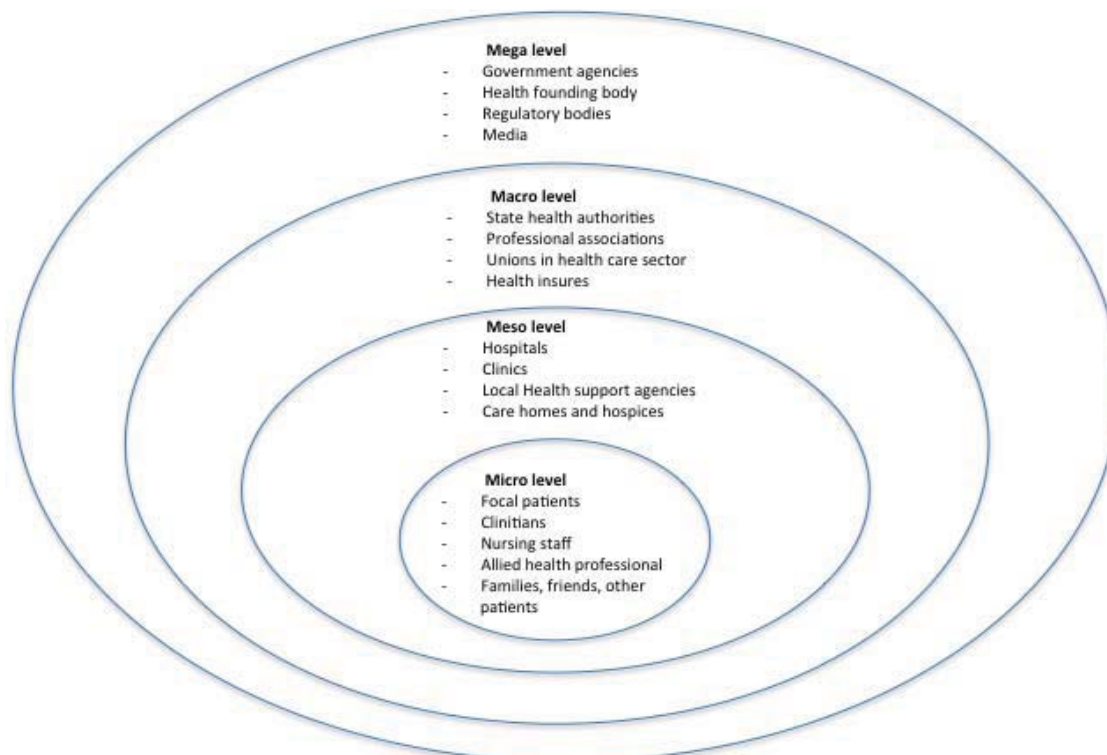


Figure 1. A representation of the Health care service ecosystem (Adapted from Frow, et al., 2016)

As an illustrative example, on-line forums and social networks – such as Facebook – could be placed at the mega level of the health care ecosystem; thus, they allow actors to widely discuss health-related issues, such as the effects of new procedures and treatments related to specific diseases (e.g. diabetes) (Robertson, et al., 2014). In fact, patients – who populate the micro-level of the service ecosystem – are likely to use digital tools as a medium, that makes them able to share their knowledge and participate to value co-creation (or value co-destruction) processes (van der Eijk, et al., 2013). The sharing of knowledge can also occur in other dedicated social networks, where patients look for new and more specific information, reporting what they find and contributing to improve both personal and common resources (Dosani et al., 2014).

It is interestingly to note that the processes of resource integration that occur at other ecosystem levels foster the creation of additional integration processes, which impact on the mega level. For the sake of the argument, patients and health care professionals' associations – operating at the macro level – may assess the reliability of health-related information provided on the internet, thus offering a “roadmap” to collect, access and use health information to actors at the mega level (Dalmer, 2017). Health care organizations – which are located at the meso level – are able to foster the establishment of meaningful patient-provider relationships, thus setting the conditions for value co-creation during the medical encounter (Annarumma & Palumbo, 2016). Last but not least, heterogeneous factors such as history, culture, politics, law, health or pharmaceutical lobbies concern the mega level and affect the definition of national orientation towards health care (Frow et al., 2016).

Ultimately, a health care service ecosystem is based on actor-to-actor (A2A) interactions that create and recreate a supportive organizational logic to service exchange and value co-creation, that is an outcome in which service providers and users (i.e. patients and informal caregivers) contribute to value creation, sharing and integrating their resources. From this standpoint, a service ecosystem can be conceptualized as a participative architecture, which allows to better understand the inner collaborative nature of value co-creation. This participative architecture offers a road map that encourages actors to participate to service exchanges and provides the mechanisms intended to the coordination, integration and synchronization of different ecosystem actors (Nambisan & Sawhney, 2011). This enables the ecosystem actors to cooperate without a strong hierarchical structure, that is typical of bureaucratic organizations.

2.2 Value Co-creation in a Health Care Service Ecosystem

Embracing the service ecosystem perspective (Siltaloppi, et al., 2016), the health care service system can be considered as a set of actors who interact within and between different ecosystem levels following specific dynamics that lead them to share, built and rebuilt their resources. These interacting processes are at the core of value co-creation or co-destruction dynamics (Peters, 2016). In line with these arguments, one of the primary concerns of S-D Logic literature (Vargo and Lush, 2004, 2008, 2016; Vargo et al., 2008; Akaka et al., 2012) is the understanding of how different actors contribute to value co-creation and how they collaboratively share their own resources. A large part of the existing scientific literature delves into the interactions occurring at micro-level (Lush and Vargo, 2006; Chandler and Vargo, 2011; Hardyman et al., 2015): here, the interactions are built upon a dyadic (patient-provider) logic, according to which the actors are willing to share and combine their resources to achieve a joint outcome.

Recently, some scholars (McColl-Kennedy, 2012, 2015; Frow et al., 2016) have begun to explore value co-creation practices at meso, macro and even mega levels, emphasizing how actors are involved in value co-creation practices by sharing their resources. Interacting with other actors (e.g. institutions, suppliers, other health providers, Non-Government Organisations – NGOs, and families), users co-create service experiences at different ecosystem levels (Epp and Price, 2008; Schau et al., 2009; Vargo and Lush, 2011; McColl-Kennedy et al., 2012). At the core of this view there is the understanding of services as contextually interpreted and experienced by individuals (Vargo and Lush, 2008; Echeverri and Skålén, 2011; Helkkula et al., 2012).

Several authors, aware of the opportunity to go beyond the traditional dyadic relationship between providers and patients, developed a relational logic, based on actor-to-actor interactions (Lusch and Vargo, 2006, 2014; Akaka et al., 2012; Vargo and Lush, 2012). In this scenario, an ecosystem approach offers a broader and systemic understanding of the relationships occurring among these actors (Henderson and Palmatier, 2010). In fact, an ecosystem perspective puts a growing emphasis on both the contribution of each actor to the whole system and on how the interactions occur among all the interacting actors (Thomas and Autio, 2014). The use of a broader perspective, which focuses on the interaction among multiple actors (Araujo et al., 2008), help to better understand “how” actors influence each others and “what” is the intensity of such influence in an ever-changing ecosystem (Frow et al., 2016). Value co-creating practices are helpful in making this point.

Generally speaking, practices are “...routinized ways in which bodies are moved, objects are handled, subjects are treated, things are described and the world is understood” (Reckwitz, 2002, p. 250). Therefore, they are intended as actions joined together by the interaction among actors (Schatzki, 2005). Moving towards a micro, meso, macro, and mega level approach to value co-creation activities, the practice theory can support the investigation of how multiple actors’ interactions affect the process of value co-creation at the intra- and inter-levels of a service ecosystem. Such a conceptual lens offers an alternative approach to value creation (Schau et al., 2009). From this point of view, patients’ participation in the co-creation of the service experience is based on the interaction with others actors placed at different levels of their service ecosystems (Vargo and Lusch, 2011; McColl-Kennedy et al., 2012). Drawing on these considerations, Frow et al. (2016) identified a typology of eight co-creation practices (CPs) which could be applied to health care. These eight practices are (Frow et al, 2016):

- CP#1: Practices that endow actors with social capital;
- CP#2: Practices that provide an ecosystem with a shared language, symbols, signs and stories;
- CP#3: Practices that shape an actor’s mental model;
- CP#4: Practices that impact the ecosystem, created or constrained by the physical structures and institutions that form their contexts;
- CP#5: Practices that shape existing value propositions and inspire new ones;
- CP#6: Practices that impact access to resources within an ecosystem;
- CP#7: Practices that forge new relationships, generating interactive and/or experiential opportunities;
- CP#8: Practices that are intentionally co-destructive creating imbalance within the ecosystem.

These eight co-creation practices are the core of the conceptual framework which inspires the analysis of value co-creation practices in a health service eco-system that is proposed in this study. It eventually aims at filling the identified gap in the literature, in an attempt to contribute to a better understanding of how multiple actors’ interactions are able to affect the shape and the functioning of the health care service ecosystem, thus influencing its ability to self-contain and self-adjust available resources in a relational logic of value co-creation (Lusch and Vargo, 2014, p. 24).

3. Research Design and Strategy

3.1 Methods

The case study methodology (Yin, 2014) is a fitting method to handle the topic dealt with in this research, that is the definition of multi-actor participation in those co-creation practices which concur to shape a health care service ecosystem. This approach entails “...a research strategy focused on the comprehension of those dynamics characteristic of specific contexts” (Eisenhardt, 1989, p. 532). Moreover, it facilitates the investigation of a phenomenon within its context, collecting data from various sources in an attempt to provide a tentative answer to the questions that have inspired this study (Baxter and Jack, 2008). Therefore, the case study method paves the way for a punctual analysis of health care systemic nature and the way actors interact to achieve health outcomes.

Drawing on Iwakabe (2015), this case study took the form of a “narrative”, according to which no quantitative results are measured and presented. Sticking to the story metaphor (Simons, 2009) and the narrative case study method (Etherington & Bridges, 2011), heterogeneous information arising from ICHOM’s partner histories were collected, organized, and interpreted in light of the eight Co-creation Practices defined by Frow et al. (2016). Data were obtained from several secondary sources (e.g. reports, handbooks, papers, video-interviews, corporate blogs, and corporate social networks) accessed surfing ICHOM’s corporate web sites. Evidence were independently searched by the authors in the period from January, 2016 to June, 2016.

At a first stage, the collected data were arranged according to a specific research protocol, which was devised *ad-hoc* by the authors for the purpose of this research. It was based on a digital worksheet that researcher could independently access to analyse the retrieved data. No time limitations were set to collect relevant data. Therefore, all data published in the ICHOM website until June, 2016 were taken into consideration. Moreover, in an attempt to increase the depth of this study, no exclusion criteria based on the authorship of the published data were used. Hence, both data published by the ICHOM and by ICHOM’s partners were contemplated for the purpose of this research. Lastly, when needed, additional evidence was searched in the web sites of the ICHOM’s partners, in order to improve the reliability and the consistency of this study. Each member of the research team classified the collected data according to the eight Co-creation Practices (CP) defined by Frow et al. (2016). Afterward, all the narrations on value co-creation practices were individually analysed by the members of the research team, who aggregated individual reports, in order to confront them and elicit agreements and disagreements. When disagreements emerged, the histories were critically reviewed and discussed until consensus was reached.

Several rules were agreed to guide both the individual analysis and the debate between the members of the research team: 1) report the data in sufficient detail to justify your conclusions; 2) mention all relevant results, including those that run counter to expectation; 3) be sure to include small effect sizes (or statistically nonsignificant findings) when theory predicts large (or statistically significant) ones; 4) do not hide uncomfortable results by omission; and 5) do not include individual scores or raw data with the exception, for example, of single-case designs or illustrative examples. As a result of this step-by-step process, a joined research report was arranged, which inspired the findings of this research. In the spirit of data sharing (encouraged by APA and other professional associations and sometimes required by funding agencies), raw data, including study characteristics and individual effect sizes used in a meta-analysis, can be made available on request by interested readers.

3.2 The Unit of Analysis

The International Consortium for Health Outcomes Measurement (ICHOM) is a non-profit organization founded by a joint initiative of different scientific, medical, and business organizations including Harvard University, Boston Consulting Group, and Karolinska Institutet. ICHOM focused its mission on a general re-thinking of the international health care system, supporting the development and the spread of shared systems dedicated to the measurement and reporting of the contribution of socio-economic actors to health outcomes.

ICHOM’s mission is “...to unlock the potential of value-based health care by defining global Standard Sets of outcome measures that really matter to patients for the most relevant medical conditions and by driving adoption and reporting of these measures worldwide” (www.ichom.org, 2017, last accessed on May, 3th 2017). To date, ICHOM has been able to map 13 diseases and define their related set of standards. According to the collected information and the theoretical framework proposed by Frow et al. (2016), ICHOM can be placed at the mega level of a health service ecosystem. In fact, it is an international NGO interacting and bringing together, according to a co-creation logic, different actors (e.g. local and national institutions, health providers, physicians, patients, etc.) in order to achieve high quality health outcomes.

4. Findings

Each story described and analysed below shows its own peculiarities in terms of informant actors, nationality, organizations, and roles. The features that mainly stood out in the narrated co-practices were actors' involvement, collaboration, and cooperation in achieving high quality health care outcomes. Moreover, sticking to a systemic interpretation of investigated practices, ICHOM facilitated the interaction between and among multiple actors belonging to different and interacting systems and making them able to learn from each other and improve their performances. The brief histories reported below show the way the different actors belonging to the ICHOM ecosystem contributed to specific health care co-creation practices, highlighting the insights which arise from the enacted practices and pointing out the ecosystem level they impacted on.

4.1 Practices that Endow Actors with Social Capital: CP#1

The HCF Research Foundation is a charitable trust, which supports research and enquiry into the provision, administration and delivery of health services in Australia. Wayne Adams, the Director of the HCF Research Foundation, stated:

"We have established a partnership with ICHOM because we recognize the critical need to shift the Australian health care system towards one based on outcomes, not simply outputs, and see our work with ICHOM as supporting that transformation."

Moreover, he declared:

"The collaboration with ICHOM reflects a growing recognition that driving value in health care requires cross-stakeholder engagement. HCF (...) collaborates with ICHOM to respond to health care expenditure cutting off. (...) The partnership with ICHOM made HCF able to offer an economic support to people who couldn't pay for their care path, respecting ICHOM standards".

HCF active engagement in ICHOM represents a co-creation practice which is intended to feed social capital for all the actors who interact within the health care service ecosystem, this influencing their social position and role in the functioning of the latter. The reframe of the roles that different agents play in the health care ecosystem may entail the arrangement of ad hoc initiatives, which allow to enhance the effectiveness and appropriateness of health services provision, without implying additional health costs.

As far as the experience of users is concerned, a patient who was engaged in one of ICHOM's online forums shared her experience in order to provide other patients with relevant information to face challenging health issues:

"I was expecting (...) and, having lost my first baby, I was determined to avoid a reprise of the tragedy (...). I had been thinking about how I could help improve health care structurally and systemically. The head echo cardiographer said that my second baby had TOF (Tetralogy of Fallot) and he would likely need multiple open-heart surgeries, my focus became medical condition and its outcomes. (...) I tried to take the best decisions about hospitals, surgeons, and treatments. I visited seven children's hospital, meeting with cardiac surgeons and asking them directly about the best treatment. Then I gathered some of the information I was looking for. My long quest for good outcomes led to a hospital in Boston, and it was there that my son was born. He had many surgeries and spent three months in the NICU (neonatal intensive care unit). He had additional surgeries and more than two dozen oesophageal dilations. (...) Despite everything, he now is happy and has no altitude or exercise restrictions. I think that medical errors must be documented alongside successes, and this information should be made accessible to both clinicians and patients".

Patients' active engagement in ICHOM's online forum represents a practice which is aimed at creating and sharing new knowledge. In the specific case reported above, the share of individual patient experience was intended to assist other women with babies suffering from TOF, providing them with both psychological support and information to properly navigate the health care system. From this point of view, ICHOM itself seems to perform as an ecosystem, which involves a wide array of agents, each of which contribute in maintaining it vivid and viable.

4.2 Practices that Provide an Ecosystem with a Shared Language, Symbols, Signs and Stories: CP#2

ICON is a global provider of outsourced drug development services to biopharma, medical device, government, biosimilar, and generic organisations; also, it is one of the most relevant ICHOM's partners. As regards with this partnership, its Chief Operating Officer (COO) argued:

“We are building around the world with institution registries measuring ICHOM Standard Sets. (...) Partners have been added to the network all over the world. (...) 54 health care facilities in India, Dubai, Mauritius, and Sri Lanka, have started measuring the Coronary Artery Disease Standard Set”.

Similarly, an ICHOM’s manager for the development of outcome measurement Standard Set reported:

“We (...) are supporting implementation projects across the US, UK, France, Australia, and, with over a hundred more institutions expressing interest in measuring our outcome sets. At the end of 2015, we launched our Implementation Communities, an ICHOM support model that invites groups of value-oriented institutions to move through the implementation process collaboratively. (...) As part of our on-going mission to promote outcomes measurement and share best practices publicly, we have migrated much of the content from our subscriber-only Implementation Network to a new file library located on ICHOM.org. This content is now freely available to all registered ICHOM.org users”.

The development of a global Standard Sets is a co-creation practice which is aimed at providing all ICHOM’s partners with a general and universally agreed protocol which supports them in outcome definition and measurement, making them perfectly comprehensible, and sharable within the whole service ecosystem. In other word, this co-creation practice involves the gradual establishment of the health care service ecosystem’s infrastructure, paving the way for the definition of shared language, symbols, signs and stories among the actors who contribute to its functioning.

4.3 Practices that Shape an Actor’s Mental Model: CP#3

Also, the COO of ICON stated:

“We are proud to bring our clinical and technical expertise in health outcomes and real-world data to help ICHOM to launch the first global health outcomes benchmarking program”.

The global health outcomes benchmarking program is intended to support health providers in changing their practices and following the most successful ones, in an attempt to facilitate a wider adoption by the side of all service ecosystem actors (e.g. Governments, Institutions, Professional Associations, Medical Staffs, Patients, Families, etc.). Emphasizing this point, the Vice President Strategy and New Program Development at ICHOM claimed:

“The ICHOM has also launched the ICHOM TechHub, (...) a review-based directory of electronic tools for outcomes measurement. (...) Using the TechHub, health care providers and administrators can view profiles and reviews, sort and filter options based on key criteria, and request additional information and virtual demonstrations from those that ultimately meet their organization’s preferences and needs. (...) Working alongside care providers around the world, we have learned that there is no ‘one-size-fits-all’ technology solution to support outcomes measurement. The diversity of geography and functionality of these platforms will allow the TechHub to serve as a valuable resource for hospitals around the world interested in measuring ICHOM Standard Sets”.

ICHOM’s TechHub is crucial to encourage the actors who populate the health service ecosystem in changing the way they approach outcome measurement, facilitating their access to specific and certified tools, which enable them to participate in co-creation practices and to effectively share their resources.

The Memorial Sloan Kettering Cancer Centre, the world’s oldest and largest private cancer center, participates in the ICHOM ecosystem. Focusing on the role of this organization in such an ecosystem, one of its Informing Doctor reported:

“Sloan Kettering engages more proactively with physicians in the selection of risk factors for adjustment of their approach to prostate cancer care, also through the design of their own report cards. Thanks to a secure web portal, urologists can access a report of their average risk-adjusted outcomes, aggregated over all of their patients who have undergone radical prostatectomy. In this way, urologists can compare their rate with colleagues’ rates, defining their own case mix”.

The web portal, being based on a logic of performance improvement and risk reduction, allows to compare data. From this point of view, it is able to deeply influence co-creation practices, as well as behaviours and activities of different physicians, shaping the actors’ mental model and setting the conditions for value co-creation.

4.4 Practices that Impact the Ecosystem: CP#4

FORCE-TJR is a Massachusetts-based research registry, which develops tools with which to record the patients' assessment of the success and failure of their surgery, and conducting research to guide both clinical care and health care policy. Its Managing Director argued:

“Rather than building new infrastructures, some U.S. providers have outsourced the collection of outcome data. Consequently, some providers were equipped with centralized registry, where the staff collected comparable data at complementary time points from multiple sites, reporting the information back to each of these various sites. Data collection process was based on patients' direct involvement, who, evaluating their treatment, contributed to co-create indicative measures about physical structures, care paths, provided services, and staff performances. (...) After signing the consent form, patients could complete the questionnaire either through a web-based survey or on paper that can be scanned. The adjusted data were stored in the national registry, and are accessible by the treating surgeon any time through a secure website”.

The development and the implementation of a centralized registry helps health providers to extend and adopt new and emerging rules, norms, and procedures which are able to support the existing and, possibly, new practices. Therefore, these types of co-creation practices deeply impact the ecosystem, affecting the informal structures and institutions that form the contexts in which the different actors interact.

4.5 Practices that Shape Existing Value Propositions and Inspire New One: CP#5.

The COO of Providence Health and Services, a not-for-profit Catholic health care system operating multiple hospitals across 5 State in US and an ICHOM Strategic Partner, claimed:

“Implementing a value-based strategy is on the mind of nearly every health care organization in the U.S. The shifting from cost-based strategies to value-based strategies (...) led some ICHOM's providers to shape Working Groups of leading physicians, patient representatives, and outcomes experts from registries. (...) Our Working Group members are volunteers who have equal voice in determining a shared outcome. (...) We find that nearly every element of their value strategies builds on and is strengthened by one thing: the ability to measure outcomes.”

The implantation of value-based strategies, which are directed to improve outcomes, shrink costs, and enhance the appropriateness of care, may lead to the definition of new value propositions, which are relevant for all the actors involved in the functioning of the health care service ecosystem. Echoing these considerations, an informant senior manager at Massachusetts General Hospital, the largest teaching hospital of Harvard Medical School, admitted:

“The Division of Population Health Management team knew it needed a better process for determining who was best served by resource-intensive procedures. Rather than require that physicians follow rigid protocols, the Division created a decision support system to help clinicians determine when a procedure was indicated, based on a patient's clinical circumstances. Procedures were integrated into the electronic medical record, and patients received videos and handouts explaining the risk and benefits of the various treatment options, as well as personalized consent forms that adapted those risk and benefits for their specific circumstances. The entire system was informed and refined by on-going tracking of outcomes”.

In this specific circumstance, the reframe of actors' value proposition was aimed at properly facing the gradual shift from volume-based fee-for-service contracts to risk-based population ones, striving for reducing the effects of such a change on the individual viability. Co-creation practices allowed to frame a new interaction approach between the patients and the providers of care, which – in turn – enhanced outcomes through on-going evaluation.

4.6 Practices that Impact Access to Resources within an Ecosystem: CP#6

ICHOM Vice President of Research and Development revealed:

“At the end of 2013, we created a new website that better reflects who we are and what we do. The web site is continually enhanced, especially thanks to the constant partners' contribution (...) who contribute to enrich its contents, publishing User Generated Contents (...) about practices, general information, and reporting inefficiencies, emergencies, and the related answer. This led to the creation of a community based common meaning sharing among a flurry of new partnerships.”

The launch of ICHOM new web site and the related social tools contributed to offer a virtual space in which the

actors populating the health care service ecosystem can access and share resources. Obviously, the greater opportunities of resource integration involve greater ability of value co-creation and, therefore, increased well-being for those who participate in the functioning of the health care service system.

Similarly, an Informant Doctor of Wexner Medical Center, a multidisciplinary academic medical center of the Ohio State University, reporting that his clinic created some questionnaires to capture patients' experiences and feelings as a quality standard, pointed out:

"During the check in, each patient was asked to complete the questionnaire, in order to make the staff able to scan it into the patient's Electronic Medical Record (EMR) in order to track outcomes. (...) Medical staff could refer to the reports and manually trend data, in order to control the evolution of care paths."

The adequate functioning of a service ecosystem basically relies on the access to timely and relevant information, which are an essential ingredient of the recipe for fostering collaborative and co-creating relationships between the different ecosystem actors.

4.7 Practices that Forge New Relationships, Generating Interactive and/or Experiential Opportunities: CP#7

In the opinion of the ICHOM Vice President:

"The frequent ICHOM's conferences are organized to support physicians and practitioners in meeting and sharing their experiences in terms of achieved outcomes. (...) Sharing their experiences, showing problems that they have faced, and, in several cases, publishing specific papers and/or articles, they can feed new practices able to improve their offering".

From this point of view, ICHOM performs as a crucial platform establishing new forms of relationships between the actors and generating greater opportunities to co-create value. In particular, ICHOM facilitates health outcomes assessment, embracing a patient-centered approach. Moreover, it attempts to deeply engage all relevant actors in outcome measurement, strengthening and intensifying relationships within ecosystem.

In line with these points, an informant physician of Memorial Sloan Kettering Cancer Centre reported:

"A patient felt very safe recording outcomes, even about sensitive issues, on a computer."

Consequently, in 2009 his centre started to use the Web Survey Core, an online platform that allows patients to report their outcomes directly to their physicians. Patients could also complete the survey during their waiting time in the clinic through a tablet. After this, the doctor could have a comprehensive view of the answers that respects patients' anonymity. In this way, doctors might be able to focus their attention on problem solving, rather than on the other issues, including data collection. This was very supporting in medical issues related to critical disease such as prostate cancer, about which patients were less confident to talk about, preferring to report about it in an anonymous way. Of course, these data are especially relevant for the purposes of shared health decision-making.

4.8 Practices that are Intentionally Co-Destructive Creating Imbalance within the Ecosystem: CP#8

An informant doctor of Memorial Sloan Kettering Cancer Centre reported on the way physicians reacted to the implementation of a new program of electronic survey. The doctor told that in his centre medical staff didn't use a digital program, considering it too complex and time expensive. Consequently, they felt:

"We were wasting their time, especially in overbooked days".

Health care professionals were also critic of this tool, considering the report it provided hard to interpret and offering little useful information. The negative reaction of Memorial Sloan Kettering Cancer Centre physicians led to the emergence of disrupting practices, based on actors' defection from the ecosystem. Likely, such a co-destruction dynamic was generated by an inadequate involvement of health care professionals in the design and implementation of the co-creation practice.

5. Discussion

The different co-creation practices analysed in this paper are expression of a patient-centered approach to care. However, their impact is not limited to a micro ecosystem level, which focuses on the dyadic patient-provider relationship; rather their effect spread to all the different ecosystem levels. The various actors who populate the health care service ecosystem (including patients, health providers, health care organizations, professional associations, community of patients, and so on) are engaged, in several different ways, in a co-creation effort, contributing to health outcome improvement. Ultimately, health care co-practices affect the long-term outcomes which could be achieved in the health care service system, relying on resource integration and redefinition of

individual value propositions. According to a recursive and circular logic, systemic and agreed value propositions enable the whole health service ecosystem to improve its effectiveness and efficiency.

Following this red-thread running through all the co-practices, the following lessons can be learned:

- 1) In terms of practices that endow actors with social capital (CP1), the first narration emphasizes the importance of trust and cooperation among the interacting actors at the mega ecosystem level. In the reported narration, trust arises from the ICHOM's ability to enhance the density of interactions. The active engagement of ICHOM's partners feeds and distributes social capital among all the interacting actors, influencing their position, influence, and attractiveness on the service ecosystem (Schau et al., 2009). From this point of view, it is not surprising that, benefitting from the collaboration with ICHOM, HCF was able to establish a better relationship with patients, especially those belonging to the marginalized group of the population.
- 2) The second narration, which concerns the meso ecosystem level, underlines that knowledge – as well as the personal experience of patients with the illness – is shared both among people suffering from similar diseases (bridging ties) and with health care providers (linking relationships), who can benefit from such a resource to arrange a health treatment which is tailored to the special health needs of each patient.
- 3) In terms of practices that provide an ecosystem with a shared language, symbols, sign and stories, the adoption of a common language fosters the reliability of shared information, making all the interacting actors able and willing to co-create value (Akaka et al., 2014). The transparency at the root of Standard Sets discussed above prevents an ambiguous analysis of health care practices, minimizing the risks of value co-destruction. This result can be achieved defining and sharing experiences or, alternatively, preventing negative practices that may lead to the misuse of available resources. Indeed, a consistent and transparent measurement of health outcomes based on shared Standards Sets (language) can improve patient experience and outcomes quality, concomitantly reducing health care costs.
- 4) The case study narration has pointed out some interesting practices, which are able to shape the actors' mental model. In particular, ICHOM's outcome benchmarking program positively affected the dynamic interactions among different actors at the same and at different levels, leading to radical change of the mental model and driving multiple actors' activities towards continuous improvement. In this case, ICHOM's leading activities and its central position within the health care service ecosystem had a deep influence on other interacting actors, feeding and/or enabling the ecosystem's dynamic configuration. In a global health care system, this change may lead to the improvement of health performance and, consequently, of the offered services. In addition, this led to an overall improvement in the quality of life.
- 5) The practices that ICHOM enacted in order to influence the ecosystem, created or constrained by the physical structures and the institutions that form their contexts, highlight the ability to improve care pathways through resources' integration. In the reported narration, physical resource (National Registry sponsored by ICHOM) dematerialization, outsourced to a specialized external provider, imply a deep redesign of the clinic's physical structure, building a new intangible infrastructure. Consequently, the implementation of the National Registry puts knowledge sharing at the core of the process of health services' provision, making patients free to report their care path experience and their demands for health services' improvement. It is evident that this structural change can potentially affect and change the way actors interact, paving the way for new emerging co-practices. This change benefits not only the treatment of a single patient, making it ever more personalized, but also the knowledge improvement of a single organization and of all those health care organizations that can access the register and participate in new resources (knowledge) creation.
- 6) In terms of practices that shape existing value propositions and inspire new ones, the emergence of a value-based approach has led some of ICHOM's providers to shape new plots of relations among actors and to develop new ways to share their resources, in order to create new value propositions, that allow an increase of achievable health outcomes. In particular, new value propositions led to the abandoning of cost-based strategies and to the implementation of value-based strategies, aimed at enhancing outcomes and lowering costs. In other words, the health service ecosystem has been shaped by the actions of multiple actors, who have integrated resources in innovative ways, thus contributing to new offering creation.
- 7) Some value co-creation practices affect the access to resources within a health care service ecosystem. The development and the implementation of an open platform highlight the logic on which ICHOM's and all the interacting actors shape the service ecosystem. This platform enables an on-going resource sharing and, at the same time, contributes to the creation of new resources, facilitating the contribution of actors who, sticking to their specific role, can publish and share User Generated Contents (UGC's). Therefore, the open-access platform enables actors' participation to specific co-creation practices, and makes them able to access new resources

generated merging their own resources.

8) ICHOM's online forum makes multiple actors able not only to share experiences and resources, but also to create new ones (such as knowledge), in order to enhance performances and improve the offered services. This practice also allows individual actors to seek and share knowledge about their health-related condition through the online forum. It is evident that the enhancement of performances and services involves an increase of the wellbeing for the whole health service ecosystem.

Last but not least, the narration pointed out some practices that are intentionally co-destructive creating imbalance within the health care service ecosystem. A co-disruptive practice has been found among the medical staff of a U.S. provider. It highlighted a voluntary resistance to changing managerial routines, due to the implementation of a new physical resource (an electronic survey). In this case, the resistance disrupted the ability to create positive health outcomes. It has also to be reported that the negative attitude of medical staff towards the new physical resource was mainly due to the different logic that guides practice in different ecosystems - in our case, the health service ecosystem in which the electronic survey has been implemented and the ICT service ecosystem in which it has been developed - and has sometimes led to unbalanced interactions among actors who participated in various embedded ecosystems (Akaka et al., 2013).

6. Conclusions and Implications

This paper supports the role of value co-creation practices in a health service ecosystem and contributes to the debate on health service research. In particular, our study firstly contributes to the empirical application in a specific context of Frow et al.'s (2016) theoretical framework, nourishing the scientific debate. ICHOM was presented as an extreme case (Eisenhardt, 1989) in shaping a service ecosystem, enabling not only resources' sharing and coordination (knowledge), but also new resources creation (shared visions and norms), which involves the on-going ecosystem adjustment. The adoption of a patient-centred approach, according to which health outcome are reconceptualised, represents the starting point of value creation, which led to organizational, physical, behavioural, and emotional changes.

In addition, this research highlights the underlying processes at the roots of both value co-creation and resources' integration in a network of a multiple interacting actors (Ostrom, et.al. 2015; Ciasullo, et al., 2017). Co-creation practices created by different actors, belonging to different ecosystem levels, show a mutual adjustment and contribute to ongoing and shared changes. From this point of view, health outcome co-creation takes place not only in light of patient's demands, needs, expectations, and experiences, but also "with" the patient, who becomes a key partner of health care professionals and a fundamental value co-creator. For this purpose, the ability of various mediating actors (e.g. ICTs providers, non-profit organizations, social workers) is crucial, since they support in correctly interpreting and using the resources that patients offer in order to redefine the health care services' offering. Following this logic, a process of mutual adjustment between these different actors arises at all the ecosystem levels (micro, meso, macro, and mega). Such an adjustment is endorsed by a gradual change in individual value propositions, through the activation of synergistic interactions which, in turn, promote a creative adaptation (Mele et al 2014).

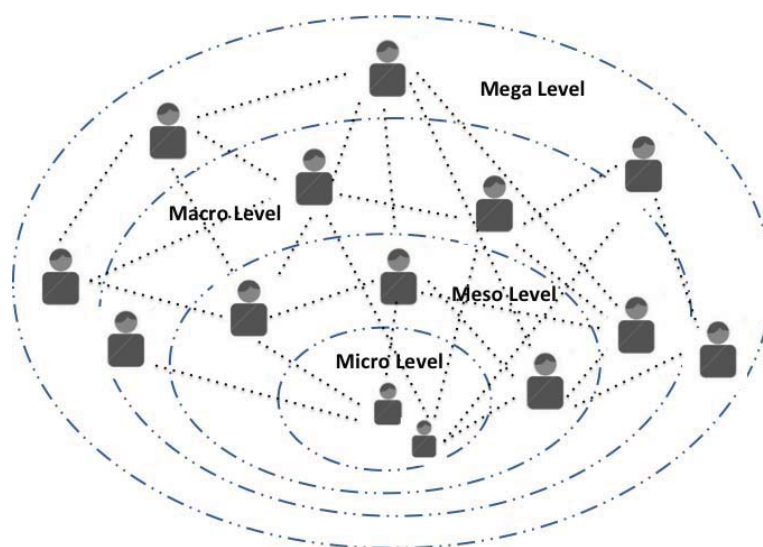


Figure 2. Resources' exchange among and between actors of different ecosystem levels

Also, this research has interesting managerial implications. First of all, health care providers should be encouraged to establish better relations with the various actors, at the micro, meso, macro, and mega levels, to co-create value. Also, appropriate strategies should be designed and implemented to avoid the emergence of value co-destruction dynamics, which entail negative health outcomes. Moreover, the lessons learned analysing the co-creation practices assist managers in redesigning the shape of the health care service system according to a systemic view (Barile, et al., 2016).

The research is somewhat limited by a focus just on ICHOM co-practices; for this reason, findings could not be generalized to similar health care service ecosystems. With this in mind, further investigations should focus on other experiences of co-creation practices, embracing either a descriptive or a comparative approach. Also, more attention should be paid to the peculiar business models that would allow health care organizations to properly function in a health care service ecosystem. Lastly, further developments are needed to better understand: (1) the way co-creation practices produce stronger and more reliable relationships between the health care service ecosystem's actors, and (2) the role of ICTs in shaping service ecosystems.

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Innovation in Tradition: Key Success Factors of New Entrepreneurs in the Retail Trade

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Abstract

Have the economic crisis, the digital revolution and the growth of mass retailing changed the success factors of small retailing companies? What impact have they had on the characteristics of the profiles of new entrepreneurs in the retail trade? On the basis of the data collected through a qualitative research by a semi-structured interview on a sample of retailers, the paper aims to provide answers to these questions.

The results of the interviews, recorded, transcribed and analysed using the software T-Lab 8.1, highlight the new success factors and, in particular, the key role assumed by web marketing. Moreover, the fact that the retail sector has maintained a strong capacity to create employment is cause for reflection on the employment potential of the small companies in the more traditional sectors. The importance of this sector appears even more significant if we consider the context of economic instability and declining consumption in which these companies are operating.

Keywords: retail trade, retailer micro enterprise, new entrepreneurs, qualitative research

1. Introduction

For a long time now economic literature has considered the retail trade as a residual sector, not very competitive and innovative, and protected from international competition. All negative features, tolerated only due to the positive contribution that the sector has always guaranteed to the country in terms of employment. The two great poles of the retail trade, food and non-food, have shared the same fate, but at different times. In Italy, mass retailing made its entry into the food sector in the Sixties and experienced rapid development which appears today to have come to the end of its cycle. Self service points of sale with ever increasing dimensions, grouped in corporate and/or contractual forms, have facilitated the concentration of this sector. In Italy, 28,232 modern points of sale account for 59% of the market (according to AC Nielsen estimates, 2013). The modernisation of the non-food sector of the retail trade finally arrived – thirty years late. As of the Nineties, the points of sale started to get bigger and large specialised retailing outlets began to attract the demand, to the detriment of traditional retailers. Although high, the competitive pressure exerted by the modern component over the traditional one has generated lower levels of concentration in the non-food supply compared to the food supply. Non-food modern retailing concentrates 44% on sales, despite the fact that it has 2,064 more shops (thereby topping a total of 30,000 units), so the economic importance of Italian non-food Mass Retailing is 15 percentage points less than the analogous channel in the food sector (according to AC Nielsen estimates, 2013). So the data point to a framework featuring a distribution network in which specialised, small retailers demonstrate a tenacity that is unequalled in Europe. Although it lost sales units in the period 2011–2013 (from 526,791 to 513,201 stores; according to Federdistribuzione estimates), the traditional stores still play an important economic role in Italy, mediating 41% of the sales of non-food products (against 42% in 2011). Signals of revitalisation are observable also in the food sector where the number of points of sale has increased by 1,965 businesses in 2013 compared to the previous year, amounting to a total of 513,201 sales units. Thus, notwithstanding the undisputed leadership of modern retailing, in the food trade traditional retailing maintains a sizeable market share of approx 18% (according to AC Nielsen estimates, 2013).

In Italian literature several studies focused on the retail trade following a sectorial logic, on the contrary, a limited number focused on small retail businesses from an economic/managerial perspective. The main reason is the fragmentation of the supply which impedes a structured activity of managerial research, only accessible from

a certain dimension, due to the economic investment and human resources it requires. Otherwise, modern retailing which aroused the interest of researchers thanks to the availability of much more detailed data on the consumer (scanner data and loyalty cards) (e.g. Castaldo, 2013; Lugli G., 2009; Pellegrini & Zanderighi, 2013; Sciarelli & Vona, 2008; Burt, 2010; Burt, Sparks, & Teller, 2010). Traditional retailing appears deserving (worthy) of the same attention as modern retailing because, not only is it far from being on the decline, but it also manifests great energy and capacity for innovation (Beaver & Jennings, 2005; Man, Lau & Snape, 2008; Mitchelmore & Rowley, 2010; Soto-Acosta, Popa, & Palacios-Marqués, 2016; Mazzei, Flynn, & Haynie, 2016). Recently, small retailers have been prompted to change by the growing preference manifested by consumers to the electronic retailing channel which (Da Costa, 2016; Sin et al., 2016), paradoxically, has also increased the demand for traditional services. Other driving factors are the aging of the population and a different way of experiencing city life in which the role of the car has been dramatically reduced. The challenge that neighbourhood points of sale will have to face in the near future is to continue to offer value in a context dominated by increasingly more custom-tailored forms of selling.

The aim of this study is to investigate the success factors of retailing microenterprises and analyse the employment potential of the Italian microenterprise sector, in which organisational, economic, social and emotional dynamics are mixed. Particular attention is dedicated to traditional non-food retailing given its economic importance. The analysis focuses on Lombardy, the most competitive region in Italy which has followed a development model based on mass retailing in its various point of sale formats: Shopping Malls, Factory Outlets, Hypermarkets, Superstores and Large Specialist Retailing Outlets. Also the presence of branch offices and franchising systems is higher here than in other Italian regions. So the choice fell on a context in which competitive pressure is so high that the solutions found by traditional retailers tend to represent anticipative, innovative and effective strategic paths for the sector as a whole and valid also for other areas of the country.

2. Method

The investigation was conducted in 2014 through a semi-structured interview addressed to a sample of 8 entrepreneurs who had set up retail businesses in the last two years. Young (30–40 years) or adults (40–60 years), the new entrepreneurs were characterised by a fairly good level of education. Before entering the retail sector, almost all of them had had previous work experience.

The interviews were carried out on the basis of pre-set questions, posed in the same way and in the same order to all of the interviewees. At the same time, they were also allowed to express themselves spontaneously. The interviewer also had the same freedom and could pose additional questions depending on the specific relational dynamics of each interview.

The conversations were recorded and subsequently transcribed so that their contents could be analysed. The activity was conducted in two phases. In the first phase, two researchers read the transcripts separately in order to familiarise themselves with the data and classify the text on the basis of pre-set themes (theory driven approach). In the second phase, the researchers reread the transcripts together, discussed any classification differences and reached an appropriate agreement on their interpretation.

In support of the analysis of the contents, the software T-Lab 8.1 was used; this made it possible to analyse the text more or less automatically, using statistical and lexical techniques.

Overall, a total of 21,353 words were identified and the processing of the texts produced the following results:

- the relevant key words and the relations between them;
- the association between the key words.

What connotes the words as being representative of the contents of the text is the frequency with which they appear (at least four times), while relevance increases with the frequency. It should be specified that some lexical forms were grouped under a single headword.

An overview of the relation between key words is provided by the multidimensional scaling map: the length of the words is a proxy for their importance, while their closeness is a proxy for the intensity of the relationship between them. The axes were labelled on the basis of the words present in the boxes and the theme to which they refer.

3. Results

The conceptual map that small entrepreneurs construct with reference to the success factors of a retailing company at a fixed place of business appears comprehensive and not at all simplistic (Fig. 1). The headwords quoted and the way in which they are placed in relation to one another take into account the complexity inherent

in doing business, but – even more important – acknowledge the fact that entrepreneurs are well aware of this. The words most frequently used are *point of sale*, *services*, *social network*, *internet*, *marketing*, *franchisor*, *skills* and *competition*. Each of these hides a complex structure of marketing levers to be used to navigate with relative ease in the fast-flowing waters of the market.

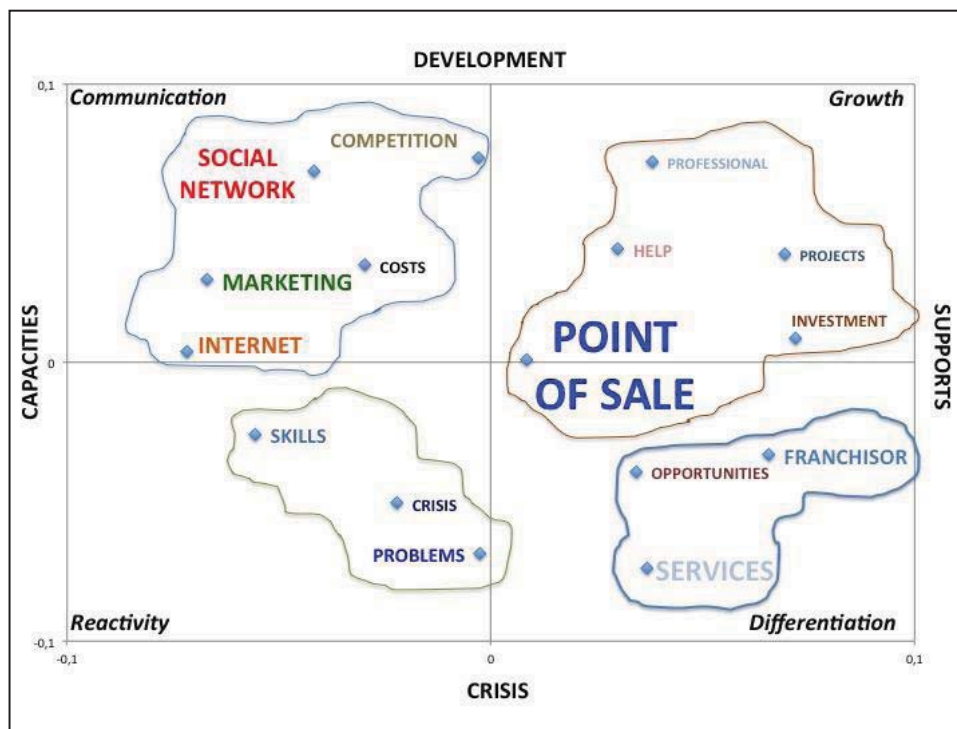


Figure 1. Success factors: conceptual map (multidimensional scaling map)

Four thematic areas can be identified, organised around two axes: development/crisis and capacities/supports. The first places the entrepreneur in the current situation (crisis) and projects him/her into the future (development); the second identifies the know-how required for success on the market (capacities) and tools needed to achieve these (supports). The four thematic areas that identify the success factors of small entrepreneurs are: communication, growth, reactivity and differentiation.

“Growth” box

Growth depends solely on the capacity to offer a product, or a point of sale, with the power to fully satisfy the customer’s requirements. An attractive setting ranks among the first factors of success because it is the place in which the customer’s purchasing experience takes place. As such, all the elements composing it (architecture, decor, furnishing accessories etc.) produce a halo effect on the assessment of the quality of the service received and, therefore, on the degree of satisfaction obtained.

The cost of store design solutions can be resolved in two ways: creativity in the search for innovative solutions at a sustainable cost and the use of the friendship network in order to obtain professional advice cheaply (or, even better, free of charge) in order to meld the various elements of the store space into a well-integrated whole that is attractive to the eye of the customer. This requires a thorough change of perspective. The point of departure shifts: from the standard format of a point of sale for a product sector which involves the finding of the necessary financial resources, to a unique point of sale format that can be achieved with resources in line with the budget available. In other words, the economic security of the activity is assured, since the design idea must be sustainable and in line with the pre-set maximum expenditure limit. Among the various alternatives for the point of sale format, the winning solution will be the one that complies with this limit, provided that it is aligned with the market positioning of the service offered.

Many people think that this design project was studied in depth with who knows what kind of investment, in order to manage to create this pseudo-salvaged vintage effect. For me this is an incredible compliment. Because we really did salvage the materials, because we had no money, but people think that there is some really sophisticated, high-budget work behind the design. And saying that it looks like a really

expensive design, ultra-researched to recreate a vintage look is the best compliment they could pay me, because it really is all that we could afford.

We consulted our architect and interior decor friends, and were helped by an interior designer friend. All on a very human level. [...] Then we had other friends, who are still taking care of the packaging and graphics. [...] And they, together with our interior designer friend created a match between the furniture and all the rest.

“Differentiation” box

The experience recounted by the entrepreneurs seems to indicate the development of new point of sale formats, using to advantage the increase in the demand for services. A product innovation leading to the success of a distribution network that could be defined as service-dominant retailing, i.e. specialised retailing distinguished by a product mix with a predominantly high service content. In order to differentiate itself from modern retailing, neighbourhood retailing redefines the product-service mix in favour of the latter. So the more traditional activity of retailing becomes secondary and ancillary to the provision of new services which become the core business of the retailing companies. An example of this trend is a case study which was the subject of an interview: a small network of points of sale under franchising (three in Milan and one in Lodi) called PCBuster (www.pcbuster.it). The company started operating with a focus on IT assistance services for the general public and small companies. Only after the initial launching phase and at the request of the clientele itself did it progressively extend its activities to the retailing of accessories for PCs. However, this second component of its product mix provided a marginal contribution to its overall turnover and was functional to being able to offer a complete service.

Service is, unquestionably, becoming a highly requested factor once more. For example, an elderly person comes in with an old mobile phone and is afraid of having to replace it: “What will happen if I put the SIM card in another device? Will I lose everything? I don’t understand the new mobile phones”. And Fabrizio, my business partner, who comes from a similar experience to mine is very patient. He takes the customers' problems in hand and resolves them, obtaining very positive results. Our business grows by word of mouth. Yesterday evening a lady came in and said: “Is it true that if I bring my mother here with her new mobile phone that you will move the memories for her and explain to her how it works?”

We have a shop that sells sweets and wedding favours, and we are just starting to enter the party planner and entertainment sector for children. I have a girl who works alongside me in this when I call her, because obviously we develop the various projects on the basis of the demand and the customer's budget.

The second imperative to guarantee success is to offer value to the customer with a product that is unique and which stands out in comparison to the competition. The opportunities for traditional retailing exist, albeit in a niche market, because the watchword of mass retailing and franchising chains is “standardisation”. This is the condition required for developing the brand and obtaining economies of scale (both internally and in negotiations with suppliers). There is nothing negative about all this, except for the fact that this marketing policy creates a supply gap which can be filled by offering the consumer something different. In a nutshell, the retailer can get a share of the market if she/he does not forget the elementary rules of business: understanding whether unsatisfied needs exist, developing a distinctive product to offer customers and letting them know about it.

Hairdressers’ and bars keeping opening up. There's no point in creating so many businesses doing the same thing. Since there is already so much competition with shopping malls attached, the possibility probably exists to create, first and foremost, original business activities, because I read an article which recommended that before opening a shop and choosing what kind of shop to open, you should create a niche market and work on an aspect that is different from all the other businesses that can be found anywhere and everywhere. [...] You have to be different from the competition. This is a success factor.

[...] because shopping malls have all become clones of one another now. Even the development of franchising systems and networks of shops have led to standardisation, most probably due to the policies imposed by the franchisors. But in the end the consumer arrives at the following conclusion: I might as well go there, it's the same as the other place.

“Communication” box

Communication occupies a prominent position among the factors that determine the success of a business. An activity which all entrepreneurs consider no longer separable from the internet and the social networks, which must be added to the more traditional methods of communication. The store sign, visual merchandising, product packaging, the shopping bag and business cards are all important elements of communication, as is the capacity to communicate in the places that the consumer visits. And more and more of these places are becoming virtual.

“The times are past when it was sufficient to have a nice shop window to attract customers and prompt them to enter the shop”; now “we have to go and get the customers where they are, and that’s the internet” (Barbara Barazzoni, entrepreneur).

Some entrepreneurs have become proficient in the use of the most popular and widely used social network, i.e. Facebook. A page dedicated to the store makes it possible to communicate what it can offer and tempt the customer to come to the point of sale to purchase the product that may have caught his/her attention. Providing the selling price is an important factor for attracting customers. It is the store’s way of telling the customer: *“I sell products with different prices; among these you will be sure to find something that you like and can afford”* (Barbara Barazzoni, entrepreneur). In addition to handling relations with regular customers, social networks offer the possibility of a much more powerful word of mouth in terms of the number of contacts that can be reached in comparison to purely physical contact. Relying on the internet for evaluating the alternatives and reading the comments of those who have had a direct experience reduces the risk of uncertainty and promotes sales. Last but not least, online communication is a valid alternative to traditional communication, such as for example, flyering. In the case of microenterprises, the profit and loss account is often unable to bear such costs.

However, the other side of the coin reveals that: firstly, it is crucial to be proficient in information technology and communication; secondly, this activity is time-consuming. Neither one nor the other condition can be taken for granted: the entrepreneur needs to be extremely adaptable to change. The alternative is to address the market, suffering the consequences of lack of integration and tardiness in the updating of information. There is nothing more deleterious for a company than to set up a virtual showcase and then fail to consistently update its contents. If visitors/customers find nothing new they will soon stop visiting the company’s websites because they do not see the point in doing so.

To sum up, leveraging on communication is important, as is putting it into practice on the internet. The logical consequence of this is that retail companies with a fixed place of business have a substantial need for training and technical support.

Graphics, marketing, are vitally important, yes, for starting up a business or otherwise, because nowadays a lot of people use mobile phones, Facebook. It is a basic thing in the sense that everybody looks at Facebook at least 10 times a day, so if you create and promote your activity on this social network, in the right way [...]

I have chosen a freelance, companies, agencies that will create a website for me next week, because since I have kids who are 22 years old, they offered to help, but I realised that someone is needed to keep it up to date, someone who will work on it, maybe not every day, but a lot, and they can’t do it, since they are at University.

“Reactivity” box

The capacity of entrepreneurs to react to the current situation of crisis and, more in general, to the problems they have to deal with, is closely linked to the competences they possess. It is a commonly shared opinion that previous experience plays a fundamental role in the success of a new retailing business. Moreover, in the case of new enterprises with several partners, the interviewees stressed the importance of the complementarity of the various competences acquired by these partners. In the majority of cases, it happens by chance, but it would be a good idea actually to plan it. In brief, experience is a potential source of competitive advantage because it enables the entrepreneur to orient him/herself in the world of business. Competences imply operating know-how with regard to the supply offered to the market.

Yes, complementarity of competences may be considered a success factor: we always say that we are 33.3% competences. Of course, I deal with communication and brand management. We were lucky because the complementarity of our competences was natural: we were all completely different and we had all reached a turning point, which had to be that of creating something of value for ourselves.

I decided to open a business in line with my experience because I was absolutely sure that this would put me at an advantage.

At the same time, also continuous training is an important factor with a view to consolidating/developing the business because it ensures that the competences possessed will continue to improve and develop. Opportunities for improvement are important because the entrepreneur tends to underestimate this aspect, and thinks that success has already been achieved when the business is set up. Compared to the past, the internet offers a wide range of opportunities for learning at relatively reasonable costs. Here we refer not only to e-learning, but also to the collective intelligence which specialist networks contribute to developing.

For me training is fundamental. Let me tell you, absurd as it may be, we are a sweet shop which also makes wedding favours. At the end of April, I took a course on all that revolves around wedding favours because even although I have the manual dexterity required plus 10 years' experience in retailing, it is still always advisable to keep up to date. So I always try to take some courses each year for this reason. Paradoxically, even although it is a small town shop, the fact of having studied English privately is a plus point for me, when foreign tourists come to town.

4. Conclusions

Unemployment in Italy, which has dropped below 13%, remains one of the country's main problems because it triggers vicious circles which are increasingly more difficult to break. In the face of this situation, which sectors and which enterprises can contribute most to reducing this phenomenon?

Already in the course of the first serious post-war economic crisis (that of the Seventies), the idea of reviewing the economic role of the small company began to make inroads. Economists realised that in the years in which the oil crisis ignited inflation, the large Italian industrial groups were busy restructuring their businesses, reducing personnel and increasing unemployment. In contrast, the small companies – particularly those with 6 to 9 employees – were managing to create new jobs. The same thing happened in the services sector, which catalysed the interest of researchers for this very reason. Today, following the crisis that began in 2008, it is legitimate to ask whether the profile of the new entrepreneurs in the retailing sector has changed.

None of the new entrepreneurs analysed in this paper was a young unemployed person without work experience. Everyone interviewed had previous work experience, confirming that business stems from business. In other words, the majority of the start-ups were actually spin-offs.

Two distinct segments of the new entrepreneurs can be identified.

The first is composed of young people aged between 30 and 40 years of age, with previous work experience, who start up a business out of choice and not because they have been forced out of the labour market. These new young entrepreneurs prefer to do business by teaming up with ex-colleagues (not alone), and they are highly motivated on a personal level: they want to demonstrate that they are capable of developing a business idea, even in such difficult times for the country as the present.

The second segment groups older entrepreneurs (40-55 years). Almost all of these people have been unemployed for a year or two because they were forced to resign and they are seeking new sources of income. The majority (70-80%) of the new entrepreneurs interviewed from this segment were university graduates and/or former executives.

Another interesting result of the survey was that investment in a new enterprise can exert a significant leverage effect on employment. For example, the entrepreneur interviewed, who started off with a partner, declared that he had invested 100,000 euro in a business which, in 2014, generated three permanent jobs. In another case, three partners in their thirties who, in May 2012, invested a total of 200,000 euro in a mixed craft and retailing business, generated fifteen permanent jobs in 2015, including those of the three partners.

Another significant result obtained from the interviews conducted was that, without the support of a trade association, it is almost impossible for a new entrepreneur – even a graduate with over twenty years' experience as an employee – to fulfil all the legal obligations laid down for founding and starting up a new enterprise, even in a sector with low entry barriers such as that of retailing.

Also emerging from the survey was the progressive development of new hybrid distribution formats which require a new, well-balanced mix of services from catering to retailing. This could be the result of the knock-on effect deriving from the development of new types of point of sale by organised mass retailing companies, such as the entrepreneur Oscar Farinetti's Eataly, which are widely publicised by the mass media.

Some of the interviews and cases analysed also highlight that in order to have success the new retailing microenterprises have to conduct marketing activities such as creating a brand/store sign, designing an display space that will create a warm, attractive atmosphere (to convey a positive, emotional marketing experience) and exploit the potential of web marketing. These are all activities that an independent entrepreneur – even a young, capable one with specific competences – cannot develop autonomously. In order to achieve this goal, a network of professionals with different specialist competences is needed. In other words, even retailing microenterprises with a fixed place of business must be able to access advanced marketing services in order to find a share of the market in a sector that is becoming more and more competitive, with sluggish or declining demand. In that regard, we encountered cases of new independent retailing entrepreneurs who organised themselves with the aid of an informal network of relations with professionals specialised in the activities described above and, first and

foremost, the graphics, the furnishing of the point of sale and web marketing.

Last but not least, the maintaining, by the retailing company, of a strong ability to create jobs: it is, in fact, the sector with the largest number of employees in the world.

Italian literature has mainly concentrated on the modernisation of distribution, the economic effects deriving from the industrialisation of the supply of retailing services – through the adoption of the self service format – and the vertical relationships of the distribution channel. It is important to remember that there is not just an economic, managerial and marketing dimension, but also a social, urban and tourist dimension, which must be considered. The separate management of these two dimensions produces “non-places” (Augè, 2008), i.e. artificial groupings specialised in the exchange of products that contribute to creating dormitory districts and suburbs, characterised by urban discomfort. When intelligently integrated, the retail trade becomes a driver for territorial development with the power to regenerate entire districts. Points of sale are, in fact, places in which goods, information, experiences and emotions are exchanged.

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Market Multiples and the Valuation of Cyclical Companies

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Abstract

Market multiples are more often used than studied. Equity analysts, investment bankers and other practitioners widely use market multiples to estimate the value of companies. Nevertheless, literature about multiples is not as rich as the wide use of these valuation tools would suggest. This paper, focusing on European listed companies, investigates how multiples can be used in the valuation of cyclical companies, a much less investigated research topic. We test the accuracy of multiples to understand whether their performance in valuing cyclical companies is better, worse or equal to the performance found in prior studies, where both cyclical and non cyclical companies are analyzed without distinguishing between them. We also attempt to verify whether the way in which multiples are calculated significantly affects the accuracy of estimation. Our aim is to develop a valuation approach consistent with valuation theory and helpful in everyday practice.

Keywords: valuation, valuation multiple, cyclical companies

JEL classification: G32, G12, G30

1. Introduction and Purpose of the Paper

In practice—in equity research, mergers and acquisitions, IPOs, etc.— multiples¹ are widely used to estimate the value of companies and this is basically due to three main reasons. First of all, a wealth of information is available to support the methodology, at least in its quick and dirty form. Secondly, multiples link to market prices and the idea of a fair value approach. Third, no one pretends, at least when using its simplest form for multiples valuation, to be accurately estimating future earnings, cash flows, growth rate or cost of capital.

Notwithstanding their practical relevance, multiples have been analyzed in a limited number of academic studies, so that, in this particular field, practice tends to prevail on theory.

Valuation through multiples is carried out in three basic steps. First comes the choice of the multiple (or multiples, if the valuator uses more than one to increase the accuracy of the estimation) on which to base the valuation. Second is the selection of a sample of comparables. And third is the calculation of the multiple(s) itself. Finally, the value of the target company is estimated by multiplying the multiple(s) for the economic or financial driver of the target.

The choice of the multiple(s) is often made on a judgmental basis, with each person using the multiple(s) that is (are) more often used by others in similar situations.²

The selection of comparables is commonly made according to industry criterion. Equity analysts, for example, will group companies belonging to the same industry or operating in the same or in similar markets³ and

¹Accordingly to Pinto, Henry, Robinson, & Stowe (2010) “Price multiples are ratios of a stock’s market price to some measure of fundamental value per share” while “Enterprise value multiples, by contrast, relate the total market value of all sources of a company’s capital to a measure of fundamental value for the entire company”.

²Price-to-earnings ratio (PE); or price-to-book value (PB) for financials; enterprise value (EV) to earnings before interest, taxes depreciation and amortization, (EBITDA); enterprise value to earnings before interest and taxes (EBIT); enterprise value to sales (S) or enterprise value to net invested capital (IC) for industrial companies, etc.

³In the case that an industry is segmented in different areas showing different trends, we find that practitioners often conduct the analysis making reference to regions (e.g. the EV/EBITDA multiple of European steel companies or the PB multiple of European banks). When the industry is global, the sample must be built accordingly.

calculate multiples on the basis of these samples. Similarly, investment bankers advising firms going public determine offering prices by making reference to listed industry peers. In both cases, the comparison generally accounts for firms with similar fundamental features,⁴ implicitly acknowledging their impact on the level of the multiples used for valuation purposes.

Multiples applied to a target company may be calculated in different ways. The most common practice is to assume *direct proportionality* between the multiple and the value driver, so using the average or median multiple to multiply the target's economic or financial driver.

The valuation of cyclical companies is an even less investigated research topic, despite its relevance from a practical point of view, as these firms represent an important segment of the economy, and analysts, bankers, and practitioners have to deal every day with valuing both listed or private cyclical firms. According to some contributions coming mainly from textbooks, a common approach among professional is that, in the calculation of the value of these firms, average cycle performance must be taken into account, being point in time results not able to express the real 'average' capacity of the firm to produce earnings or cash flows.

Given these premises, our paper aims at filling a gap in literature, providing at the same time a useful contribution to professionals engaged in cyclical companies valuation. In particular, we want to give an answer to three research questions:

- 1) May multiples be used in the valuation of cyclical companies achieving a level of accuracy comparable to that found in prior studies, where both cyclical and non cyclical companies have been considered, without distinguishing between them?
- 2) Does the way in which multiples are calculated matter?
- 3) Is it necessary, in the case of cyclical companies, to focus on medium term average performances?

The paper proceeds as follows. Section 2 reviews the literature. Section 3 illustrates our theoretical framework and the structure of the empirical analysis. Section 4 presents our main findings. Section 5 concludes.

2. Literature Review

Multiples are analyzed in a limited number of studies, many of which dated. In general, the aim of existing studies is to compare multiples in order to find those providing the best estimation accuracy, without distinguishing between cyclical and non cyclical firms. In table 1, we report the main features of a number of relevant research works that investigated this topic; for each, we highlight objectives, methodology and main findings. As one can see from the table, the contributions differ significantly on several dimensions—the purpose of analysis, the number of firms examined, the criteria for peer selection, the way in which multiples were calculated, the main findings. We found that results were often controversial, at least regarding some of the aspects of the methodology. As far as accuracy, different authors reached quite different results, while on the side of peer selection, the industry criterion is almost unanimously considered the proper choice, at least as a first step; the possibility of improving the effectiveness of this criterion by considering additional ones (like profitability, growth, risk and size) is often broached,⁵ even if there is not agreement about effects on estimation accuracy. As far as calculation methodology is concerned, again, approaches differ. While in the practice of financial markets average/median multiples are often assumed as a benchmark for valuations, the literature also examines the use of the harmonic mean and regression analysis. Different authors find that the latter methods do not always produce improvements in valuation results.

The research gap is even much more evident in the case of cyclical companies, particularly for what concerns the application to them of the relative valuation methodology.

We found contributions on this topic mainly in textbooks dealing with valuation and in a limited number of research papers.⁶ Some major points are common in discussions. First, some authors point out that valuing cyclical companies is more difficult than valuing noncyclical ones. De Heer, Koller, Schauten, & Steenbeck (2000) hold that the valuation of cyclical companies is more complicated compared to noncyclicals because, at any point in time, it is difficult to state whether the current cycle will continue. They observe that earnings

⁴Market in which the firm operates, business model, actual and future profitability, risk, growth perspectives.

⁵Among studies not examined in Table 1, Dittman and Weiner (2005), in a research focused on European companies, show how selecting comparables according to the return on assets leads to the best results in terms of accuracy, when using EV/EBIT as estimator.

⁶Often working papers, not published in major financial journals.

forecasts are particularly poor in the case of cyclical companies as financial analysts seem to ignore cyclicity, overvaluing companies at the peak of the cycle and undervaluing them at the bottom (with overvaluation being, in absolute terms, greater than undervaluation). Koller, Goedhart, & Wessels (2005), for example, observe that the valuation of cyclical companies represents a field in which theory and reality conflict: share prices of cyclical companies, according to authors, fluctuate more than those of noncyclical ones and, above all, fluctuate more than one would expect on the basis of a *discounted cash flow* (DCF) valuation. Tremolizzo (2009) finds that applying multiples to cyclical companies leads to valuation errors that are greater than in the case of noncyclical firms.

A second issue on which some authors focus is how to deal with cyclicity in earnings for valuation purposes. In cyclical companies, current profitability or cash flow indicators may, at a given point in time, not represent the *average conditions* of the firm. Profitability and cash flow are normally depressed at the bottom of the cycle and high at the peak. This variability of economic results is managed, in practice, according to the principle of *normalized earnings* (operating or net), which tries to identify the *normal* (average) profitability potential of the company over the whole cycle. The principle of averaging results is the basic option, with different adjustments. Examples of this approach may be found in work by Damodaran (2009, 2012) and by Pinto, Henry, Robinson, & Stowe (2010), where the suggested approach is to consider historical results. As an adjustment, Pinto et al. (2010) consider the possibility of using the average profitability ratio, instead of earnings, when the firm has had a significant increase of invested capital. Koller et al. (2005) also suggest considering past results to understand the real profitability potential of a company and to combine this analysis with a forward-looking estimate of a future possible break in the cycle. Their approach is to consider several scenarios—a base one in which the company is supposed to behave in the future as it has in the past and another one considering the possibility of cycle break – and to weight these scenarios according to their likelihood. The probability is estimated by considering the rationality of both hypotheses. Note that the idea of averaging results over the cycle is not correlated with the use of multiples. To the contrary, authors who hold to the principle of averaging results also consider fundamental methodologies, like discounting earnings or cash flows. Among these just mentioned contributions, the only one applying the idea of average cycle performance in relative valuation is the one of Damodaran. In conclusion, the idea of averaging (normalizing) economic and financial results in order to get the normal cycle performance, seems to be a very common idea for the purpose of valuing cyclical companies.

3. Research Structure

3.1 The Sample

Our analysis covers the 2003 – 2012 decade. We have extracted from the Factset database a sample of European companies by using the following procedure. First we selected, with reference at the date of 07/01/2013, all listed companies within the European Union, Norway, and Switzerland (in total, 29 countries) with a sector classification within Dow Jones Industry Classification Benchmark (ICB).⁷ According to this system, firms are classified in 10 industries, partitioned into 18 sectors.⁸ We have assumed a company as cyclical, consistent with financial market practice, if it is classified into the following three industries (eight sectors): Basic Materials ([1] *Basic Resources*, [2] *Chemicals*), Consumer Cyclical ([3] *Automobiles*, [4] *Cyclical Goods and Services*, [5] *Media*, [6] *Retail*), and Industrial ([14] *Construction*, [15] *Industrial Goods and Services*). Our approach resembles Morningstar's industry classification,⁹ with two differences. The first is that we exclude from the sample financial companies, that, due to the impact of the recent financial crisis, could have had a relevant

⁷The Dow Jones Industry Classification Benchmark (ICB) is an taxonomy launched by Dow Jones and FTSE in 2005 and now owned solely by FTSE International.

⁸To identify cyclical companies, we relied on the ICB (old version of the classification) available in the Factset database at the date of extraction of our sample. This classification distinguishes among the following industries [sectors]: 1) Basic Materials ([1] *Basic Resources*, [2] *Chemicals*); 2) Consumer Cyclical ([3] *Automobiles*, [4] *Cyclical Goods and Services*, [5] *Media*, [6] *Retail*); 3) Consumer Noncyclical ([7] *Food & Beverage*, [8] *Noncyclical Goods & Services*); 4) Energy ([9] *Energy*); 5) Financial ([10] *Banks*, [11] *Financial Services*, [12] *Insurance*); 6) Healthcare ([13] *Healthcare*); 7) Industrial ([14] *Construction*, [15] *Industrial Goods and Services*); 8) Technology ([16] *Technology*); 9) Telecommunications ([17] *Telecommunication*); 10) Utilities ([18] *Utilities*). The ICB has recently been changed, removing the distinction between cyclical and noncyclical goods. The old version is still available on Factset database, and we decided to rely on it as it better fits the purpose our study.

⁹See Morningstar, Morningstar Global Equity Classification Structure, Morningstar Research, May 24, 2011.

impact on results. Another reason for excluding financials is that we use asset-side multiples in our valuations, which are generally considered less appropriate in the case of these companies. The second difference is that we include industrial companies in our sample, while Morningstar classifies them in the supersector, denominated “sensitive,” that lies between cyclical and defensive. Given the lack of a universal definition of “cyclical companies,” we are convinced that our selection criteria can be considered a sensible basis for empirical analysis.

The whole sample is comprised of 1933 companies (table 2). As a second step of our procedure, we trim our sample, eliminating all the observations below the fifth and above the ninety-fifth percentile. We also drop all the observations with negative values of EBIT and EBITDA. Finally, we consider only those companies for whom all data are available in a given year.¹⁰ As a consequence, the number of firms has been significantly reduced compared to the initial number. Our sample is comprised of about 800 firms per year, for a total of 7,844 firm/year observations.

3.2 Methodology

3.2.1 Which Multiple?

The literature does not reach unanimous conclusions about the best multiple or multiples to use in valuations. Our approach follows an idea first signaled by Kaplan and Ruback (1995 and 1996) and then by Pratt (2001)¹¹, but actually not applied in subsequent research studies. The idea is to select, among possible multiples, the one(s) that show the minimum variability¹² over a given period, in order to be confident that through this choice we are basing the valuation on economic or financial drivers (the basis of the multiple) that really matter for the market. Even when more than one multiple is used in the valuation, the selection of the multiple may be made on the basis of minimum variability, and the weights may be determined according to parameters stemming from empirical analysis¹³.

For this reason we previously submitted a list of seven multiples, the most widely used in practice, to a check through dispersion analysis, over the period 2003 -2012: results are reported in table 3. The coefficient of variation—the measure of dispersion—is calculated for each company as the ratio between the standard deviation and the average over the 10-year period and the cross-sectional average is the coefficient of variation for each multiple. Dispersion analysis suggests that asset-side multiples, which are significantly less disperse than equity side multiples, may provide better estimates. Given these first empirical findings, we have decided to carry out our analysis using asset-side multiples only, and we note that this approach is consistent with market practice, as analysts, bankers and other practitioners do their valuations mainly using asset-side multiples.

3.2.2 Peer Selection

We use the “industry criterion” for picking peers, using firms from the same sector within a given industry, thus accepting a common approach in both the literature and practice. When valuing companies through this methodology, practitioners generally refer to comparable firms belonging to the same industry. As we calculate multiples (even) through regression analysis, we are confident that we can also capture what some authors search for, specifically, basing the selection of comparables on similarity of fundamentals. In this way, we account for the other main methodological alternative that can be found in the literature.

3.2.3 Multiple Calculation

We consider only current multiples, as the use of forward ones would significantly reduce the number of firms in our sample. The numerator is the EV at the end of the year, and the denominator is the value of the economic

¹⁰For each company, the following data were considered necessary to be included in the sample: positive EBIT and EBITDA (either current and the two- to four-year average), invested capital, sales.

¹¹See Kaplan and Ruback (1996), p. 48: “Valuation by comparables or multiples relies on two assumptions. First, the comparable companies are assumed to have expected future cash flows that grow at the same rate and have the same level of risk as those of the firm being valued. Second, the value of the company is assumed to vary in direct proportion with changes in the performance measure; that is, if expected EBITDA increases by 10%, expected value also rises by 10%.” The same concept may be found in Pratt (2001), p. 133.

¹²As measured by the ratio between standard deviation and average of the multiple, over a given period.

¹³As an example, if we calculate multiples through regression analysis, the weights of the multiple may be determined according to the results obtained through the regressions themselves (for example weighting multiples on the basis of the R squared (adjusted) of the regressions used to calculate them).

quantity at fiscal year-end. We also address the concern raised by some authors that, when dealing with cyclical firms, hold that valuation should consider average cycle performance. As a consequence, we base our valuations on average (cycle) results. As we already pointed out, this approach is normally associated with fundamental valuation methodologies, based on earnings or cash flow discounting. In our case, focusing on valuation multiples, we want to check whether the idea of averaging results improves estimation accuracy. We will then calculate both current and historical multiples, the latter obtained by putting in the denominator the average of the income statement drivers (EBIT, EBITDA, SALES) over a period of two to four years.¹⁴ We intend to verify whether averaging economic results can help to obtain better estimations even if, from an economic perspective, one would expect that multiples, being based on market prices, should already include investors' valuation of the average performance of cyclical firms. Market prices, the numerator of the multiples, should then, at least in theory, be sufficient to consider the specific features of cyclical firms, and averaging economic results should not prove relevant for estimation accuracy. We average only income statement drivers as balance sheet ones (in our case, invested capital) are less subject to cycle dynamics. For this reason, we will have, in the case of multiples based on income statement drivers, four values instead of one.

Given these multiples, we first determine, according to the principle of *direct proportionality*, the average, the median, and the harmonic mean and use these benchmarks multiple to evaluate each company in the sample. Considering these three estimators, we take into account what is done by all authors analyzed in our literature review. The *direct proportionality* approach is based on the assumption that companies will converge to average sector conditions. If this holds true, multiplying the benchmark¹⁵ sector multiple by the basis of the multiple (the denominator) of the target company, may be considered a sound estimation approach

When the denominator of the multiple is represented by a measure of income (both operating or net), the underlying hypothesis of convergence to the mean multiple holds when risk profiles and growth prospects are equal for all the companies in the sample¹⁶.

When the denominator of the multiple is represented by a measure of capital (net invested capital or common equity) or revenues, the underlying hypothesis of convergence is true when risk profiles, growth prospects, and profitability are the same for each company. The reason is immediately obvious: any revenues / invested capital multiple can be clearly decomposed into the product of the primary multiple (Enterprise Value / Unlevered Free Cash Flows_{t-1}) and the profitability of the specific company being valued.

The limits of the application of sector mean multiples are so rooted in the differences in terms of risk, growth prospects, and profitability among companies included in the sample. These limitations can be overcome with the use of different estimators, namely OLS, by introducing regressions. Regressions can explain the cross-sectional dispersion among different multiples on the basis of fundamental drivers. For instance, if one were to use the multiple Enterprise Value / Invested Capital, it is possible to use, as independent variable, some measures of profitability, growth, or risk. The greatest advantage of a regression is, however, pointed out by Liu, Nissim, & Thomas (2002), that is, the introduction of the intercept α , which can capture the effects of omitted variables in the valuation model. By introducing an intercept, one should be able to capture the fundamental elements common to all firms (in terms of growth, risk and profitability).

Based on these considerations, we decided to calculate multiples through single-factor regressions, using fundamental drivers as independent variables and allowing for an intercept with the purpose of capturing the impact of omitted variables. The identification of independent variables to be used in the regression analysis is made by leveraging on a simplified model of fundamental analysis.

From the fundamental model, we have calculated EV/S and EV/IC through a single-factor regression where the multiples are the dependent variables and the independent ones are EBIT/S and EBITDA/S in the first case and EBIT/IC and EBITDA/IC in the second.

¹⁴In our analysis, we have even calculated average results over a longer period, up to eight years, but we do not show these data as we verified that extending the period does not contribute to estimation accuracy.

¹⁵We use in the text the term "mean" multiple but the same holds in the case of multiples calculated through median or harmonic mean.

¹⁶To understand the reasons, it is sufficient to decompose the multiple Enterprise Value / NOPAT into its fundamental determinants. The value of assets of a company can be expressed by a synthetic Discounted Cash Flow Model, by capitalizing the current Unlevered Free Cash Flows (UFCF_{t-1}) at a rate that equals the difference between the opportunity cost of capital (the weighted average cost of capital, wacc) and the growth rate (g).

We decided not to include, among independent variables, (1) the weighted average cost of capital (wacc), basing this decision on the hypothesis of a common industry level,¹⁷ and (2) the corporate tax coefficient (T_c), given the wide range of values of this driver among different countries and its numerous changes in the course of time. We also assumed that the value of the growth rate (g) depends both on the industry perspective (a fraction of it that may be considered uniform among companies) and on firm specific conditions (with this fraction captured by the profitability ratios included in the regressions). The amortization coefficient (d) has already been considered in direct proportional multiples where, as we will see below, its explanatory power is quite limited, as proved by the fact that EV/EBITDA performs significantly better than EV/EBIT.

In sum, EV/EBIT and EV/EBITDA are calculated in three ways (arithmetic mean, median, and harmonic mean), while EV/S and EV/IC are calculated in five ways, the three just mentioned plus two regressions.

The use of this kind of linear regression assumes as negligible the differences in terms of cost of capital and growth prospects not already captured in the slope and the intercept.

Accuracy is measured using median absolute percentage error (MAPE), the absolute value of the difference between estimated price and actual price, scaled by actual price, one of the various measures of error that can be found in the literature. We motivate our choice, aware that definition of pricing error is relevant for accuracy valuation (Dittman and Maug, 2008), with the fact that absolute error captures both over- and undervaluation, while the median allow us to avoid the effect of outliers (cases of very high over or undervaluation).¹⁸

4. Results

We show results of our analysis under two different perspectives. First, in table 4, we report the average values of MAPE for all cyclical companies over the entire decade. These data allow us to compare the accuracy of different multiples and the way in which multiples are calculated, making reference to all considered cyclical firms over a long period. Second, in table 5 and 6, we analyze the accuracy of the four considered multiples in each of the 10 years, thus giving an idea of stability of estimations over time.

4.1 Whole Sample, All Years

Table 4 reports MAPE for tested multiples; in each year, we calculate current multiples and, for EV/EBIT, EV/EBITDA, and EV/S, historical multiples, averaging the denominator of multiples based on income statement drivers over two, three, and four years. For this reason, we have, for these multiples, four values of MAPE. In the case of EV/IC we have, in contrast, only the current multiple for each year. For EV/S and EV/IC we also have, for each year, two additional values each, coming out of the regressions operated; as a consequence, these two multiples are calculated in five ways instead of three. Values of MAPE reported in Table 4 are the 10-year averages of median errors obtained in each one of the 10 years.

a) Accuracy of proportional multiples.

Multiples comparison. Comparing multiples calculated according to the direct proportionality criterion, EV/EBITDA emerges by far as the most accurate in estimation, with an error of 31.0% (median of current multiple), followed by EV/EBIT (35.7%, harmonic mean, two-year average of EBIT), EV/IC (40.2%, harmonic mean) and EV/S (51.8%, median of current multiple), which provide significantly worse estimations compared to the other three.

Multiples calculation. Considering the way in which multiples are calculated, we find that best estimates are provided by the median and the harmonic mean, while arithmetic mean produces in all cases the worst estimates. In the case of EV/EBIDA, the estimation obtained through the arithmetic mean is worse compared to median and harmonic mean but is better than the best estimations obtained with the other three multiples. This suggests that EV/EBITDA dominates the other three multiples in terms of accuracy.

Historical vs current multiples. Interestingly, EV/EBITDA and EV/S provide the best estimations considering current multiples, and the accuracy of estimation worsens when the averages of drivers are considered instead of current ones. To the contrary, the best estimation accuracy of EV/EBIT is found by making the average two-year EBIT the denominator of the multiple.

b) Results obtained through regression analysis.¹⁹ For the reasons outlined in paragraph 3.2.3, we have

¹⁷This hypothesis holds true, for European companies, at least until the second half of 2011.

¹⁸According to Alford (1992), this measure of error gives equal importance to positive and negative errors; as the distribution of this error measure is right skewed, accuracy may be estimated using the median of error.

¹⁹In table 8, we present the results about the average accuracy (mean squared R) of the regression performed.

calculated EV/S and EV/IC through single-factor regression analysis, using as independent variables EBIT/S and EBITDA/S in the first case and EBIT/IC and EBITDA/IC in the second case. Estimation accuracy of the two multiples improves dramatically in both cases, but, in the case of EV/S, which provided the worst estimates using proportional multiples, estimation error is still greater than the one obtained through (proportional) EV/EBITDA. EV/IC is the best estimator of our sample, with a MAPE around 29% in both cases. In other words, the way in which multiples are calculated seems to make the difference in terms of quality of estimations.

4.2 Analysis of Estimation Accuracy over Time

Table 5 reports MAPE for tested multiples for each year.

a) EV/EBIT

The accuracy of the current proportional multiples estimation remains substantially stable over time, with an error ranging between 30% and 34%, except for the crisis years (2008/2009) and 2003, when estimation error is significantly greater, producing significant impact on the decade average. The best estimates are obtained in the pre-crisis period (2005-2006). The median and harmonic mean consistently produce better estimates compared to the arithmetic mean.

Putting in the denominator the average EBIT of two to four years significantly improves the estimation only for 2009, when the crisis weakens significantly the accuracy of current multiples. In other years, some improvements in terms of accuracy may be found by averaging EBIT, but the benefit is often limited. Overall, the current multiple provides the best estimate in two out of 10 years, while the two-year averaged EBIT gives the best result in six years, and the four-year average in two.

b) EV/EBITDA

Results provided by this multiple are clearly the best compared to other proportional multiples; in seven of the 10 years considered, MAPE ranges from 24.6% to 26.2%, while the error increases significantly in 2008 (less in 2009) and 2003 but less than in the case of EV/EBIT. The best estimations are obtained in 2005-2006, just before the outbreak of the crisis. Even in the case of EV/EBITDA, the best results are obtained through the median (four times) and harmonic mean (six times) but, contrary to what we found for EV/EBIT, estimates obtained through the arithmetic mean are not so far from those obtained through the best estimators (median and harmonic mean). In the case of this multiple, the contribution given by putting in the denominator the average EBITDA is very limited; the best estimates are obtained five out of 10 times by using current multiples and, in the five other cases, by using an average calculated on two years. Calculating average of EBITDA over longer periods produces similar or worse results.

c) EV/S

Estimation error is significantly larger than in the cases of EV/EBIT and EV/EBITDA, with the best estimates implying a mispricing of more than 40%. (43.2% is the best result, obtained for 2006, while in 2005 error is 45.7%.) In 2008, the results worsen significantly, as in the case of other two multiples. Averaging sales over two to four years doesn't significantly contribute to estimation accuracy. In six out of 10 cases, the best estimations are provided by the current multiple; in one case, by the two-year sales average; and in three, by the three-year average. In four cases, the best estimation is provided by the harmonic mean; in five cases, by the median; and in one case, the two estimators provide the same result.

d) EV/IC

Estimation error obtained with this multiple is larger than the one provided by EV/EBIT and EV/EBITDA and smaller than that found through EV/S. The best estimation is obtained in 2005 (38.2%, median of MAPE). The harmonic mean (seven times) and median (three times) provide much better estimates compared to arithmetic mean: the results are more stable in the course of years, and even in periods, like the financial crisis and 2003, in which accuracy of other multiples decreases significantly.

e) Results obtained through regression analysis (table 6)

In table 6, we report results obtained in the course of the 10 years through regression analysis, calculating EV/S as a function of EBIT and EBITDA margin and EV/IC as a function of EBIT/IC and EBITDA/IC. Results are quite interesting as the accuracy of the two multiples increases dramatically compared to the case in which they have been calculated according to direct proportionality.

The independent variables used in regressions can always explain a large portion of the multiple cross section variability.

As far as EV/S is concerned, we find the best results using EBITDA margin as independent variable in the regression six times out of the 10 years considered and three times using EBIT margin. Once we find the same results using the two margin ratios. In five cases, the best estimation is provided by current margin, in three, by the two-year average, and in two cases, the current and two-year average provide the same results. Using averages referring to a longer period worsens accuracy. This way of calculating the multiple gives to EV/S a level of accuracy that is not far from that of proportional EV/EBITDA.

Coming to EV/IC, it is possible to see how its calculation through a single-factor regression where the independent variable is the profitability ratio of invested capital provides very good level of estimation accuracy. Nine out of ten times the best results are obtained using EBIT/IC as independent variable and only once using EBITDA/IC. The results obtained through regression analysis beat those obtained through proportional EV/EBITDA in eight out of 10 cases. In the other two, the difference is so small to be considered immaterial (0.2% and 0.3% respectively). In seven out of 10 years, both results obtained through regressions are better than those obtained through proportional EV/EBITDA.

The results obtained may be considered quite good even in absolute terms: apart from 2003, 2008, and 2009, MAPE is lower than 30%— in some years (2005 and 2006), significantly lower. Even in the three years in which estimation accuracy is generally weaker, MAPE increases but less than for other multiples.

4.3 Robustness Check: Sector Analysis

The results obtained may depend on the definition of the sample and the definition of cyclical firm. It should be recalled that the literature has not identified a unique way to identify a firm as cyclical: the definition of cyclical company refers to a sector, without providing a clear distinction between cyclical and non-cyclical sectors. In order to verify the robustness of the results obtained, we have carried out our analysis even at the sector level.

In table 7, we analyze the accuracy of estimation within each of the eight sectors composing our sample, to verify whether accuracy is stable among them.

Repeating the analysis for each one of the eight sectors considered in our sample, we obtained results reported in table 7, which can be summarized as follows.

- a) MAPE, for each sector/all years, ranges from a minimum of 25.8% (basic materials) to a maximum of 31.4% (cyclical goods). In seven out of eight cases, MAPE is lower than 30% and, in four cases, lower or equal to 28%.
- b) EV/IC calculated through regression analysis produces the best estimate in seven out of the eight cases. In the eighth case (Retail sector), the most accurate estimate is provided by EV/EBITDA (two-year average). In the calculation of EV/IC, EBIT margin is the best-performing independent variable in five cases, while EBITDA margin produces better estimates in the other three cases (but in one of these three, both multiples are beaten by EV/EBITDA, two-years average).
- c) Among the four proportional multiples, EV/EBITDA ranks always first, and EV/S always fourth; EV/EBIT is six times second and two times third; and EV/IC is two times second and six times third. Differences in accuracy between the best-performing multiple (EV/EBITDA) and the second is quite significant (4.7% on average, with a minimum of 3% and a maximum of 7.4%), while the difference between the first and the third in rank is much bigger (9.9% on average with a minimum of 4.5% and a maximum of 15.3%). The performance of EV/S is so poor, compared to EV/EBITDA, that results seem to recommend against using this multiple in the proportional version.
- d) Accuracy of EV/S increases dramatically within all sectors when the multiple is calculated through regression analysis. MAPE is significantly reduced in this case and approximates EV/EBITDA, being larger, on average, by 1.9%. These results suggest the use of EV/S only when this multiple is calculated through regression analysis, using EBITDA margin as independent variable (providing better estimates in seven out of eight cases).
- e) Considering the four proportional multiples, we can measure the impact of the way in which they are calculated (arithmetic mean, median or harmonic mean). Sectors analysis confirms the results already shown in table 4 (all sectors/all years): considering each of the eight sectors, the 10-year average MAPE of the four multiples (32 observations), we find that the harmonic mean provides the best estimate in 18 cases, and the median in 12. In one case, the two estimators provide the same result and in one case only the arithmetic mean provides the best estimate.
- f) Finally, comparing current and historical multiples, we find mixed results. The best-performing proportional multiple, EV/EBITDA, provides the best estimates using current EBITDA in four out of eight cases. In three cases, accuracy increases using the two-year average, and in one case, using the four-year average. In

the case of EV/EBIT, averaging seems to help in terms of accuracy as only in two cases are the best results obtained using current EBIT. In the other six, averaging (three times two years, two times four years and once three years) provides better performance. Even evidence about EV/S is quite mixed: proportional EV/S yields best results three times using current sales, twice using the four-year average, and once using the two-year average. In two cases the best results are provided by two multiples simultaneously (current and two-year average; two- and four-year averages). Calculating EV/S through regressions, the best estimates are obtained five times using current margin, once using the four-year average, once using the two-year average, and once by both current and two-year margin

4.4 Comparison with Results Obtained by Authors Using the Same Definition of Error

Alford (1992), analyzing estimation accuracy of PE on the basis of different criteria for comparables selection, finds a level of estimation error of 23.9% for the best-performing selection criterion (industry and ROE). This result is obtained averaging median absolute percentage error for the three years considered in his analysis. Cheng and McNamara (2000), conducting an analysis similar to that of Alford but on a longer period, find that estimations through PE yield an error of 26.4% when comparables are selected on the basis of both industry and ROE criteria.

Another comparison is the work of Deng, Easton & Yeo (2010), who do an extensive analysis over 25 years considering current data only and including firms with negative fundamentals. When calculating multiples according to the direct proportionality criterion, using the median and harmonic mean, they find a level of accuracy which is lower than ours. 1) Using the harmonic mean to calculate multiples, they obtain a mean (median) absolute valuation error of 51% (47%) for the best-performing asset-side multiple (EV/NOA²⁰), while the best-performing equity-side multiple (P/BV) yields a mean (median) error of 51% (48%). 2) Calculating multiples through median, the maximum level of accuracy is obtained through the same two multiples with a mean (median), with errors of 50% (45%) and 48% (43%). When they use regression analysis, the results improve significantly: mean (median) absolute valuation error value for the best-performing asset-side multiple (EV/NOA) is 41% (34%), while the best-performing equity-side multiple (PB) yields a mean (median) error of 41% (34%). Valuation error found by these authors is further reduced when the valuation is conducted by combining multiples. Using jointly EV/NOA and EV/EBITDA leads to a mean (median) error of 35% (29%), and 34% (27%) is reached when the restriction of a non-negative EBITDA is imposed. Similar results are obtained combining, under an equity-side perspective, P/BV and P/EBITDA (34% the mean error and 27% the median error), this time imposing the restriction of a negative EBITDA.

In their analysis of multiples' accuracy in European equity markets, Schreiner and Spremann (2008) consider a list of 27 equity multiples, 10 of which are forward looking. Among the 17 current multiples considered, the best-performing one, a knowledge-related multiple,²¹ has a mean (median) error of 44.45% (25.37%). Results improve considering forward-looking multiples, with a minimum mean and median error of 31.68% (P / two years earnings) and 21.51%, respectively (P / two-year earnings before taxes). Repeating the analysis on the U.S. market, the accuracy of estimation improves, with a median error 2.3% smaller, on average, compared to results obtained in European markets. The best-performing multiple, price scaled by earnings plus amortization of intangible assets, provides an error smaller by 1.62%.

5. Conclusion

Valuation through market multiples is an everyday practice in financial markets, but fewer studies on this subject have been published than one would expect. More than this, the issue of the valuation of cyclical companies, a relevant practical problem given the large number of cyclical firms, has received almost no attention in the literature. Authors who deal with this subject, mainly in textbooks, point out two main issues. The first is that the valuation of these companies is more complex than that of noncyclical firms, and the second is that their valuation should be approached considering average firm performance over an entire cycle to account for the variability of performance over time. For this reason, they average firms' results, mainly profitability or cash flows indicators, and use them to support fundamental methodologies.

Given this evidence, we have tried to answer to three correlated research questions. First, we wanted to verify whether the methodology of multiples can be effectively used in estimating the value of cyclical companies.

²⁰Net Operating Assets.

²¹Price scaled by earnings plus amortization of intangible assets, one of the six knowledge-related multiples used by authors in their accuracy analysis.

second, we wanted to see whether and how the way in which multiples are calculated, one of the basic pillars of the methodology, has a significant impact on the accuracy of estimations. Third, we empirically tested the idea that in the valuation of cyclical companies the basis of the multiple should be determined taking into account the average (over the cycle) economic or financial performance of the company.

Using a sample of listed European cyclical companies over the decade of 2003 – 2012, we find interesting results. First, the overall level of accuracy of our estimations is quite similar to that found by authors who have analyzed the estimation performance of multiples using samples including both cyclical and noncyclical companies. This result is especially interesting since the period over which we carried out our analysis includes the crisis years, when the market turbulence exasperated market volatility, with obvious consequences on the performance of a market-based methodology. Secondly, our results suggest that EV/EBITDA is by far the most accurate estimator among proportional multiples; the median and the harmonic mean appear to be the best ways in which this multiple should be calculated, and current EBITDA is, in almost all cases, the economic driver providing best estimates. Third, the idea of averaging results over longer periods to account for specific features of cyclical companies does not seem to generate superior estimations through the multiples methodology, at least for the best proportional multiple (EV/EBITDA). Averaging produces some improvements in valuation performance only for multiples yielding poorer results. Fourth, results obtained through regression analysis indicate that the way in which multiples are calculated really matters. Our findings suggest that combining, through regression analysis, a balance sheet-based multiple (EV/IC) and a profitability driver (EBIT/IC or EBITDA/IC) is an effective way to reach a good level of accuracy in estimation.

Table 1. Literature review

<u>Alford (1992)</u>	<u>Kaplan and Ruback (1995, 1996)</u>	<u>Cheng and McNamara (2000)</u>
OBJECTIVE: test PE accuracy sensitivity to comparables' choice	OBJECTIVE: comparing relative accuracy of DCF and market multiples	OBJECTIVE: test the valuation accuracy of the PE, the PB and a combination of PE and PB (equally weighted)
ERROR DEFINITION: Absolute % error: (Predicted price – Actual price) / Actual price	ERROR DEFINITION: natural log of estimated value to transaction value	ERROR DEFINITION: <u>percentage absolute error scaled by actual price (PAE/A)</u> ; <u>percentage absolute error scaled by predicted price (PAE/P)</u> ; <u>adjusted percentage absolute error (APAE)</u> , adding at the absolute error at the denominator of PAE/P; the square root of APAE
SAMPLE: NYSE, ASE and OTC firms for the years 1978, 1982 and 1986. Ebit and Earnings both positive.	SAMPLE: 51 Highly Leveraged transactions	SAMPLE: All firms from the 1992 Compustat (1973-1992, only positive earnings and book value)
COMPARABLES' SELECTION CRITERIA: Market Industry (3 SIC) TA Roe Industry + TA Industry + Roe TA + ROE	COMPARABLES' SELECTION CRITERIA: i) firms in the same industry; ii) firms involved in similar transactions; iii) firms both in the same industry and involved in similar transactions	COMPARABLES' SELECTION CRITERIA: Market Industry (4 SIC) TA Roe Industry + TA Industry + Roe
MTP CALCULATION: Median mtp	MTP CALCULATION: Median mtp	MTP CALCULATION: Median mtp
MAIN RESULTS: Greater PE accuracy when comparables are selected on the basis of: industry or pairs of Industry, TA and ROE.	MAIN RESULTS: The method of multiples performs almost as well as the DCF and the use of both is recommended	MAIN RESULTS: The main difference with Alford's findings is that combining industry and ROE as selection criteria for comparable firms provide significant better estimations than considering only industry. PE performs better than the PB and the combined PE-PB method performs better than the PE alone.

<u>Kim and Ritter (1999)</u>	<u>Liu, Nissim, and Thomas (2002)</u>
<p>OBJECTIVE: investigate the accuracy of multiples in valuing IPOs</p> <p>SAMPLE: 190 domestic operating company IPOs</p> <p>COMPARABLES SELECTION CRITERIA: a) recent IPOs in the same industry (four-digit SIC code); b) comparables identified by a research boutique specializing in the valuation of IPOs</p> <p>MTP CALCULATION: a) regression approach (the dependent variable being the multiple for the valuation of the IPO and the independent variable being the median multiple of comparables) b) simple approach, using the mean or median multiple of comparables</p> <p>ERROR DEFINITION: natural log of the ratio of the predicted multiple to actual multiple</p> <p>MAIN RESULTS: a) PE, PB, PS: i) using regression, recent IPOs from the same industry as comparables, and historical numbers, gives very poor results in terms of estimation accuracy ii) using comparables provided by the financial boutique and moving from historical to forecasted earnings improves substantially estimation accuracy (forecasted earnings are more important than more accurate comparables selection); iii) including growth does not increase accuracy when next-year forecasts are considered; iv) accuracy is greater for old firms than for young ones; v) different calculation of multiples – regression approach versus simple calculation – has mixed effect on estimation accuracy. b) EV multiples (EV/S and EV/EBITDA) i) EV/S performs much better than P/S (which performs as bad as historical earnings in the PE estimation); ii) EV/EBITDA performs better (as well as PE estimation when current year forecasts are considered) than EV/S, especially for old firms; iii) finally, when using the EV/Sales multiple as valuation benchmark, the authors find that profitability and growth have a positive impact on the level of multiple (about 20% premium). Accuracy is greater for old firms (for which profitability matters much more than growth) than for new ones; results obtained using EV/S are less accurate than those obtained using forecasted earnings when the PE is assumed as valuation benchmark.</p>	<p>OBJECTIVE: comparing the valuation performance of a long and comprehensive list of multiples (17), based on different value drivers, with the purpose of identifying the best-performing ones.</p> <p>SAMPLE: firms representing between 11 and 18% of NYSE + AMEX + NASDAQ companies, (1982 and 1999); only firms showing positive multiples are considered.</p> <p>COMPARABLES SELECTION CRITERIA: a) entire cross section of firms b) comparables from the same industry</p> <p>MTP CALCULATION: a) harmonic mean, b) median, and c) regression analysis</p> <p>ERROR DEFINITION: (Predicted price – Actual price) / Actual price</p> <p>MAIN RESULTS: a) forward earnings are the most relevant value driver and (valuation performance increases for longer time horizons), while multiples based on measures of intrinsic value perform significantly worse than forward earnings b) considering historical data, the dispersion of pricing errors increases substantially (sales perform the worst, while earnings perform better than book value) c) multiples based on cash flow measures perform generally bad d) when sales and EBITDA are used as value drivers, EV multiples perform worse than equity multiples e) harmonic mean performs better than median, and the regression approach increases the valuation performance of poorly performing multiples; no significant improvements are found for the most performing ones f) the common practice of selecting firms from the same industry gives better results than considering as comparables all the firms included in the cross section g) relative performance of multiples is relatively stable over time and across industries</p>
<p>Beatty, Riffle, and Thompson (1999)</p> <p>OBJECTIVE: investigate the effect of how multiples are calculated on their respective accuracy</p> <p>SAMPLE: All Compustat firms from 1980 to 1992 meeting some conditions</p> <p>COMPARABLES SELECTION CRITERIA: three-digit SIC Code</p> <p>MTP CALCULATION: eight methodologies, six of which include only earnings and book value, the seventh adds dividends and the eighth total assets. The first five models are proportional, as they do not contain an intercept. Four out of these five models equally weight PE and PB; the difference between one methodology and the others is the way in which multiples are calculated, while in the fifth model, weights are empirically derived. The other three models are linear regressions containing an intercept. In the first of these three, the regression includes only earnings and book value (as in the first five models), while the second includes dividends, and the last dividends and total assets.</p> <p>ERROR DEFINITION: (actual price – predicted price)/actual price (mean value is considered)</p>	<p>Lie and Lie (2002)</p> <p>OBJECTIVE: investigate valuation performance of different multiples (10)</p> <p>SAMPLE: all Compustat active firms, data for fiscal year 1998 (forecast refer to 1999)</p> <p>COMPARABLES SELECTION CRITERIA: industry criterion (three-digit SIC code, when at least five comparable were available, if not, two-digit SIC code)</p> <p>MTP CALCULATION: median value of comparable firms</p> <p>ERROR DEFINITION: natural logarithm of the ratio between estimated value and market value</p>

MAIN RESULTS: a) equally weighting average PE and PB leads to the worst results
 b) the model based on inverse average (e/P and b/P) performs much better
 c) the deflated regression weights model (where the weights are not defined ex ante— as in the first four models—but are derived empirically from market analysis) is the best-performing among proportional models
 d) among the three linear models, the best estimates are provided by the first one, which includes, as independent variables, only earnings and book value of equity. Including in the regression even dividends and size (total assets) leads to an increase in pricing error

MAIN RESULTS:

I) a) between the two earnings based multiples, the forecasted PE clearly outperforms the other, based on historical earnings;
 b) adjusting EV and book value of assets for cash levels does not produce any material effect on results
 c) among EV multiples, book value (EV/book value of assets) provides the best estimates, while EV/Sales perform the worst. The other two multiples, EV/EBITDA and EV/EBIT, lie in between, with the former performing better than the latter
 II) separating financial from nonfinancial and grouping on the basis of size and profitability: i) valuation tends to be more accurate for larger than smaller companies (undervaluing the former and overvaluing the latter; ii) independently from company size, asset multiples outperform equity multiples, with the EV/Book Value of Assets performing the best and the EV/Sales performing the worst; iii) companies with low / medium profitability levels are better estimated through the asset multiples (although positively biased), while multiples based on earnings provide, as expected, poor estimation for low earnings companies. (In this case, in an equity-side approach, forecasted earnings perform better than current earnings). Earnings multiples (EV/EBITDA and EV/EBIT) perform as well as the asset multiple (EV/Book Value of Assets) for companies with high earnings; iv) considering that earnings multiples are positively biased while asset and sales multiples are negatively biased, the authors decide to consider both, checking the valuation performance of a hybrid measure made of both the asset and the EBITDA multiples (equally weighted): this hybrid measure performed better than individual multiples; v) quite surprisingly, the authors find that the valuation accuracy of multiples is greater in the case of financial companies, where results show higher performance for EV multiples even if, we observe, these companies are rarely estimated under an asset-side approach; vi) multiples generate poor valuation performances in the case of companies with high levels of intangibles

Schreiner and Spremann (2007)

OBJECTIVE: investigate the estimation accuracy of market multiples: i) equity side vs asset side multiples; ii) 'knowledge based' multiples vs traditional multiples in science based industries; iii) forward looking multiples vs trailing multiples

SAMPLE: European firms from the DJ Stoxx 600 over the period 1996 – 2005

COMPARABLES' SELECTION CRITERIA: industries and subindustries according to the ICB classification system, provided by DJ and FTSE

MTP CALCULATION: median multiple

ERROR DEFINITION: scaled absolute valuation errors, defined as the absolute difference between predicted and actual price, scaled by actual price

MAIN RESULTS: i) equity side multiples perform better than asset side multiples; authors hold that the reason is to be found in the uncertainty in the estimation of market value of debt (and EV (as a consequence, in the following part of the analysis only equity side multiples are considered); ii) 'knowledge related' multiples (considering R&D expenditures and amortization of intangibles) perform better than traditional ones in the case of science based industries; iv) forward multiples are more accurate than trailing ones

Bhojraj and Lee (2002)

OBJECTIVE: developing a more systematic technique for selecting comparable firms and finding out the comparables which allow the best estimation of the target firm's future multiples (one, two and three years ahead EV/Sales and PB, in the specific case)

SAMPLE: all firms in the intersection of (a) the merged COMPUSTAT industrial and research files, and (b) the I/B/E/S historical database of analyst earnings forecasts, excluding ADRs and REITs, for the period 1982-1998.

COMPARABLES' SELECTION CRITERIA: firms which have 'warranted multiples' (calculated on the basis of fundamental drivers) closest to the one of the target firm

MTP CALCULATION: multiple regression model

ERROR DEFINITION: Absolute Error, defined as the absolute difference between actual and implied price, scaled by the actual price

MAIN RESULTS: identifying comparables on the basis of 'warranted multiples' significantly increases the accuracy of estimation of future multiples compared to the case in which comparables are selected solely on an industry/size basis

Deng, Easton, and Yeo (2010)

OBJECTIVE: analyze multiples accuracy, comparing asset-side and equity-side multiples

SAMPLE: all companies listed on NYSE, AMEX, and NASDAQ with firm/year observations for the period of 1963 – 2008

Harbula (2009)

OBJECTIVE:

SAMPLE: 400 companies selected from the DJ STOXX 600 (1986-2009)

COMPARABLES' SELECTION CRITERIA: four-digit SIC code and size

MTP CALCULATION:

- a) harmonic mean and median; b) regression analysis;
c) combination of multiples

ERROR DEFINITION: absolute valuation error, defined as the absolute difference between predicted and actual price, scaled by actual price

MAIN RESULTS:

- a) harmonic mean and median: among EV multiples, NOA is the driver that provides the lowest mean valuation error, closely followed by sales; EBITDA ranks third and free cash flow performs the worst; among equity multiples, the best performance is provided by BV, while sales provides higher errors, and errors are much higher in the case EBITDA and net income are considered as value drivers
b) regression analysis: improvement in the valuation performance of all multiples, especially for those performing worse in the first stage of the analysis and a partial change in the ranking of multiples
c) combination of multiples: combining two multiples may increase significantly valuation performance. The best estimations are those obtained combining NOA and EBITDA for enterprise valuation and BV and EBITDA for equity-side valuation. Combining sales—a useful value driver that can be easily used when others are negative—with an income measure, produces an improvement in valuation performance. Differences in valuation accuracy are not relevant between firm with positive and negative income fundamentals, and in some cases results show that pricing errors based on sales are smaller for firms with negative fundamentals, compared to firms with positive ones

COMPARABLES' SELECTION CRITERIA:

- a) industry criterion

MTP CALCULATION: both direct proportionality and regression analysis

ERROR DEFINITION: absolute mean and median error margin versus actual price

MAIN RESULTS:

- a) comparables from the same industry: i) prospective multiples perform better than current or historical (especially earnings driven multiples); ii) profitability-based multiples prove to be the more accurate, especially when based on current and forward figures (vs. historical); iii) asset-side multiples perform better than equity-side ones; iv) combining multiples increases the accuracy (current and forward and/or different multiples); v) there is not a multiple fitting all industries
b) regression analysis: a list of potential drivers are tested in a single-factor regression analysis to identify those that better explain the difference between the multiples of a given firm and the industry/sample median. Most relevant drivers are selected for a multifactor regression analysis carried out to verify the importance of different drivers in explaining the level and evolution of valuation multiples for every firm. The main findings are the following: i) growth has a strong impact on all the considered multiples; ii) profitability has a positive impact on all multiples not including a direct measure of profit (EV/Sales, EV/Invested Capital), while its effect is more ambiguous for multiples based on direct profit measure; iii) stability of profitability and growth appear to be important drivers of market multiples; iv) EV multiples have a mildly positive correlation with financial leverage up to a certain level and then the relationship turns negative; equity multiples have a negative correlation with financial leverage as long as it remains within reasonable level and then in turns strongly positive; v) size and liquidity profile are almost immaterial; vi) in many cases the relationship between multiples and financial drivers is not linear, highlighting the need for additional analysis

Hermann and Richter (2003)

OBJECTIVE: investigate all relevant issues of the methodology: comparables' selection, drivers of the multiples and calculation (with specific focus on the first aspect)

SAMPLE: 524 largest (in terms of market cap) US firms and 830 large European firms

COMPARABLES' SELECTION CRITERIA: a) all sample firms; b) SIC codes (starting with four-digit and reducing the number until four firms are identified; c) fundamental factors; d) like c) plus long-term growth rates from IBES; e) combination of b) and d)

MTP CALCULATION: arithmetic mean, median, harmonic mean, regression analysis

ERROR DEFINITION: absolute value of the difference between the natural log of predicted price and the natural log of actual price

MAIN RESULTS: a) multiples based on earnings lead to best estimates and sales-based multiples to the worst. PB produces much better estimates (compared to EBIDAAT and EBIAT) when companies are selected on the basis of ROE and earnings growth instead of industry criterion; b) selecting comparables on the basis of fundamental drivers (namely, earnings growth and ROE) leads to better results. Selecting firms on the basis of both fundamentals and industry membership does not improve accuracy; c) median appears as the best estimator, followed by the mean, while arithmetic mean and harmonic mean provide less accurate estimations. Using regression analysis for controlling for fundamental factors gives worse results than using the median of comparable firms selected on the basis of similar fundamental factors.

Tremolizzo (2009)

OBJECTIVE: compare the accuracy of multiple in estimating cyclical and noncyclical companies

SAMPLE: 174 companies listed on the London Stock Exchange from 1995 to 2007, 101 from cyclical industries and 73 from noncyclical ones

COMPARABLES' SELECTION CRITERIA: two-digit SIC Code (28, 36, 33 and 37 for cyclical companies; 20, 24, 21, 49 for noncyclical)

MTP CALCULATION: average and median multiples

ERROR DEFINITION: absolute value of the difference between the natural log of predicted price and the natural log of actual price

MAIN RESULTS: a) using PE, forward PE, EV/EBIT and EV/EBITDA, estimates of cyclical companies are less accurate than estimates of noncyclicals. Difference in accuracy increases adjusting EV multiples for cash and cash equivalents; b) using regression analysis, valuation error is found to be positively correlated with cyclicity and EBIT volatility and negatively correlated with size; c) logit analysis confirms that cyclicity and EBIT volatility are associated with larger valuation error, while size has the opposite effect

Table 2. Sample structure

Industry	Sector	Number of Observations
Basic Materials	[1] Basic Resources	150
	[2] Chemicals	97
	[3] Automobiles	70
Consumer Cyclical	[4] Cyclical Goods and Services	381
	[5] Media	209
	[6] Retail	111
Industrial	[14] Construction	217
	[15] Industrial Goods and Services	698
Sum		1933

Table 3. Mean Coefficient of Variation of Different Multiples (2003-2012)

Multiple	Coefficient of Variation	average number of observations
EV / Sales	0,33	865
EV / EBITDA	0,33	819
EV / EBIT	0,36	776
EV / Invested Capital	0,39	682
Price / Earnings	0,51	890
Price / Cash Flows	0,45	734
Price / Book Value	0,44	846

Table 4. Median Absolute percentage error; 2003 - 2012

	Core Enterprise Value / EBIT			
	four	three	two	Current
	years	years	years	
	Ebit	Ebit	Ebit	
	average	average	average	
Arithmetic mean	43,30%	43,40%	43,60%	48,90%
Median	37,40%	36,80%	36,20%	37,60%
Harmonic mean	36,70%	36,20%	35,70%	36,80%
	Core Enterprise Value / EBITDA			
	four	three	two	Current
	years	years	years	
	Ebitda	Ebitda	Ebitda	
	average	average	average	
Arithmetic mean	35,10%	33,70%	32,80%	32,50%
Median	33,00%	32,30%	31,30%	31,00%
Harmonic mean	33,10%	32,30%	31,50%	31,10%
	Core Enterprise Value / Sales			
	four	three	two	Current
	years	years	years	
	Sales	Sales	Sales	
	average	average	average	
Arithmetic mean	58,40%	57,40%	57,00%	56,40%
Median	53,00%	52,30%	52,00%	51,80%
Harmonic mean	53,20%	52,70%	52,60%	52,30%
EV/S = $\alpha + \beta \times \text{Ebit/Sales}$	38,10%	37,50%	36,40%	36,80%
EV/S = $\alpha + \beta \times \text{Ebitda/Sales}$	35,60%	34,30%	33,20%	32,30%

	Core EV / Invested Capital (current)
Arithmetic mean	48,50%
Median	40,40%
Harmonic mean	40,20%
$EV/IC = \alpha + \beta \times Ebit/IC$	28,20%
$EV/IC = \alpha + \beta \times Ebitda/IC$	29,30%

Table 5. Values of Median Average Percentage Error in each year for each multiple; 2003 - 2012

Year	Estimator	Core Enterprise Value / EBIT				Core Enterprise Value / EBITDA				Core Enterprise Value / SALES				Core EV / Invested Capital
		four years Ebit average	three years Ebit average	two years Ebit average	current	four years EBITDA average	three years EBITDA average	two years EBITDA average	current	four years SALES average	three years SALES average	two years SALES average	current	
2012	arithmetic mean	41,70%	37,10%	35,80%	43,30%	33,10%	31,90%	30,30%	31,00%	58,60%	57,80%	57,00%	56,10%	45,10%
	median	35,30%	32,90%	30,90%	33,80%	31,40%	31,30%	29,20%	30,40%	54,90%	54,60%	54,50%	54,60%	41,60%
	harmonic mean	35,00%	32,60%	31,20%	33,10%	32,60%	30,80%	29,90%	30,40%	53,70%	53,40%	53,50%	53,80%	41,30%
2011	arithmetic mean	41,90%	47,10%	43,60%	47,80%	34,10%	34,30%	32,90%	32,50%	64,40%	63,10%	62,40%	61,70%	48,90%
	median	35,80%	35,70%	33,80%	33,20%	33,00%	32,20%	30,70%	29,90%	56,60%	55,70%	56,30%	55,90%	41,40%
	harmonic mean	35,30%	36,10%	32,90%	32,40%	32,40%	32,60%	31,20%	29,00%	54,10%	53,30%	54,00%	54,20%	40,40%
2010	arithmetic mean	35,40%	40,90%	47,60%	41,40%	31,90%	31,60%	31,90%	30,70%	58,60%	58,30%	57,60%	56,10%	50,50%
	median	32,30%	32,80%	37,10%	33,60%	30,40%	31,20%	31,50%	29,70%	52,70%	51,90%	52,80%	51,80%	42,30%
	harmonic mean	31,90%	31,80%	36,20%	32,10%	30,20%	30,60%	32,20%	30,80%	53,60%	52,50%	52,80%	52,50%	41,80%
2009	arithmetic mean	42,30%	40,50%	44,30%	63,00%	33,70%	32,00%	32,80%	33,20%	59,60%	58,00%	58,70%	58,80%	49,90%
	median	37,50%	36,70%	35,90%	43,20%	31,60%	31,00%	30,90%	30,50%	52,90%	52,70%	53,00%	54,60%	39,20%
	harmonic mean	34,70%	34,80%	35,10%	42,40%	31,70%	32,20%	29,90%	32,70%	53,10%	53,70%	53,60%	52,20%	39,40%
2008	arithmetic mean	59,90%	60,50%	60,90%	71,60%	48,30%	47,90%	48,80%	45,90%	63,70%	63,40%	64,40%	65,00%	50,20%
	median	53,70%	54,00%	54,10%	56,10%	46,90%	46,40%	47,00%	44,00%	62,30%	61,20%	59,50%	59,30%	41,80%
	harmonic mean	51,00%	51,90%	53,10%	53,00%	47,90%	47,30%	47,70%	46,20%	64,80%	64,30%	63,00%	62,70%	41,30%
2007	arithmetic mean	42,50%	41,70%	40,80%	44,30%	33,50%	30,40%	28,90%	30,80%	53,90%	52,50%	52,50%	54,00%	46,40%
	median	34,20%	33,70%	35,00%	35,40%	30,10%	30,40%	27,90%	27,50%	47,60%	48,00%	48,00%	47,60%	39,20%
	harmonic mean	34,80%	34,10%	33,20%	33,90%	30,50%	29,70%	27,80%	26,20%	49,30%	48,10%	47,70%	47,60%	39,00%
2006	arithmetic mean	34,40%	34,20%	35,00%	35,10%	29,20%	26,10%	26,00%	26,10%	50,90%	50,20%	48,90%	47,50%	45,80%
	median	30,50%	29,10%	28,30%	29,20%	27,50%	25,00%	24,70%	25,30%	44,70%	44,30%	43,60%	43,30%	39,50%
	harmonic mean	30,50%	29,00%	29,10%	30,20%	27,00%	25,40%	25,20%	24,90%	45,40%	45,20%	43,90%	43,20%	39,90%
2005	arithmetic mean	39,20%	35,40%	33,50%	37,40%	31,10%	29,40%	27,80%	28,30%	54,50%	54,40%	53,50%	51,30%	47,00%
	median	31,50%	31,30%	28,60%	30,60%	27,10%	25,10%	25,30%	27,00%	50,10%	48,30%	47,30%	45,70%	38,20%
	harmonic mean	31,60%	31,20%	29,90%	30,50%	26,60%	25,10%	24,60%	25,30%	49,10%	47,60%	47,40%	48,00%	39,10%
2004	arithmetic mean	43,80%	41,80%	39,80%	39,50%	33,40%	32,60%	30,10%	29,00%	56,30%	53,70%	52,90%	52,10%	49,10%
	median	36,50%	35,60%	33,50%	33,60%	30,80%	29,80%	28,40%	29,20%	48,80%	48,20%	48,00%	48,50%	39,30%
	harmonic mean	35,90%	34,70%	32,10%	34,10%	31,00%	29,30%	28,20%	29,30%	49,80%	49,90%	50,50%	51,20%	39,00%
2003	arithmetic mean	51,50%	54,80%	54,40%	66,00%	42,50%	41,20%	38,70%	37,50%	63,40%	62,70%	62,10%	61,00%	52,10%
	median	47,20%	46,00%	44,80%	47,70%	40,80%	40,00%	38,00%	36,60%	59,30%	58,50%	57,50%	56,30%	41,90%
	harmonic mean	46,20%	46,20%	44,40%	46,60%	40,70%	40,10%	37,90%	36,40%	59,10%	58,90%	59,10%	57,60%	40,60%

Table 6. Enterprise Value/Sales - Enterprise Value/Invested Capital; Median Absolute Percentage Error in each year 2003 – 2012 through regression analysis

		Core Enterprise Value / Sales				Core EV / Invested Capital
		four years	three years	two years	Current	
		Sales average	Sales average	Sales average		
2012	Ebit margin for EV/S and EBIT/IC for EV/IC	35,80%	34,50%	31,90%	34,00%	26,30%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	34,70%	33,30%	32,00%	32,50%	29,30%
2011	Ebit margin for EV/S and EBIT/IC for EV/IC	35,60%	36,60%	37,00%	36,50%	27,60%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	35,10%	34,20%	32,80%	33,50%	29,60%
2010	Ebit margin for EV/S and EBIT/IC for EV/IC	33,40%	33,40%	35,70%	33,40%	29,90%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	32,20%	32,70%	32,80%	29,60%	30,30%
2009	Ebit margin for EV/S and EBIT/IC for EV/IC	36,90%	36,70%	34,90%	39,40%	30,20%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	34,00%	31,90%	31,50%	31,50%	28,70%
2008	Ebit margin for EV/S and EBIT/IC for EV/IC	52,80%	55,90%	54,50%	53,40%	36,00%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	46,40%	49,10%	47,80%	45,50%	36,80%
2007	Ebit margin for EV/S and EBIT/IC for EV/IC	35,30%	34,40%	34,10%	34,30%	26,60%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	34,10%	30,90%	29,60%	29,70%	27,80%
2006	Ebit margin for EV/S and EBIT/IC for EV/IC	31,60%	29,40%	27,30%	28,50%	23,20%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	28,50%	25,90%	26,30%	25,70%	24,10%
2005	Ebit margin for EV/S and EBIT/IC for EV/IC	35,00%	32,60%	30,30%	29,50%	23,70%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	31,40%	28,90%	27,40%	27,40%	24,80%
2004	Ebit margin for EV/S and EBIT/IC for EV/IC	37,70%	33,70%	33,00%	33,30%	26,20%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	34,70%	31,80%	29,80%	29,20%	27,90%
2003	Ebit margin for EV/S and EBIT/IC for EV/IC	46,60%	47,80%	45,60%	45,40%	32,30%
	Ebitda margin for EV/S and EBITDA/IC for EV/IC	45,00%	44,10%	41,80%	38,20%	33,50%

Table 7. Results by sector; average Median Absolute Percentage Error for all years

Auto					
EV/EBIT	four years	three	two years	Current	EV/IC
	Ebit average	years Ebit average	Ebit average		
Arithmetic mean	46,10%	48,40%	48,70%	55,00%	
Median	43,10%	44,10%	46,50%	45,90%	
Harmonic mean	44,10%	45,30%	46,40%	46,60%	
EV/EBITDA	four years	three years	two years	Current	EV/IC
	Ebitda average	Ebitda average	Ebitda average		
Arithmetic mean	40,40%	37,90%	36,90%	35,00%	
Median	33,40%	35,30%	35,30%	31,90%	
Harmonic mean	35,40%	36,10%	33,80%	33,10%	
EV/SALES	four years	three years	two years	Current	EV/IC
	Sales average	Sales average	Sales average		
Arithmetic mean	55,50%	53,70%	52,00%	48,10%	47,50%
Median	50,40%	47,90%	45,40%	45,20%	39,30%
Harmonic mean	46,40%	47,20%	45,60%	44,50%	40,70%
Regression with EBIT Margin - Ebit / IC	40,30%	42,80%	41,90%	43,80%	29,10%
Regression with EBITDA Margin Ebitda / IC	40,60%	38,30%	36,30%	36,60%	32,90%

Basic Materials

EV/EBIT	four years	three	two years	Current	
	Ebit average	years Ebit average	Ebit average		
Arithmetic mean	44,00%	53,10%	55,10%	70,10%	
Median	39,60%	41,80%	45,60%	53,50%	
Harmonic mean	39,40%	41,50%	45,20%	51,20%	
EV/EBITDA	four years	three years	two years	Current	
	Ebitda average	Ebitda average	Ebitda average		
Arithmetic mean	34,70%	35,00%	33,60%	35,40%	
Median	32,70%	33,30%	31,10%	33,40%	
Harmonic mean	33,10%	33,50%	33,60%	35,20%	
EV/SALES	four years	three years	two years	Current	EV/IC
	Sales average	Sales average	Sales average		
Arithmetic mean	77,80%	73,10%	68,20%	64,40%	40,60%
Median	48,10%	48,50%	48,20%	49,20%	35,90%
Harmonic mean	50,50%	49,30%	48,90%	49,60%	35,90%
Regression with EBIT Margin - Ebit / IC	32,10%	34,00%	36,70%	37,30%	25,80%
Regression with EBITDA Margin Ebitda / IC	37,60%	35,40%	33,30%	33,30%	26,40%

Chemicals

EV/EBIT	four years	three	two years	Current	
	Ebit average	years Ebit average	Ebit average		
Arithmetic mean	37,30%	39,30%	39,10%	48,70%	
Median	33,20%	32,40%	34,60%	33,70%	
Harmonic mean	33,90%	33,40%	34,10%	33,40%	
EV/EBITDA	four years	three years	two years	Current	
	Ebitda average	Ebitda average	Ebitda average		
Arithmetic mean	30,70%	30,30%	29,30%	30,50%	
Median	30,30%	29,70%	29,50%	28,30%	
Harmonic mean	31,40%	31,00%	30,60%	29,10%	
EV/SALES	four years	three years	two years	Current	EV/IC
	Sales average	Sales average	Sales average		
Arithmetic mean	54,60%	52,50%	51,00%	50,20%	37,20%
Median	45,50%	43,30%	42,70%	41,50%	35,70%
Harmonic mean	44,40%	43,00%	43,10%	40,50%	35,50%
Regression with EBIT Margin - Ebit / IC	31,90%	31,20%	31,00%	32,30%	26,30%
Regression with EBITDA Margin Ebitda / IC	31,70%	32,10%	30,50%	29,60%	28,40%

construction

EV/EBIT	four years	three	two years	Current	
	Ebit average	years Ebit average	Ebit average		
Arithmetic mean	45,40%	44,50%	46,10%	52,70%	
Median	38,50%	38,10%	36,80%	40,50%	
Harmonic mean	36,70%	36,80%	36,30%	40,10%	

EV/EBITDA	four years	three years	two years	Current	
	Ebitda average	Ebitda average	Ebitda average		
Arithmetic mean	36,90%	34,30%	33,50%	32,70%	
Median	33,40%	33,50%	33,40%	33,20%	
Harmonic mean	32,40%	33,10%	33,10%	33,30%	

EV/SALES	four years	three years	two years	Current	EV/IC
	Sales average	Sales average	Sales average		
Arithmetic mean	55,10%	55,40%	55,10%	57,30%	44,40%
Median	56,60%	55,60%	56,40%	56,30%	36,90%
Harmonic mean	62,10%	61,90%	61,80%	61,70%	37,30%
Regression with EBIT Margin - Ebit / IC	40,90%	41,30%	41,30%	42,40%	29,10%
Regression with EBITDA Margin Ebitda / IC	37,10%	35,20%	35,30%	33,40%	28,90%

Cyclical Goods

EV/EBIT	four years	three	two years	Current	
	Ebit average	years Ebit average	Ebit average		
Arithmetic mean	52,50%	50,30%	50,60%	57,80%	
Median	43,20%	41,00%	39,10%	39,20%	
Harmonic mean	40,30%	39,50%	39,10%	38,10%	

EV/EBITDA	four years	three years	two years	Current	
	Ebitda average	Ebitda average	Ebitda average		
Arithmetic mean	39,30%	37,90%	37,90%	35,70%	
Median	35,80%	34,60%	34,20%	33,60%	
Harmonic mean	36,10%	35,40%	34,00%	33,30%	

EV/SALES	four years	three years	two years	Current	EV/IC
	Sales average	Sales average	Sales average		
Arithmetic mean	65,30%	63,50%	63,50%	63,30%	55,30%
Median	59,80%	60,10%	59,90%	58,90%	46,90%
Harmonic mean	55,60%	55,40%	55,70%	55,40%	46,00%
Regression with EBIT Margin - Ebit / IC	46,70%	44,40%	42,10%	41,40%	31,40%
Regression with EBITDA Margin Ebitda / IC	39,70%	38,40%	37,50%	35,00%	32,50%

Industrial

EV/EBIT	four years	three	two years	Current	EV/IC
	Ebit average	years Ebit average	Ebit average		
Arithmetic mean	39,00%	39,00%	38,20%	41,80%	
Median	34,60%	34,20%	32,90%	33,70%	
Harmonic mean	34,50%	33,50%	32,10%	32,90%	
EV/EBITDA	four years	three years	two years	Current	EV/IC
	Ebitda average	Ebitda average	Ebitda average		
Arithmetic mean	33,10%	31,90%	30,70%	30,80%	
Median	31,80%	30,90%	29,70%	29,40%	
Harmonic mean	31,80%	30,50%	29,80%	29,10%	
EV/SALES	four years	three years	two years	Current	EV/IC
	Sales average	Sales average	Sales average		
Arithmetic mean	55,90%	55,60%	55,70%	54,60%	46,90%
Median	51,40%	50,80%	50,50%	49,90%	39,60%
Harmonic mean	51,70%	50,90%	50,50%	50,60%	39,30%
Regression with EBIT Margin - Ebit / IC	35,60%	34,90%	33,70%	33,60%	26,20%
Regression with EBITDA Margin Ebitda / IC	33,40%	32,10%	31,30%	30,90%	27,80%

Media

EV/EBIT	four years	three	two years	Current	EV/IC
	Ebit average	years Ebit average	Ebit average		
Arithmetic mean	39,90%	39,50%	41,70%	42,70%	
Median	35,90%	34,90%	34,80%	37,80%	
Harmonic mean	34,90%	35,40%	34,70%	36,40%	
EV/EBITDA	four years	three years	two years	Current	EV/IC
	Ebitda average	Ebitda average	Ebitda average		
Arithmetic mean	32,10%	31,10%	29,80%	30,50%	
Median	31,40%	30,00%	29,20%	30,20%	
Harmonic mean	31,60%	30,50%	30,20%	30,40%	
EV/SALES	four years	three years	two years	Current	EV/IC
	Sales average	Sales average	Sales average		
Arithmetic mean	49,30%	48,80%	48,80%	48,10%	47,60%
Median	48,50%	47,50%	46,40%	48,20%	40,90%
Harmonic mean	50,30%	50,10%	50,00%	48,70%	39,30%
Regression with EBIT Margin - Ebit / IC	36,10%	35,30%	34,00%	35,30%	28,70%
Regression with EBITDA Margin Ebitda / IC	33,40%	32,10%	30,40%	30,40%	28,00%

Retail					
EV/EBIT	four years	three	two years		
	Ebit	years Ebit	Ebit	Current	
	average	average	average		
Arithmetic mean	47,70%	46,30%	45,40%	46,70%	
Median	36,60%	35,40%	34,50%	34,40%	
Harmonic mean	37,60%	36,00%	34,80%	34,00%	
EV/EBITDA	four years	three years	two years		
	Ebitda	Ebitda	Ebitda	Current	
	average	average	average		
Arithmetic mean	37,10%	35,10%	34,30%	34,00%	
Median	35,70%	33,50%	31,10%	29,90%	
Harmonic mean	35,30%	33,40%	29,70%	30,00%	
EV/SALES	four years	three years	two years	Current	EV/IC
	Sales	Sales	Sales		
	average	average	average		
Arithmetic mean	61,50%	60,60%	61,90%	61,90%	70,00%
Median	56,30%	55,60%	55,30%	55,00%	45,00%
Harmonic mean	54,90%	56,10%	56,80%	57,70%	45,60%
Regression with EBIT Margin - Ebit / IC	36,70%	35,60%	32,90%	34,20%	34,00%
Regression with EBITDA Margin Ebitda / IC	36,20%	35,40%	32,60%	32,20%	33,80%

Table 8. Economic Significance of Performed Regressions (average R²)

	EV/Sales_{4y} = α + β	EV/Sales_{3y} = α + β	EV/Sales_{2y} = α + β	EV/Sales_{1y} = α + β	EV/IC = α + β · x
	x Ebitda-Margin_{4y}	x Ebitda-Margin_{3y}	x Ebitda-Margin_{2y}	x Ebitda-Margin_{1y}	Ebitda/IC
Average - All Sectors	48,8%	50,8%	52,2%	51,9%	44,7%
Auto	37,6%	38,6%	37,1%	39,4%	35,3%
Basic-Materials	52,4%	54,8%	52,9%	48,1%	39,0%
Chemicals	47,3%	51,0%	51,9%	49,3%	34,3%
Construction	52,9%	56,2%	59,2%	56,5%	42,8%
Cyclical-Goods	46,8%	49,1%	51,7%	53,2%	49,8%
Industrial	51,8%	53,7%	54,5%	54,9%	48,2%
Media	46,8%	49,1%	50,7%	54,0%	46,4%
Retail	56,0%	55,8%	61,4%	61,4%	61,4%
	EV/Sales_{4y} = α + β	EV/Sales_{3y} = α + β	EV/Sales_{2y} = α + β	EV/Sales_{1y} = α + β	EV/IC = α + β · x
	x Ebit-Margin_{4y}	x Ebit-Margin_{3y}	x Ebit-Margin_{2y}	x Ebit-Margin_{1y}	Ebit/IC
Average - All Sectors	46,0%	45,8%	46,3%	43,1%	46,7%
Auto	43,7%	40,6%	37,4%	30,5%	41,6%
Basic-Materials	54,2%	54,0%	50,4%	43,2%	48,9%
Chemicals	49,1%	47,7%	47,9%	45,3%	38,7%
Construction	49,5%	51,2%	53,6%	49,8%	40,2%
Cyclical-Goods	37,5%	37,8%	39,8%	39,1%	47,8%
Industrial	47,7%	48,4%	48,5%	44,9%	50,6%
Media	36,6%	35,8%	35,5%	35,5%	46,1%
Retail	50,7%	52,3%	60,7%	59,7%	60,4%

This table shows the economic significance (squared r) of performed regressions. At the end of each year we perform the following regressions (made on a sector base):

- 1) Enterprise Value / Sales = + x EBITDA / Sales
- 2) Enterprise Value / Sales = + x EBIT / Sales
- 3) Enterprise Value / Invested Capital = + x EBITDA / Invested Capital
- 4) Enterprise Value / Invested Capital = + x EBIT / Invested Capital

The table shows the average R² (2003 - 2012) obtained for the performed regressions in each sector.

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