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COINTEGRATION BETWEEN ECONOMIC ACTIVITY AND OIL PRICES IN THE OPEC COUNTRIES: A TIME SERIES APPROACH

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Abstract

The aim of this paper is to study the long-term relationship between oil prices and economic activity, proxied by GDP. To account for the long accepted evidence of a non-existing long run relationship between oil prices and economic activity, we carry out unit root and cointegration tests in presence of deterministic structural breaks. Our empirical analysis concerns the OPEC group, and generally extends from 1960 to 2012. This study contributes to the extensive literature on oil prices by adding a proper supply side analysis of a possible long run equilibrium between GDP and oil prices in a group of oil exporting and producing countries, and effectively manages to find an equilibrium relationship in Saudi Arabia by taking into account possible structural breaks. Setting up a Granger causality test in presence of deterministic structural breaks, the papers concludes that, even though no short run causality linkage could be found between oil prices and GDP, the existence of such relationship holds in the long run and appears to show some degree of predictive ability on GDP growth in Saudi Arabia.

Keywords: OPEC Countries, GDP growth, Oil prices, Cointegration Analysis.

JEL Classification: C32, F43, O47.

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1. Introduction and Literature Review

The aim of this paper is to study the long-term relationship between oil prices and economic activity. Unlike most of the existing literature, which focuses on Western countries, we analyze the relationship between oil prices and GDP in a group of oil exporting countries, belonging to the Organization of the Petroleum Exporting Countries (OPEC). To describe this relationship, past literature has considered a time series framework. These studies have generally found evidence of an inverse, and generally inconsistent relationship between the two variables. In his seminal paper, Hamilton (1983) showed through an unrestricted VAR model that oil prices and U.S. GDP were negatively correlated, as every recession in the post-war era was normally preceded by a sudden spike in the oil prices. However, by the mid-1980s, the estimated linear relationship between oil prices and GDP began to loose significance: the declines in oil prices occurred over the second half of the 1980s were found to have smaller positive effects on economic activity than what was predicted by linear models. At the same time, evidence of asymmetries in the link between the two variables had been found and tested at various stages across literature. Mork (1989) re-examines results from Hamilton (1983) and finds out that rising prices appear to be more highly correlated to gross national product than price decreases in the U.S. A few years later, Mork, Olsen, and Mysen (1994) extended this analysis and found evidence of an asymmetric relationship for a group of seven industrialized countries. Exploring the linkage between monetary policy and oil prices, Lee, Ni, and Ratti (1996) switched the analysis to the role of volatility and found out that oil prices are more likely to have an impact on growth in economic contexts with more stable and predictable fluctuations. Ferderer (1996) focused on industrial production growth rather than GDP, and through a structural VAR approach found strong evidence of asymmetric behavior, as price increases explained more than twice the volatility in production growth than price decreases. Hamilton (1996) carried on from this last piece of information, and replying to Hooker (1996) introduced a new notion of net price increase arguing that it is the joint presence of volatility and asymmetry that allows oil prices to affect the economy. Recently, asymmetric cointegration modelling has been employed to confirm the evidence that economic activity responds asymmetrically to oil price shocks in order to uncover the structural relationship between oil prices and GDP[1]. Indeed, at least in countries belonging to the western hemisphere, rising oil prices appear to retard aggregate economic activity by more than falling oil prices stimulate it. However, to our knowledge, few studies have focused on the supply side of the world oil market and on the long-run relationship between GDP and oil prices in oil producing/dependent countries.

[1] To cite the most recent examples, see Lardic and Mignon (2006) and Lardic and Mignon (2008).

The rest of the paper is organized as follows: Section 2 introduces the topic and gives a literature review, together with an explanation of the theory related to the linkages between oil prices and economic activity; Section 3 introduces the data and gives an overview of the methodology; unit root test on the series are carried out in Section 4 while Section 5 contains the cointegration analysis; Section 6 reports the estimates of the weak causality tests we ran, and Section 7 finally concludes.

2. Transmission Channels

As we have already discussed in the introduction, the post-World War II relationship between oil prices and economic activity appears to have changed sometime in the 1980s. Rotemberg and Woodford (1996) state in a very clear way that sometime after 1980 OPEC lost its ability to keep the nominal price of oil relatively stable. After such date, variations in the demand for oil were reflected quickly in nominal price changes, and several statistical properties and overall behaviour of oil prices changed as a result. The meaning of the change in the oil-price GDP could thus be interpreted in two different ways. Firstly, oil might have once been able to affect GDP, or perhaps the relationship might have been absent at all, the only reason for its pre-1980 existence being that the earlier sample period of the data was not lengthy enough to expose the null character of the hypothesis. A second, possible interpretation is that the relationship was never intended to be linear, but that pricing conditions in the world oil market from just after World War II through the late 1970s let linear versions of the relationship approximate the observed behavior, while hiding the real structural form of the relationship. However, instead of resorting to an asymmetric approximation to model the relationship, our paper favors a structural break set-up in the deterministic components of the series. Our analysis thus estimates the relationship focusing on the OPEC countries, and accommodates the above first critique making use of all yearly available information for the group, and the second critique not by specifying a non-linear relation-ship between GDP and nominal oil prices through new variable definitions or asymmetric approaches, but by accounting for the impact of non-linearities on a country by country approach based on the structural break analysis of the data generating processes of GDP and nominal oil prices and on a possible change in the deterministic components in the long-run relationship between the two variables.

Oil prices are likely to affect macroeconomic activity in both the short and the medium-run. This paragraph fits in the main analysis as it indicates potential linkages between oil prices and economic activity.[2] Theory would distinguish

[2]For a valid overview of the channels of impact of energy prices shocks on aggregate economic activity, with a specific focus on importing countries, see Brown and Yucel (2002).

three main transmission channels: a traditional input-costs channel, the effects of income shifts across oil importing and oil exporting countries and finally asymmetric effects of monetary policy actions. The first channel can be considered as the industrial spill-over channel: as oil prices drop (increase) prices of competing energy commodities are driven down (up) too, and oil-intensive production sectors' prices are positively (negatively) hit as the decline in oil prices influences a range of different inputs. The income shifts channel on the other side operates as a redistribution of income from countries with a generally higher propensity to save, the exporting countries, to countries with a generally higher propensity to spend, the importing countries. This, at least in the short-medium term, assuming positive expectations of the importing countries and financial and fiscal constraints of the exporting countries remain unchanged, would result, in the case of an oil price drop, in an overall stronger demand for oil. Finally, with a specific focus on importing countries, the drop (increase) in oil prices might trigger a loosening (strengthening) of the monetary policy, fostering (depressing) economic activity, while the effect might reverse in exporting countries, where the inability of the oil industry to reach the fiscal break-even point after a decrease in oil prices might promote contractionary fiscal actions, slowing down overall economic activity.[3] In a time framework like ours, identify the impact of each channel in the short/medium run is not an easy task. Variations of the oil prices might feed into the economy through any of the channels or have a contemporary effect in two or all of them. Substantially, the presence of this three channels seems to indicate that a positive variation of the oil prices would normally involve a positive variation of economic activity. On the other side, in the long run, we can think about oil prices as an instrument to detect the presence of a commodity curse effect on long run GDP levels, and would thus expect the long run elasticity of oil prices with respect to GDP to enter the relationship with a negative sign.

3. Data and Methodology

Countries belonging to our database were selected based on data availability and their status as OPEC members. An issue we would like to address, related to the time dimension of the analysis, has to do with the sample period of the series. Many, if not the majority of the literature we previously reviewed, has up until now consistently chosen year 1980 as the initial sampling period. Historical reasons accounted for are the beginning of the globalization era, a higher degree of insulation of the world economies from commodity price shocks, as well as availability of high quality data. Given current data availability, as the GDP and the oil prices series are both available starting from 1960 for the majority of the countries belonging to the group we examined, we choose to focus on this two

[3]For a more informative overall explanation, as well as an overview of the potential short run effects of the recent oil price plunge, see Baffes, Kose, Ohnsorge, Stocker, Chen, Cosic, Gong, Huidrom, Vashakmadze, Zhang, and T. (2015).

variables to check for the existence of a long-run relationship taking into account the presence of structural breaks in their data generating processes. From an empirical viewpoint, we consider a linear cointegration framework to analyze the link between nominal oil prices and real GDP.[4] The real GDP series for our set of countries are taken from the World Bank Database (WDI) while the oil price series are taken from the British Petroleum company (BP) statistical database (where the nominal oil price series are defined as "money of the day"). The WDI contains GDP yearly series from 1960 and covered almost entirely the OPEC group. Some gaps at the beginning of the GDP series were filled in with the help of the IMF financial statistics database (IFS). The bivariate relationship between real GDP and oil prices could be implicitly represented as in equation (1):

$$GDP_t = f(oil_t) \quad (1)$$

where GDP_t is the natural log of real GDP and oil_t is the natural log of the oil prices series. Since cointegration implies a possible error correction representation by the Granger representation theorem, we will estimate the above relationship in an error correction model specification, in order to check for long-run weak causality direction as well as short run and joint causality. Before proceeding with the weak causality tests, an analysis of the order of integration and cointegration is carried out in the next Section.

[4]The reason why we should choose nominal oil prices over real one is well explained by Hamilton (2005), according to whom endogeneity issues should be far more prevalent when employing real oil prices series as these are more likely to carry the effect of strong exogenous shocks as the Suez crisis. However, we carried on this exercise employing both a nominal and a real definition of oil prices.

Table 1. OPEC Countries, Descriptive Statistics of GDP

Country	T	Mean	Median	Variance
AGO	28	23.77	32.52	0.26
ARE	38	25.38	25.29	0.22
DZA	53	24.67	24.88	0.65
ECU	53	23.79	23.9	0.65
GAB	53	22.4	22.58	0.33
IDN	53	25.38	25.44	0.81
IRN	53	25.74	25.46	1.22
IRQ	53	23.58	23.77	0.91
KWT	53	24.68	24.63	0.15
LBY	41	24.47	24.5	0.29
NGA	49	24.76	24.74	0.26
QAT	53	24.04	23.9	0.47
SAU	50	25.74	26.01	1.01
VEN	50	25.32	25.32	0.13

Abbreviations: Ago=Angola, ARE=United Arab Emirates, DZA=Algeria, ECU=Ecuador, GAB=Gabon, IDN=Indonesia, IRN=Iran, IRQ=Iraq, KWT=Kuwait, LBY=Lybia, NGA=Nigeria, QAT=Qatar, SAU=Saudi Arabia, VEN=Venezuela

4. Unit Root Tests

4.1. Methodology

Integration analysis was conducted with the corrected Ng and Perron (2001) M-tests, were an intercept and a trend were included in every ADF regression for the time series in levels, and a constant only for the differenced series. In order to tackle the issue of trend-break stationarity, with a particular emphasis on the GDP series,we also employed the unit root tests proposed in Zivot and Andrews (1992) and Lumsdaine and Papell (1997), which account for the possibility of either one or two endogenously determined structural breaks in the series.[5] Additionally, the Perron and Vogelsang (1992) and Clemente, Montanes, and Reyes (1998) Innovation outlier (IO) and Additive outlier (AO) tests, which have been here applied to check for stationarity of the first differenced series, were carried out. Given the length of the time series at our disposal, only up to two breaks were considered in both deterministic components of the assumed data generating processes, aimed at avoiding the critique of data mining and to ensure the empirical relevance of the breaks. In order to ascertain the effective order of

[5]The necessity of looking for an endogenous methodology to test for the null hypothesis of no structural change can be spotted in Christiano (1992), where the author, based on the evidence contained in a seminal paper by Perron (1989), states that a choice of breaks independent from prior information on the data, an exogenous break-date choice, would lead to normally reject a no-break null hypothesis.

integration of the series, we followed the approach described by Dickey and Pantula (1987), starting the unit root analysis from the differenced series and then reducing the order of differentiation checking for non-rejection of the null hypothesis of unit root.

4.2 Results for GDP

Results of the M-tests in Table 2 show that only in six out of the fourteen OPEC countries[6] the GDP might actually follow an I(1) process. According to the Ng and Perron (2001) tests results, some GDPs would appear to follow an I(2) process. Since the GDP of oil-exporting countries might have been influenced by some relevant historical events,[7] we report the one and two breaks test results for the variable in first differences in Tables 6 and 8 for the innovative outlier methodology, and Tables 5 and 7 for the additive outlier methodology. The Zivot and Andrews (1992) and Lumsdaine and Papell (1997) tests, carried on the variable levels and whose output we report in Tables 3 and 4, point alternatively at two I(1) groups: the one break test would consider the GDP in Qatar, Nigeria, Libya, Iraq and Ecuador to be non-stationary, pointing at the oil crisis of the seventies as the relevant break date; the two break test would instead show a non-stationary GDP for Arab Emirates, Libya, Iraq, Qatar, Saudi Arabia and Venezuela. The same two tests, carried out following the IO methodology, would instead present a less conservative evidence: the one break test would indicate the GDP in Angola, Arab Emirates, Ecuador, Gabon, Iraq, Kuwait, Libya, Nigeria and Venezuela as I(1), while the two break IO test would point at Arab Emirates, Iraq, Kuwait, Libya, Nigeria and Venezuela as I(1) series. Based on our results, we choose to restrict our analysis to an I(1) group including Angola, Ecuador, Indonesia, Iraq, Nigeria and Venezuela, which the Ng and Perron (2001) tests indicated as having a non-stationary in level GDP,[8] and ultimately adding Qatar, Libya, Saudi Arabia and Arab Emirates, whose GDP series were indicated as non-stationary in at least one of the four unit root tests with structural breaks we employed.

[6] Angola, Ecuador, Indonesia, Iraq, Nigeria and Venezuela.

[7] Such as the first oil crisis in the late seventies, the switch from administered to free market oil prices and the oil price glut in the second half of the eighties, second order effects of the gulf war in the nineties and finally recent developments connected to the second globalization era and the increase in size of the service sector in the years 2000.

[8] It has been acknowledged how M-type tests are normally less inclined to suffer of small sample bias than other ADF based tests. However, for the purpose of this investigation, the outcome of unit root tests accounting for at least a single structural break in the form of a sudden or more gradual change cannot be neglected. For this reason, results on the integration order for the AO and IO tests were carried on to the cointegration analysis.

4.3 Results for Oil Prices

Even though the previously mentioned discussion on endogeneity issues formulated by Hamilton (2005) suggested us to evaluate nominal prices, in this Section we aim at determining the order of integration of both the nominal series and the 2013 adjusted oil price series from the BP database.[9] Structural break related analysis of price series is a relevant part of the analysis: breaks related to sudden changes in economic policies or to sudden shocks in political stability are very likely to have direct effects on oil prices, which in turn could affect real economy through the channels we already discussed in the short/medium run, as well as altering the structure of the relationship between GDP and oil prices in the long run. As we have already mentioned, we employ a bottom-up approach to test for the order of integration of the oil series, thus starting from the series first differences. Employing again the unit root tests introduced above, we test both the real and the nominal oil price in first differences with one and two endogenous breaks in Tables 11 and 12, then proceed to test the series in levels and present the output in Table 10, where we also show the output for the Ng and Perron (2001) tests both in first differences and levels. Our results show that all the modified M-tests would give evidence that the oil series, both real and nominal, are I(1). It is worth noticing that the existence of breaks in any series might result in the oil price variable appearing more integrated than it actually is. When the one break tests and the two break tests were carried out, the former tests suggested the variable might be I(2), while the latter tests, in particular the Clemente, Montanes, and Reyes (1998) tests in their additive outlier specification, again indicated oil prices as an I(1) variable, furthermore highlighting two historically relevant breaks in 1972 and 1984.[10] These results allowed us to carry out the following cointegration tests considering the oil price series as I(1).

[9] We recall that the discussion on the order of integration of macro-economic variables is mainly connected to the stream of analysis related to persistence of shocks or absence of time-wise memory in GNP and Oil price series which started with the seminal work of Perron (1989).

[10]The first date being one year before the first oil crisis price spike, the second date corresponding to the year before the Saudi Arabia induced oil price glut and sudden decline in oil prices. For a recent historic overview on the two events, see Jones (2012).

Table 2. Unit root tests, Ng and Perron (2001)

Country	Variable	Mz	MZ_t	MSB	MP_t
DZA	GDP_t	-0.42	-0.36	0.86	39.10
AGO	GDP_t	-4.65	-1.50	0.32	19.42
	GDP_t	-9.19**	-2.14**	0.23**	2.67**
	GDP_t	-6.19	-1.70	0.28	14.68
ARE	GDP_t	-0.40	-0.40	1.00	50.10
ECU	GDP_t	-5.57	-1.66	0.30	16.34
	GDP_t	-9.57**	-2.16**	0.23**	2.66**
	GDP_t	-3.69	-1.34	0.36	24.46
GAB	GDP_t	-1.43	-0.83	0.58	16.84
IDN	GDP_t	-5.71	-1.64	0.29	15.86
	GDP_t	-16.42***	-2.87***	0.17***	1.49***
	GDP_t	-6.68	-1.80	0.27	13.67
IRN	GDP_t	-0.26	-0.36	1.37	92.62
IRQ	GDP_t	-6.60	-1.76	0.27	13.83
	GDP_t	-22.82**	-3.38**	0.15**	1.08**
	GDP_t	-8.89	-2.10	0.24	10.27
KWT	GDP_t	-1.15	-0.76	0.66	21.30
	GDP_t	-8.61	-2.06	0.24	10.63
LBY	GDP_t	-0.82	-0.31	0.38	12.38
NGA	GDP_t	-2.52	-1.09	0.43	35.03
	GDP_t	-7.50*	-1.93*	0.26*	3.28*
	GDP_t	-2.99	-1.07	0.36	26.77
QAT	GDP_t	-2.48	-1.11	0.45	9.87
	GDP_t	-3.77	-1.21	0.32	21.87
SAU	GDP_t	-0.79	-0.63	0.80	31.02
VEN	GDP_t	-2.55	-1.08	0.42	33.94
	GDP_t	-24.66***	-3.50***	0.14***	1.02***
	GDP_t	-5.55	-1.66	0.30	16.42

***Denotes significance at the 1% level,
**Denotes significance at the 5% level,
*Denotes significance at the 10% level.
All the frequency zero spectrum calculations for the modified tests were based on an auxiliary detrended GLS autoregression of the natural log of GDP, where lagged di¤erences were chosen by the Modified Aikake selection criteria, starting from a maximum lag based on Schwert (1989) rule of thumb. A trend and a constant were included in the tests when the variables were analyzed in levels, while a constant only was included in the tests when the variables were analyzed in first differences.

Table 3. Zivot and Andrews Test (1992), One break

Country	Variable	ADF	T1	MAIC Lags
DZA	GDP_t	-4.55	1987	1
AGO	GDP_t	-4.44	1993	0
ARE	GDP_t	-3.63	1982	0
ECU	GDP_t	-5.14	1973	1
GAB	GDP_t	-4.95	1974	0
IDN	GDP_t	-5.59**	1998	0
IRN	GDP_t	-7.05***	1969	1
IRQ	GDP_t	-4.34	1991	1
KWT	GDP_t	-4.68	1990	0
LBY	GDP_t	-2.94	1973	1
NGA	GDP_t	-2.72	1980	0
QAT	GDP_t	-2.62	1984	0
SAU	GDP_t	-4.22	1972	1
VEN	GDP_t	-3.13	1980	0

***Indicates significance at 1% level, **indicates significance at 5% level, *indicates significance at 10% level. All basic specifications accomodate a trend and one break is allowed in both the intercept and the deterministic trend.

Table 4. Lumsdaine and Papell Test (1997), Two Breaks

Country	Variable	ADF	T1	T2	MAIC Lags
DZA	GDP_t	-9.61***	1983	1996	1
AGO	GDP_t	-4.74	1992	2005	0
ARE	GDP_t	-5.08	1982	1989	0
ECU	GDP_t	-7.42***	1972	1988	1
GAB	GDP_t	-7.64***	1970	1977	0
IDN	GDP_t	-8.36***	1968	1997	0
IRN	GDP_t	-7.45***	1969	1979	1
IRQ	GDP_t	-5.93	1978	1990	1
KWT	GDP_t	-6.01	1978	1992	0
LBY	GDP_t	-4.78	1978	1992	1
NGA	GDP_t	-4.94	1968	1996	0
QAT	GDP_t	-4.02	1986	1991	0
SAU	GDP_t	-5.34	1972	2003	1
VEN	GDP_t	-4.68	1979	2001	0

***Indicates significance at 1% level, **Indicates significance at 5% level, *Indicates significance at 10% level. All basic specifications accomodate a trend and two breaks are allowed in both the intercept and the deterministic trend.

Table 5. Perron and Vogelsang (1992), AO, One Break

Country	Variable	ADF	T1	P-value
DZA	GDP_t	-2.32	1985	0.284
AGO	GDP_t	-1.71	1991	0.422
ARE	GDP_t	-1.45	1984	0.18
ECU	GDP_t	-5.66**	1978	0.006
GAB	GDP_t	-3.03	1974	0.016
IDN	GDP_t	-5.56**	1996	0.027
IRN	GDP_t	-3.17	1967	0.015
IRQ	GDP_t	-7.81**	1989	0.829
KWT	GDP_t	1.96	1989	0.869
LBY	GDP_t	-9.62**	1978	0.048
NGA	GDP_t	-5.51**	2002	0.032
QAT	GDP_t	-5.49**	1990	0
SAU	GDP_t	-2.45	1974	0.001
VEN	GDP_t	-3.57	2001	0.681

**Significant at 5%. GtoS (General to specific test on significance of lagged variable) procedure employed to select number of lags. The test for first differences accommodates a single shift in the mean. Additive outlier methodology.

Table 6. Perron and Vogelsang (1992), IO, One Break

Country	Variable	ADF	T1	P-value
DZA	GDP_t	-4.10	1978	0.03
AGO	GDP_t	-6.16**	1992	0.014
ARE	GDP_t	-4.54**	1987	0.581
ECU	GDP_t	-5.80**	1974	0.03
GAB	GDP_t	-7.93**	1975	0
IDN	GDP_t	-7.51**	1997	0.609
IRN	GDP_t	-2.56	1977	0.141
IRQ	GDP_t	-11.37**	1990	0.961
KWT	GDP_t	-4.45**	1990	0.014
LBY	GDP_t	-9.12**	1973	0.008
NGA	GDP_t	-5.42**	2001	0.117
QAT	GDP_t	2.69	1992	0.224
SAU	GDP_t	-3.11	1973	0
VEN	GDP_t	-6.66**	2002	0.053

**Significant at 5%. GtoS (General to specific test on significance of lagged variable) procedure employed to select number of lags. The test for first differences accomodates a single shift in the mean. Innovation outlier methodology.

Table 7. Clemente, Montanes and Reyes (1998), AO, Two Breaks

Country	Variable	ADF	T1	T2
DZA	GDP_t	-2.06	1984	1985
AGO	GDP_t	-2.41	1991	2003
ARE	GDP_t	-7.33**	1982	1986
ECU	GDP_t	-7.26**	1970	1976
GAB	GDP_t	-2.58	1971	1974
IDN	GDP_t	-3.96	1980	1996
IRN	GDP_t	-6.74**	1974	1986
IRQ	GDP_t	-9.42**	1989	2001
KWT	GDP_t	-2.28	1980	1989
LBY	GDP_t	-10.10**	1978	1996
NGA	GDP_t	-4.40	1974	2002
QAT	GDP_t	-5.74**	1983	1994
SAU	GDP_t	-5.62**	1979	1985
VEN	GDP_t	-6.69**	1978	2001

**Significant at 5%. GtoS (General to specific test on significance of lagged variable) procedure employed to select number of lags. The test for first differences accommodates two shifts in the mean. AO methodology.

Table 8: Clemente, Montanes and Reyes (1998), IO, Two Breaks

Country	Variable	ADF	T1	T2
DZA	GDP_t	-4.42	1984	1995
AGO	GDP_t	-3.37	1992	2003
ARE	GDP_t	-7.18**	1981	1987
ECU	GDP_t	-7.54**	1971	1975
GAB	GDP_t	-9.51**	1972	1975
IDN	GDP_t	-11.40**	1966	1997
IRN	GDP_t	-7.13**	1976	1981
IRQ	GDP_t	-13.46**	1990	2002
KWT	GDP_t	-6.39**	1978	1990
LBY	GDP_t	-9.86**	1979	1994
NGA	GDP_t	-5.90**	1969	2001
QAT	GDP_t	-2.69	1984	1992
SAU	GDP_t	-3.18	1973	1981
VEN	GDP_t	-6.05**	1979	2002

**Significant at 5%. GtoS (General to specific test on significance of lagged variable) procedure employed to select number of lags. The test for first differences accomodates two shifts in the mean. IO methodology.

Table 9. Summary Results, Unit Root Tests

Tests	**I(1)**
Ng Perron Tests	AGO ECU IDN IRQ NGA VEN
One Break AO	ECU IRQ LBY NGA QAT
One Break IO	AGO ARE ECU GAB IRQ KWT LBY NGA VEN
Two Breaks AO	ARE IRQ LBY QAT SAU VEN
Two Breaks IO	ARE IRQ KWT LBY NGA VEN
Tests	**I(0)**
Ng Perron Tests	-
One Break AO	IDN
One Break IO	IDN
Two Breaks AO	ECU IRN
Two Breaks IO	ECU GAB IDN IRN

5. Cointegration Tests

Given oil was found to be an I(1) variable in the previous Section, we proceeded to run a series of tests in order to check whether or not the oil price might be cointegrated with GDP. The economic intuition behind such relationship has to do with the extent to which economies depend on commodities exports, which qualifies them as commodity dependent countries. For such reason, even when we might expect a spike or a decrease in oil prices to start feeding into economic activity with some delay, affecting GDP in the short and medium run, our interest lies first of all in checking whether or not oil prices and GDP in OPEC countries drift together in time following an equilibrium path. We employ the Gregory and Hansen (1996a) cointegration test, allowing for a single regime shift or a complete structural change in both deterministic and stochastic components of the cointegrating relationship, and two vector cointegration based tests, the Johansen and Juselius (1990) test and the Johansen, Mosconi, and Nielsen (2000) cointegration test, the latter allowing for an exogenous structural break in the deterministic trend.[11]

[11]Another feasible and equivalent choice while testing for cointegration would be the "de-trended" cointegration test by Saikkonen and Lütkepohl, (Saikkonen and Lütkepohl (2000a), Saikkonen and Lütkepohl (2000b), Saikkonen and Lütkepohl (2000c)) which apply a Johansen type test to a detrended series with a deterministic term. Such test, however, would have been unfeasible for a structural break in the deterministic trend term.

Table 10. Nominal and Real Oil Price Unit Root Tests

Ng and Perron (2001) Tests					
Value	**Variable**	**Mz_a**	**MZ_t**	**MSB**	**MP_t**
nominal	OIL_t	-19.33***	-3.08***	0.16***	1.37***
real	OIL_t	-18.98***	-3.05***	0.16***	1.39***
nominal	OIL_t	-5.17	-1.60	0.31	17.62
real	OIL_t	-5.52	-1.64	0.30	16.43
Zivot and Andrews (1992) Test, One Break					
Value	**Variable**	**ADF**	**T1**	**MAIC lags**	
nominal	OIL_t	-3.12	1986	0	
real	OIL_t	-3.11	1986	0	
Lumsdaine and Papell (1992) Tests, Two Breaks					
Value	**Variable**	**ADF**	**T1**	**T2**	**MAIC Lags**
nominal	OIL_t	-5.75	1973	2000	0
real	OIL_t	-6.22	1973	1999	0

***Denotes significance at the 1% level, **Denotes significance at the 5% level, *Denotes significance at the 10% level. For the Ng-Perron tests, All the frequency zero spectrum calculations for the modified tests were based on an auxiliary detrended GLS auto-regression of the natural logarithm of GDP. A trend and a constant were included in the level tests, while a constant only was included in the first differences test. Both The Zivot-Andrews and the Lumsdaine-Papell tests are based on model C specification, allowing for both a break in the intercept and the trend. In all tests, lagged di¤erences were chosen by the Modified Aikake selection criteria, starting from a maximum lag based on Schwert (1989) rule of thumb, $P_{max} = 12 * (\frac{T}{100})^{\frac{1}{4}}$

Table 11. Perron and Vogelsang (1992), One Break

Nominal Oil Price				
Specification	**Variable**	**ADF**	**T1**	**p-value**
AO	OIL_t	-2.14	1972	0.442
IO	OIL_t	-2.78	1973	0.649
Real Oil Price				
Specification	**Variable**	**ADF**	**T1**	**p-value**
AO	OIL_t	-2.07	1972	0.517
IO	OIL_t	-2.78	1973	0.717

**Indicates significance at 5%. Trend term not included (model A). AO stands for additive outlier method, IO for innovative outlier method. T1 indicates the endogenous break date.

Table 12. Clemente, Montanes and Reyes (1998), two breaks

Nominal Oil Price				
Specification	**Variable**	**ADF**	**T1**	**T2**
AO	OIL_t	-7.30**	1972	1984
IO	OIL_t	-3.32	1973	1997
Real Oil Price				
Specification	**Variable**	**ADF**	**T1**	**T2**
AO	OIL_t	-7.33**	1972	1984
IO	OIL_t	-3.51	1973	1997

**Indicates significance at 5%. Trend term not included (model A). AO stands for additive outlier method, IO for innovative outlier method. T1 and T2 indicate the endogenous break dates.

5.1. Residual Based Approach

In this Sub-section, we offer an overview of the three equation models from Gregory and Hansen (1996a) which we selected to test for cointegration in a residual based framework. The modified ADF tests proposed by the authors offer the advantage of being non-informative with respect to the time of a structural break, and as such (partially) prevent informal time series analysis such as a visual examination of the time series plot, offering a way to retrieve endogenously the suspected time of the structural break. The basic Model specification would start defining a standard single-equation cointegrating regression:

$$y_t = \mu + \alpha x_t + \varepsilon_t \quad (2)$$

where variables y_t and x_t are assumed to be I(1) and the residuals stationary. If this long run relationship were to naturally hold, the intercept and the estimated coefficient would need to be constant over time. However, such set-up does not appear to be the case in many application, such as ours.[12] For such reason, structural changes, reflected by a change in the intercept or the slope, need to be addressed. In order to do that, the authors introduce a break dummy variable:

$$\varphi_t = 0 \; if \; t \leq [T_\tau]$$

$$\varphi_t = 1 \; if \; t > [T_\tau]$$

Where τ represents the unknown relative time of the structural change, T is the number of observations in the series, and the brackets denote the integer part of the product. From the basic set-up, the authors illustrate five different specifications, three of which were considered in our analysis. The first

[12]This explains why we pointed out how the use of such methodology in presence of breaks would "partially" prevent an informal graphical analysis.

specification, defined the level shift with trend model in Gregory and Hansen (1996a) (C/T model), is represented as:

$$y_t = \mu_1 + \mu_2 \varphi_{t\tau} + \beta t + \alpha x_t + \varepsilon_t \quad (3)$$

which would basically imply a shift of the cointegrating relationship, captured by term $\mu_2 \varphi_{t\tau}$ which keeps gravitating around a non-zero mean. An alternative parametrization we considered was:

$$y_t = \mu_1 + \mu_2 \varphi_{t\tau} + \alpha x_t + \varepsilon_t \quad (4)$$

were only a shift in the intercept in the cointegrating relationship is considered and neither the trend term nor the cointegrating relationship are able to rotate at breakpoint $t = \tau T$. Although the parametrization in (4) might appear less indicative than those in (3) and (5) after a visual inspection of the data, for the sake of a formally consistent analysis we choose to report it as well. The last speci…cation we employ is the most general one, which Gregory and Hansen (1996b) define as a complete regime shift with a shift in the trend (C/S/T model). This relationship can be formalized as in (5)

$$y_t = \mu_1 + \mu_2 \varphi_{t\tau} + \beta_1 t + \beta_2 t \varphi_{t\tau} + \alpha_1 x_t + \alpha_2 x_t \varphi_{t\tau} + \varepsilon_t \quad (5)$$

where μ_1 and μ_2 would denote respectively the original intercept and its change at time $t = \tau T$, β_1 and β_2 would denote the slope of the trend and its change at the time of the break, and α_1 and α_2 would represent the slope of the cointegrating relationship and its change. Similarly to Zivot and Andrews (1992), Gregory and Hansen (1996a) set up a series of cointegration test statistics for every possible break point in a bounded interval required for tractability of the data.[13] The smallest value of the augmented Dickey-Fuller test statistic on the residuals of the previous parametrizations across all the possible set of breaks in the selected interval is taken as the relevant statistic:

$$ADF = \inf_{\tau \in T}[\, ADF\ (\tau)]$$

with T being the compact subset inside which the minimum test statistic is taken. We next report and discuss the results of the Gregory and Hansen (1996a) and Gregory and Hansen (1996b) tests for Angola, Ecuador, Indonesia, Iraq, Nigeria and Venezuela, Qatar, Libya, Arab Emirates and Saudi Arabia. These were the countries whose GDP were found to be integrated of order one in the unit root Section. As we mentioned before, the test were carried out for a break in the

[13]Following the suggestions of the authors, we ran the tests taking for each possible break point in the interval ([:15n]; [:85n]).

intercept, trend, and cointegrating coefficient of each relationship (model C/S/T, Tables 13 and 14), a single break in the level assuming a constant and a time trend in the cointegrating relationship (model C/T, Tables 15 and 16), and a single break in the level assuming a constant only in the cointegrating relationship (model C, Tables 17 and 18[14]).

The tests show a singular result. Whenever no hint of cointegration could be found between oil prices and GDP in the majority of the analyzed sub-set of OPEC countries, one country out of the selected ten, Saudi Arabia, presents clear evidence of cointegration, depending on the set up of the deterministic component of the test, at least at the very liberal 10% level when a trend and an intercept are included alongside with what Gregory and Hansen (1996b) define as a regime shift (allowing for a break in both the intercept and the trend in the cointegrating relationship) for the case where the relationship between real GDP and nominal oil prices was analyzed, and at the 5% level with the same deterministic set-up but considering the GDP-real oil price relationship instead. Such result appears to only partially agree with Lescaroux and Mignon (2008), where the relationship could be verified as well for Iran, Iraq, and Qatar.[15] This result also appears to be in line with Saudi Arabia's position as OPEC's "swing producer", and suggests that the state of dependency of the country on oil production might be more intense than in all the other OPEC countries. A last, useful inside is that the relationship, found only in Saudi Arabia, represents a further indication that the economy of the country is still far from any attempt of diversification, evidently protected more by energy prices upswings and collapses of the oil price than in the past thanks to its price setting power and its excess reserves rather than by any attempt at structural reforms of its economy and development of alternative sectors.

[14] The possibility of a mean stationary cointegrating vector does not appear rigorous given that the GDP series would appear to show a trend while the first differenced oil series would not. Nevertheless, we report the results for model C for completeness of the analysis and to overcome, as we already stated, the limitations of a visual analysis. The number of lagged differences was taken following the MAIC criterion used in the unit root analysis.

[15]While accounting for a single structural break, we could find some pretty weak evidence of cointegration for Iraq and United Arab Emirates. However, this would pretty much depend on the lag choice. On the contrary, even when we employed a much less conservative number of lags to test for Saudi Arabia according to the unmodified Aikake criterion, the outcome of the tests did not change, staying put under the 10% critical value.

Table 14. Gregory and Hansen (1996b), GDP and Real Oil, C/S/T

Country	ADF	Lags	[T]
AGO	-3.82	0	1991
ECU	-4.54	1	2000
IDN	-3.90	0	1998
IRQ	-4.75	1	1988
NGA	-4.66	0	1979
VEN	-3.74	0	2000
QAT	-3.95	0	2002
LBY	-5.22	1	1979
ARE	-4.88	0	1988
SAU	-5.87**	1	1970

**Denotes significance at the 5% level. A trend and intercept are assumed in the cointegrating relationship, the set up includes a complete regime shift (a contemporaneous break in intercept, trend and cointegrating relationship). Critical values are -6.02 (1%), -5.50 (5%), -5.24 (10%) and were taken from Gregory and Hansen (1996b), pag. 559.

Table 13. Gregory and Hansen (1996b), GDP and nominal oil, C/S/T

Country	ADF	Lags	[T]
AGO	-3.86	0	1991
ECU	-4.13	1	2000
IDN	-3.86	0	1998
IRQ	-4.72	1	1988
NGA	-4.85	0	1979
VEN	-3.62	0	2000
QAT	-3.72	0	2003
LBY	-5.22	1	1979
ARE	-4.75	0	1988
SAU	-5.48*	1	1977

*Denotes significance at the 10% level. A trend and intercept are assumed in the cointegrating relationship, the set up includes a complete regime shift (a contemporaneous break in intecept, trend and cointegrating relationship). Critical values are -6.02 (1%), -5.50 (5%), -5.24 (10%) and were taken from Gregory and Hansen (1996b), pag. 559.

Table 15. Gregory and Hansen (1996a), GDP and Nominal Oil, C/S/T

Country	ADF	Lags	[T]
AGO	-4.04	0	1990
ECU	-4.35	1	1972
IDN	-3.61	0	1998
IRQ	-4.02	1	1988
NGA	-3.90	0	1979
VEN	-3.55	0	1980
QAT	-4.28	0	1995
LBY	-4.14	1	1971
ARE	-3.74	0	1992
SAU	-4.26	1	1970

A trend and intercept are assumed in the cointegrating relationship, the set up includes a single level shift in the mean of the cointegrating relationship. Critical values are -5.45 (1%), -4.99 (5%) and -4.72 (10%) and were taken from Gregory and Hansen (1996a), pag. 33, tab. 1A.

Table 16. Gregory and Hansen (1996a), GDP and Real Oil, C/T

Country	ADF	lags	[T]
AGO	-4.01	0	1991
ECU	-4.37	1	2000
IDN	-3.67	0	1998
IRQ	-3.88	1	1988
NGA	-4.19	0	1979
VEN	-3.44	0	1980
QAT	-4.25	0	1995
LBY	-4.47	1	1971
ARE	-3.57	0	1992
SAU	-4.36	1	1970

A trend and intercept are assumed in the cointegrating relationship, the set up includes a single level shift in the mean of the cointegrating relationship. Critical values are -5.45 (1%), -4.99 (5%) and -4.72 (10%) and were taken from Gregory and Hansen (1996a), pag. 33, tab. 1A.

Table 17. Gregory and Hansen (1996a), GDP and Nominal Oil, C

Country	ADF	lags	[T]
AGO	-4.85	0	1989
ECU	-4.28	1	1987
IDN	-3.98	0	1986
IRQ	-3.73	1	1994
NGA	-3.23	0	1974
VEN	-3.62	0	1988
QAT	-3.99	0	1995
LBY	-2.71	1	1990
ARE	-4.11	0	1991
SAU	-3.77	1	1970

An intercept is assumed in the cointegrating relationship, the set up includes a single level shift in the mean of the cointegrating relationship. Critical values are -5.13 (1%), -4.61 (5%), -4.34 (10%) and were taken from Gregory and Hansen (1996a), pag. 33 table 1A.

Table 18. Gregory and Hansen (1996a), GDP and real oil, C

Country	ADF	lags	[T]
AGO	-5.33	0	1996
ECU	-4.17	1	1987
IDN	-4.07	0	1986
IRQ	-3.67	1	1989
NGA	-2.98	0	1994
VEN	-4.04	0	1988
QAT	-3.19	0	1986
LBY	-3.50	1	2001
ARE	-3.59	0	1991
SAU	-3.62	1	1987

An intercept is assumed in the cointegrating relationship, the set up includes a single level shift in the mean of the cointegrating relationship. Critical values are -5.13 (1%), -4.61 (5%), -4.34 (10%) and were taken from Gregory and Hansen (1996a), pag. 33 table 1A.

5.2 Vector Based Cointegration Analysis

This Section shows the results based on the Johansen and Juselius (1990) trace test and the Johansen, Mosconi, and Nielsen (2000) exogenous one break test for cointegration. In particular, among the three nested long run matrix trace tests, we choose to follow the most general specification, the $H_l(r)$ test from the afore-mentioned paper, to allow for the time series in levels to have a broken trend while allowing for a broken trend in the cointegrating relationship as well. To grant the tractability of the data, the standard specification of the test was augmented with an unrestricted exogenous impulse dummy at the time of the break, an unrestricted exogenous broken trend dummy, and a restricted exogenous trend and break interaction dummy in the cointegrating relationship. Following Johansen, Mosconi, and Nielsen (2000), we start with a canonical specification of a cointegrated vector auto-regressive model:

$$\Delta X_t = \Pi X_{t-1} + \Pi_1 t + \varepsilon_t \tag{6}$$

where, to simplify notation in (6), we have avoided any additional lag. In this model, where X_t represents the vector of variables , and the error ε_t is assumed to be identically and independently normally distributed with finite variance and a mean equal to 0, cointegration will appear if the matrix of the long run relationships has a reduced rank and could thus be described as the product $\Pi = \alpha\beta'$, where both α and β are $(p * r)$ full rank matrices. However, this would imply the presence of a quadratic trend in the level variables, which we choose not to assume due to lack of evidence on the matter. For such reason, the quadratic trend can be assumed away defining $\Pi_1 = \alpha * \gamma'$. That basically means restricting the trend to the cointegrating relationships to rule out the quadratic trend. This way, the specification for the standard Johansen trace test was

$$\Delta X_t = \alpha(\beta' X_{t-1} + \gamma' t) + \mu + \varepsilon_t \tag{7}$$

which involved calculating the reduced rank of the combined matrix, $(\Pi, \Pi_1) = \alpha(\beta', \gamma')'$. This allowed us to formulate the cointegration hypothesis in terms of the rank of Π in conjunction with Π_1:

$$H_l(r) : rank(\Pi, \Pi_1) \leq r$$

If we assume the sample might have q sub-periods, or equivalently $q - 1$ breaks, the base-line model in (6) can be rewritten q times, conditional on the first k observations of each sub-sample, as q "break models":

$$\Delta Y_t = (\Pi, \Pi_j) \begin{pmatrix} Y_{t-1} \\ t \end{pmatrix} + \mu_j + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + \varepsilon_t \tag{8}$$

where $j = 1,2,\dots,q$, such that $j = 2$, and Π, Π_j and μ_j are $(p * 1)$ matrices, with p being equivalent to the number of time series in Y_t. Finally, instead of writing q equations, the sub-samples are accommodated by defining the following matrices:

$$D_{j,t} = \left(1, \dots, D_{q,t}\right)', \qquad \mu = \left(\mu_1, \dots, \mu_q\right), \qquad \gamma = (\gamma_1, \dots, \gamma_q)$$

with dimensions $(q * 1);\ (p * q);\ (q * r)$. This allows to rewrite equation (8) as:

$$\Delta Y_t = \alpha \begin{pmatrix} \beta \\ \gamma \end{pmatrix}' \begin{pmatrix} Y_{t-1} \\ tD_{t-k} \end{pmatrix} + \mu D_{t-k} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + \sum_{i=0}^{k-1} \sum_{j=2}^{q} \kappa_{j,i} I_{j,t-i} + \varepsilon_t \quad (9)$$

where the intervention dummies $D_{j,t}$, $D_{j,t-k}$ and $D_{j,t}$ are defined[16] as:

$D_{j,t} = 1$ for $T_{j-1} + 1 > t \geq T_j$

$D_{j,t} = 0$ otherwise

$D_{j,t+k} = 1$ for $T_{j-1} + 1 + k > t \geq T_j + k$

$D_{j,t+k} = 0$ otherwise

$for\ j = 2, \dots, q$

where, to clarify notation, t represents the time trend, T_j is the last observation of sub-sample j, and the impulse break dummy $I_{j,t}$ is defined as:

$I_{j,t} = 1$ for $\mathrm{t} = T_{j-1} + 1$

$I_{j,t} = 0$ otherwise

Since in our case the number of sub-samples is equal to two, the impulse break dummy $I_{j,t}$ will be just equal to the first difference of the break dummy at time t: $\Delta D_{j,t} = I_t$. The use of impulse break dummies is justified by the need to restrict the residuals to 0 given the initial value in the second sub-period. Finally, the

[16] Notice that the notation we are employing here borrows extensively from Joyeux (2007) and is different from the one used by Johansen, Mosconi, and Nielsen (2000), who define the impulse break dummies as $D_{j,t}$ and the break dummies as the sub-sample sum of a set of indicator dummies, $E_{j,t}$.

likelihood ratio test devised by Johansen, Mosconi, and Nielsen (2000), and based on the squared sample canonical correlations of the long run matrix and the first differences vector of variables, will be:

$$LR\{H_l(r)|H_l(p)\} \tag{10}$$

The tests have different asymptotic properties than the standard tests without breaks given the presence of the exogenous dummies. As a consequence of that we report the different critical values for the $H_l(r)$ tests taken from Giles and Godwin (2012) in the output Tables 21 and 22, while results for the baseline specification (equation (6)) are reported in Tables 19 and 20. Results from the Johansen and Juselius (1990) and the Johansen, Mosconi, and Nielsen (2000) tests suggest the presence of a cointegrating relationship in both Angola and Saudi Arabia. However, since none of the residual based tests indicated Angola as a possible candidate to the long run equilibrium, we could conclude that only Saudi Arabia results, which consistently showed proof of cointegration between oil and GDP across all tests, could be carried on to the next Section for the weak causation tests.

5.2 Weak Causality Tests for Saudi Arabia

To complete the analysis, based on the results of the previous Sections, we present the results of the Granger causality test, a series of Wald test based on linear restrictions we specified in order to test for weak causality in the long run, short run and in the "joint run". Since the C/S/T test allowed us to find evidence of cointegration in Saudi Arabia, we take advantage of the Engle-Granger representation theorem to set up a series of Granger causality tests in order to verify whether or not the existence of a long run relationship between GDP and oil price might have some positive/negative effect on economic activity in Saudi Arabia, or better be helpful in forecasting growth in such country.[17] Following the outcome of the Gregory and Hansen (1996b) C/S/T test, we ran a first step regression of the cointegrating relationship. Recalling equation (5), we calculated the following equilibrium residuals:[18]

[17]We are aware that the Granger causality test is in reality a predictive ability test of the lags of a series with respect to another variable. For such reason, we choose to apply and interpret this test as evidence that a broken long run relationship might be able to help forecasting future growth, so that the test would at least give us an indication of weak causality direction.

[18]We report the estimates of the long run elasticities in Table 23. The oil price variable consistently enters in both the real and the nominal oil price regressions with a negative sign, confirming our expectations from Section 2.

$$\hat{\varepsilon}_t = y_t - \hat{\mu}_1 - \hat{\mu}_2\varphi_{t\tau} - \hat{\beta}_1 t - \hat{\beta}_2 t\varphi_{t\tau} - \hat{\alpha}_1 x_t - \hat{\alpha}_2 x_t\varphi_{t\tau} - \varepsilon_t \quad (11)$$

Then, using the residuals from (11), we estimated the following error correction models:

$$\Delta GDP_t = \mu_1 + \lambda_1[ECT_{t-1}] + \sum_{t=1}^{k}\beta_{i,1}(\Delta oil_{t-k}) + \sum_{t=1}^{k}\beta_{i,2}(\Delta GDP_{t-k}) + \varepsilon_t \quad (12)$$

$$\Delta oil_t = \mu_2 + \lambda_2[ECT_{t-1}] + \sum_{t=1}^{k}\beta_{i,1}(\Delta GDP_{t-k}) + \sum_{t=1}^{k}\beta_{i,2}(\Delta oil_{t-k}) + \varepsilon_t \quad (13)$$

the specifications in (12) and (13) were tested twice for $k = (1;\ 2)$, considering alternatively the error correction term from the relationship between GDP and nominal oil prices (ECT nom) and the error correction term from the relationship between GDP and real oil prices (ECT real). The error correction term, consistently with the previous cointegration analysis, contains not only an intercept and a deterministic trend, but also the structural break we identified for Saudi Arabia through the Gregory and Hansen (1996b) at time t = 1970 for the nominal oil price and t = 1977 for the real oil price. Testing for long run weak causality in (12) and (13) required us to test the speed of adjustment terms, that is $H_0: \lambda_1 = 0$ and $H_0: \lambda_2 = 0$. To test for strong Granger causation, we then carried out a joint test on the lagged first differences of the variables and the error correction coefficients, that is we tested for $H_0: \lambda_1 = \beta_{1,1} = \beta_{1,2} = \cdots = \beta_{1,k} = 0$ in equation (12) and $H_0: \lambda_2 = \beta_{1,1} = \beta_{1,2} = \cdots = \beta_{1,k} = 0$ in equation (13). The joint run test in particular aims at checking which variable bears the burden of a short-run adjustment to re-establish a long-run equilibrium after a shock to the system. Results, shown in Tables 24 and 25 show that weak causality in the long term runs uniquely from the error correction term to GDP growth, as generally all the error correction adjustment coefficients are significant at the 5% level.

Our results on Saudi Arabia are remarkably different from Lescaroux and Mignon (2008) findings, where all the countries which were initially selected by these authors for the long run causation analysis and that resulted in a single univocal direction of causation from oil prices to GDP in the long run (namely, Iran, Qatar and United Arab Emirates) were not selected by us for such analysis due to lack of sufficient evidence on cointegration. In our tests, no lagged first differences of the independent variable in any specification proved to be significant. As for the tests based on the joint causation in the long and the short run, we could gather strong evidence that changes in the oil prices appear to Granger-cause GDP growth in Saudi Arabia jointly with the long run equilibrium correction, while no reverse causation was found as the null hypotheses $H_0: \lambda_2 = \beta_{1,1} = 0$ and $H_0: \lambda_2 = \beta_{1,1} = \beta_{1,2} = 0$ in equation (13) could never be rejected at all conventional confidence levels. The joint test of Δoil_{t-1} and ECT_{t-1} shows that both real and nominal oil prices indeed affect GDP_t, confirming the existence of

a mechanism through which the volatility of oil prices exerts its influence on long-run and short run economic fluctuations of GDP through at least one of the channels we discussed in Sub-section 2.1.

Table 19. Johansen Trace Tests, Real GDP and Nominal Oil Prices

H_0	AGO	ECU	IDN	IRQ	NGA
r = 0	19.54	13.3	9.31	15.62	18.74
r = 1	4.41	4.97	4.03	3.21	6.65
H_0	**VEN**	**QAT**	**LBY**	**ARE**	**SAU**
r = 0	19.29	37.84*	29.93*	16.66	24.99*
r = 1	4.34	11.63	13.01	2.24	8.51

*Denotes rejection of the null hypothesis at the 5% level. Tests are carried out assuming a continuous deterministic trend in the level data and in the cointegrating equation. Due to the results of the AIC and BIC information criteria and the general to specific analysis on a VAR with a maximum lag length set according to Schwert (1989) rule of thumb, a single lag for structure for the short run component of the model was adopted.

Table 20. Johansen Trace Tests, Real GDP and Real Oil Prices

H_0	AGO	ECU	IDN	IRQ	NGA
r = 0	20.75	11.23	9.75	13.44	21.17
r = 1	4.6	3.95	3.41	2.87	5.29
H_0	**VEN**	**QAT**	**LBY**	**ARE**	**SAU**
r = 0	18.26	38.15*	22.14	16.93	21.48
r = 1	3.63	11.56	6.22	2.1	5.34

*Denotes rejection of the null hypothesis at the 5% level. Tests are carried assuming an intercept and a continuous deterministic trend in the level data and in the cointegrating equation. Due to the results of the AIC and BIC information criteria and the general to specific analysis on a VAR with a maximum lag length set according to Schwert (1989) rule of thumb, a single lag for structure for the short run component of the model was adopted.

Table 21. Johansen, Mosconi and Nielsen (2001) Trace Test, Real GDP and Nominal Oil Prices

H_0	AGO	ECU	IDN	IRQ	NGA
r = 0	42.57*	20.31	14.89	18.62	24.14
r = 1	9.96	0.76	1.31	4.13	5.91
break date	1991	2000	1998	1988	1979
5% critical value, r = 0	35.21	35.21	35.21	37.38	36.7
5% critical value, r = 1	17.79	17.79	17.79	18.92	18.59
H_0	**VEN**	**QAT**	**LBY**	**ARE**	**SAU**
r = 0	25.72	29.39	17.28	14.67	37.64*
r = 1	4.37	8.58	7.15	4.26	8.55
break date	2000	2002	1979	1988	1970
5% critical value, r = 0	35.21	35.21	36.7	36.7	32.97
5% critical value, r = 1	15.79	15.79	18.59	18.59	16.55

**Denotes rejection of the null hypothesis at the 5% level. The tests assume both the level data and the cointegrating equation might have a broken deterministic trend. The exogenous break dates are based on the results of the Gregory Hansen tests. Due to the results of the AIC and BIC information criteria and the general to specific analysis on a VAR with a maximum lag length set according to Schwert (1989) rule of thumb, a single lag for structure for the short run component of the model was adopted.

Table 22. Johansen, Mosconi and Nielsen (2001) Trace Test, Real GDP and Real Oil Prices

H_o	AGO	ECU	IDN	IRQ	NGA
r = 0	41.83*	18.49	15.43	17.42	26.69
r = 1	9.83	0.29	1.77	3.41	5.87
break date	1991	2000	1998	1988	1979
5% critical value, r = 0	35.21	35.21	35.21	37.38	36.7
5% critical value, r = 1	17.79	17.79	17.79	18.92	18.59
H_o	VEN	QAT	LBY	ARE	SAU
r = 0	24.94	30.22	16.96	13.31	35.55*
r = 1	4.71	9.14	6.73	4.12	5.45
break date	2000	2002	1979	1988	1970
5% critical value, r = 0	35.21	35.21	36.7	36.7	32.97
5% critical value, r = 1	17.79	15.79	18.59	18.59	16.55

**Denotes rejection of the null hypothesis at the 5% level. The tests assume both the level data and the cointegrating equation might have a broken trend. The exogenous break dates are based on the results of the Gregory Hansen tests. Due to the results of the AIC and BIC information criteria and the general to specific analysis on a VAR with a maximum lag length set according to Schwert (1989) rule of thumb, a single lag for structure for the short run component of the model was adopted.

7. Conclusions

This paper analyzed the presence of a long run equilibrium relationship in the OPEC countries between the real GDP and a nominal and a real oil price series since the creation of the group in 1960. Our estimates show that such relationship could not be verified for the majority of the countries in the group. However, cointegration between the GDP and the nominal and real oil price series in Saudi Arabia, once the presence of a structural break in 1970 had been accounted for, was accepted by both the residual and the VAR based approach we employed in the analysis. The existence of such relationship confirms the role of the country as the determinant "swing producer" of the group, showing a consistent pattern which dates back before the oil price glut of the eighties, underlying a long run pattern of dependence of the economy of Saudi Arabia on oil prices. By analyzing a series of Granger causality tests with underlying structural breaks, we conclude that, even though no direct short run causality linkage could be proved between oil prices and GDP, the existence of such relationship holds in the long run and appears to show some degree of predictive ability on GDP growth in Saudi Arabia.

Table 23. C/S/T Specification Based Regressions, Dependent Variable GDP

	Nominal Oil	**Real oil**
oil price	-0.29	-8.63
	(0.09)	(2.82)
	[0.01]	[0.01]
$\psi_{t\tau}$ ∗oil price	0.49	8.88
	(0.11)	(2.82)
	[0.00]	[0.01]
intercept	22.61	45.46
	(0.09)	(7.54)
	(0.00)	[0.00]
t $\psi_{t\tau}$ ∗intercept	2.25	-21.07
	(0.18)	(7.54)
	[0.00]	[0.01]
trend	0.29	0.02
	(0.02)	(0.09)
	[0.00]	[0.86]
$\psi_{t\tau}$ ∗trend	-0.27	0.01
	(0.19)	(0.10)
	[0.00]	[0.93]
observations	50	50
R-squared	0.98	0.98

Estimation of the long run elasticities based on C/S/T specification. Standard error in parentheses, p-values in square brackets.

Table 24. Causality Tests, k = 1

Source of Causation		
Short Run		
	$\boldsymbol{\Delta oil_{t-1} nom}$	$\boldsymbol{\Delta oil_{t-1} real}$
ΔGDP_t	0.66	0.54
	(0.42)	(0.47)
	$\boldsymbol{\Delta GDP_{t-1}}$	-
$oil_t nom$	0.00	-
	(0.99)	-
$oil_t real$	0.01	-
	(0.94)	-
Long Run		
	$\boldsymbol{ECT_{t-1} nom}$	$\boldsymbol{ECT_{t-1} real}$
ΔGDP_t	23.73**	23.39**
	(0.00)	(0.00)
$oil_t nom$	0.93	-
	(0.34)	-
$oil_t real$	-	0.56
	-	(0.46)
Joint Causality		
	$\boldsymbol{\Delta GDP_{t-1}, ECT_{t-1} nom}$	$\boldsymbol{\Delta GDP_{t-1}, ECT_{t-1} real}$
$oil_t nom$	0.58	-
	(0.56)	-
$oil_t real$	-	0.36
	-	(0.69)
	$\boldsymbol{\Delta oil_{t-1} nom, ECT_{t-1} nom}$	$\boldsymbol{\Delta oil_{t-1} real, ECT_{t-1} real}$
ΔGDP_t	11.92**	11.78**
	(0.00)	(0.01)

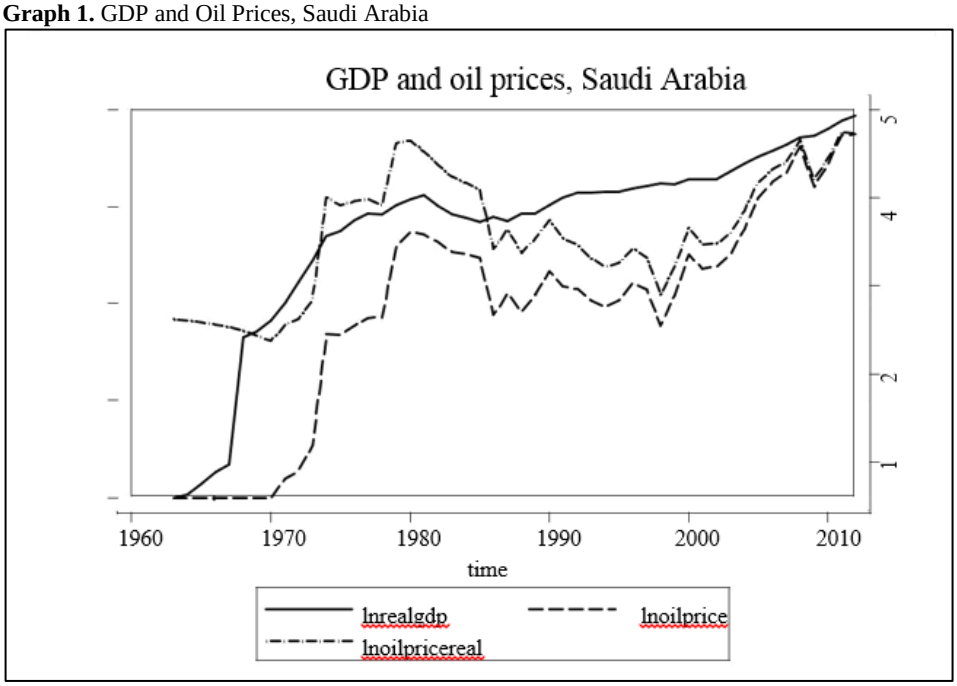
**Denotes significance at 5%. The table denotes F-statistics values. p-values are in parenthesis.

Table 25. Causality Tests, k = 2

Source of Causation		
Short Run		
	$\Delta oil_{t-1,t-2}nom$	$\Delta oil_{t-1,t-2}real$
ΔGDP_t	0.33	0.43
	(0.72)	(0.65)
	$\Delta GDP_{t-1,t-2}$	
$oil_t nom$	0.01	-
	(0.99)	-
$oil_t real$	0.03	-
	(0.97)	-
Long run		
	$ECT_{t-1,t-2}nom$	$ECT_{t-1,t-2}real$
ΔGDP_t	30.37**	26.53**
	(0.00)	(0.00)
$oil_t nom$	0.86	-
	(0.36)	-
$oil_t real$	-	0.62
	-	(0.43)
Joint Causality		
	$\Delta GDP_{t-1,t-2}, ECT_{t-1}nom$	$\Delta GDP_{t-1,t-2}, ECT_{t-1}real$
$oil_t nom$	0.41	-
	(0.75)	-
$oil_t real$	-	0.33
	-	(0.80)
	$\Delta oil_{t-1,t-2}nom, ECT_{t-1}nom$	$\Delta oil_{t-1,t-2}real, ECT_{t-1}real$
ΔGDP_t	10.17**	8.89**
	(0.00)	(0.01)

**Denotes significance at 5%. The table denotes F-statistics values. p-values are in parenthesis.

Graph 1. GDP and Oil Prices, Saudi Arabia



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CONFRONTING THE POLISH DAIRY INDUSTRY WITH THE INTERNATIONAL COMPETITION IN THE EU FOOD MARKET

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Abstract

During the Polish membership in the European Union and right before accession, the dairy industry has been subject to a in-depth process of restructuring and modernization. These processes made it possible to achieve the required veterinary and sanitary standards and to adapt the production to the market requirements. A basis for the structural transformation were implemented investments which contributed to modernization of the production process and to restructuring of employment. These positive developments are well reflected by the increased concentration of both the resource base and the production in the dairy industry, the improved labour efficiency and productivity of assets, as well as the gradual increase in the effectiveness of milk processing. In the process of investing, an important role has been played by support from EU funds, which became a stimulus to accelerate the process of modernization of dairy companies. Modernization of milk processing also enabled a significant improvement in the quality of products, which became an important factor in competitiveness both in the domestic and international market. Implemented investments, first of all, in modern production lines, have determined the good situation of the sector and the success achieved by its leaders in foreign markets. Today, Polish milk processing plants are considered one of the most modern plants in the European Union and Polish dairy industry became a major producer of milk and milk products in the EU. Poland is their fourth producer, with the 8% share in the EU dairy industry's production value. The years 2004-2014 are a period of the dynamic development of the Polish dairy industry. The employment in the Polish dairy industry decreased by more than 20%, which was reflected in the improved labour productivity. However, the labour productivity in the Polish dairy industry is still much lower than the EU-15 average, although these differences are decreasing year by year. Currently the Polish dairy industry belongs to the leading producers of dairy products in the EU and has a strong competitive position in the international market.

Keywords: Dairy Industry, International Competitiveness, Modernization, Poland, European Union.
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1. Introduction

The aim of this paper is to study the long-term relationship between oil prices and economic activity. Unlike most of the existing literature, which focuses on Western countries, we analyze the relationship between oil prices and GDP in a group of oil exporting countries, belonging to the Organization of the Petroleum Exporting Countries (OPEC).

The dairy sector is very important to the food industry in Poland. It is indicated by a large share of milk in agricultural commodity production (16.5%) and a significant share of the dairy sector in sales revenue (13%) and employment (10%) in the food industry. Milk and dairy products are an important source of income and food for numerous cow holdings. The Polish dairy sector is also a net exporter (its share in the food trade balance is around 12%) and holds a significant share in the value of export of agri-food products (7%). Poland is a major producer of milk and dairy products in the world (2-3%), and particular in the European Union (about 12%).

The transition of the Polish economy to the free market system (in the 1990s) and subsequently accession to the EU (in 2004) led to a fundamental change in market conditions in an environment of the Polish dairy industry. A change in the supply and demand situation on the domestic market and on international markets, and a change in policy towards the sector, in particular a market regulation system, allowed the profound sectoral restructuring and modernisation process to be initiated, both in the agricultural and processing sphere. Structural and ownership transformations on holdings and in dairy enterprises made milk production and processing more concentrated. The process is not yet complete, as the sector is still quite fragmented compared to its main competitors on the world market, but progress achieved in this respect is enormous. The modernisation of holdings and processing enterprises led to meeting veterinary, sanitary and quality standards required in the EU and adjusting the dairy industry's production structure to the changing demand of ever-more demanding consumers.

Changing market conditions also had a strong impact on international trade in dairy products and on the international competitiveness of the sector. Systemic transformations coincided with the liberalisation of trade in agricultural products under the Uruguay Round of the GATT, and then of the WTO. During this period, enterprises in the sector little benefited from market support under these provisions. Accession to the EU brought the first major changes in foreign trade conditions. Free access to the large and well-developed market and the introduction of Common Agricultural Policy (CAP) instruments meant a level playing field for producers from other EU Member States not only in terms of access to the EU market, but also support for export and domestic customs protection. Market transformations were accompanied by the inclusion of the Polish dairy industry in global processes as demonstrated by, *inter alia*, foreign

direct investment (FDI) by transnational corporations (TNCs). In fact, the dairy industry is not highly globalised (TNCs' share in sales is about 15%), and its FDI absolute value was not high, but such investment was crucial to the development of certain dairy market segments and forced domestic producers to intensively adjust to competition conditions on the international market.

The change in market conditions had a positive impact on the development of foreign trade in dairy products. Under conditions of relative domestic demand stabilisation, growing export became a decisive factor in the development of the sector. Free access to the EU market and thus increasingly stronger links between the sector and the EU market led to significant changes in the geographical structure of export – the EU's share in export rose to about 75%. The commodity structure of export of dairy products changed as well. In fact, modernisation processes in the Polish dairy industry were reflected in a higher share of highly processed products in the structure of export. Consequently, the commodity structure of Polish export came closer to the export structure of highly economically developed countries. For many years, the Polish dairy sector has been characterised by a surplus of export over import in terms of quantity and value, being thus a stable net exporter. Since accession to the EU, the positive balance of trade in dairy products has been steadily increasing which is undoubtedly positive. Generally intensive trade, which is a source of a permanent trade surplus, serves the development of the sector and facilitates its transnational economic integration.

However, the Polish dairy industry does not fully exploit its export potential which, in line with the theory of abundance of resources of factors of production, includes primarily potential for milk production in agriculture, potential for dairy processing in the dairy industry and competitive potential on international markets. It is indicated by, *inter alia*, a surplus of production over domestic consumption measured by the self-sufficiency ratio (116% in 2016). Natural conditions and resources of factors of production and the possibility of improving the genetic material of cows offer opportunities for increasing milk production in agriculture. The dairy industry also enjoys large production potential which allows for the development of processing and the flexible adjustment of supply to changes in demand on both the domestic market and on international markets. Opportunities for promotion and advertising or access to retail chains in other countries are still under-exploited. As a result, the competitive position of Polish producers on external markets, although improved in the past decade, is still not strong enough in many market segments. One indication may be a low number of EU-registered regional dairy products and no branded products (e.g. cheese) recognised on the world market. The Polish dairy sector thus continues to face challenges of making better use of its production, processing and competitive potential. Success in export and an increase in the share in the international market can only be achieved with broadly understood, more effective use of factors of

production, and promotional and advertising activity both at the sectoral and individual level.

The aim of the paper is to present the development of the Polish dairy industry's restructuring and modernisation processes after Poland's accession to the European Union, and to assess the current position of the Polish dairy industry against the background of selected EU Member States, in particular major producers of dairy products[1] in Europe, i.e. France, Germany, Italy, the Netherlands, Spain, the United Kingdom and Belgium. To analyse the competitive position of the Polish dairy industry in the EU, we compared, *inter alia*: the value of marketed production, employment, labour productivity and production concentration. Data were derived from the Eurostat database. Before the assessment, we analysed structural transformations in the Polish dairy industry during Poland's membership in the European Union based on data from national statistics (Central Statistical Office (CSO), Ministry of Finance, etc.). The research presented in this paper covers primarily 2004-2014 (and rarely 2016).

2. Restructuring and Modernisation Processes in the Polish Dairy Industry

The Polish dairy industry has undergone the profound restructuring and modernisation process in recent years. Its confrontation with strong international competition on the EU and global food market was preceded by processes of adjustment to functioning according to market economy principles and EU regulations. Consequently, the Polish dairy industry became one of the most modern sectors of the Polish food industry, being capable of not only presenting an attractive offer of good quality dairy products at competitive prices to a domestic consumer, but also effectively competing on the demanding international market.

Structural transformations in the dairy industry consisted mainly in increasing production concentration, improving milk processing effectiveness and making establishments undergo substantial modernisation. In 2004-2016, the number of dairy enterprises decreased by 34% to 175, employment – by 20% to 32.4 thousand persons, while deliveries of milk to establishments increased by 39%. Thus, the statistical size of dairies – measured by the volume of processed milk – more than doubled to 63.5 thousand tonnes, and – measured by sales value – increased by 61% to PLN 27.6 billion. The dynamics of revenue per 1 enterprise was even higher, as the average revenue per 1 enterprise increased nearly two-and-a-half fold to PLN 158 million. Milk processing effectiveness – measured by labour productivity – improved as well. Milk processing per 1 employee increased

[1] The term "dairy products" means: milk and cream (not concentrated), milk powder, buttermilk, curdled milk, yoghurt, kephir, whey, butter, cheese.

in the analysed period by over 73% and – measured by sales value – increased twofold (Table 1).

Table 1. Milk production and processing in Poland

Item	2004	2010	2016	Change ratio 2016/2004
Milk production ['000 tonnes]	11,810	12,270	13,275	112.4
Milk collection ['000 tonnes]	8,002	9,024	11,125	139.0
Number of enterprises*	265	205	175	66.0
Employment ['000 persons]*	40.4	34.9	32.4	80.2
Sales revenue [PLN '000 000]*	17,191	23,133	27,637	160.7
Milk processing per 1 enterprise ['000 tonnes]	30.2	44.0	63.5	210.3
Sales revenue per 1 enterprise [PLN '000 000]	64.9	112.8	157.9	243.3
Milk processing per 1 employee ['000 kg]	198	258	343	173.2
Sales revenue per 1 employee [PLN '000]	425.5	662.8	853.0	200.5
Export ['000 tonnes in milk equivalent]	2,060	2,165	3,900	189.3
Import ['000 tonnes in milk equivalent]	505	815	1,790	358.0

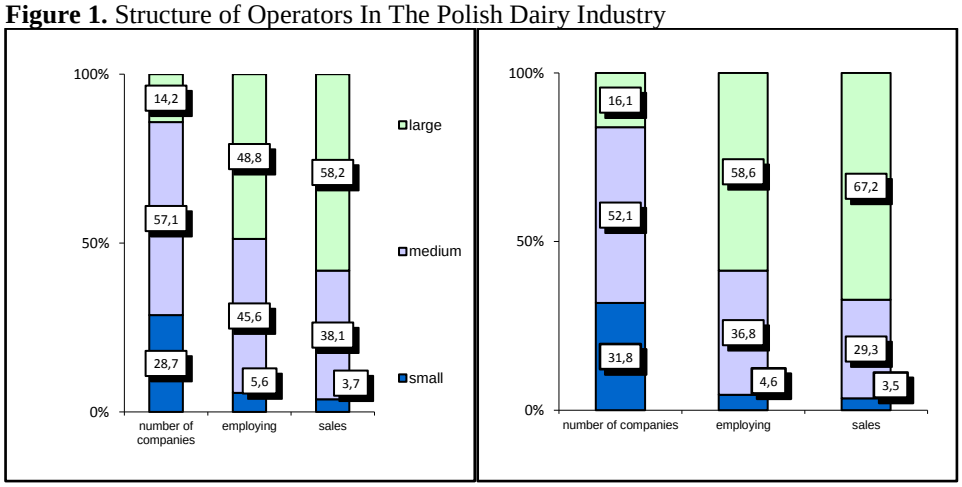
* only enterprises with over 9 employees

Source: Own elaboration based on: Szajner, 2017, p. 3; Rynek Mleka, Stan i perspektywy nr 22-53, „Analizy Rynkowe", 2005-2017.

Poland is a net exporter of dairy products and foreign trade is important to their market balance. During EU membership, there was a dynamic increase in trade, as export expressed in raw milk equivalent nearly doubled to about 4 million tonnes and import increased three-and-a-half fold to 1.7 million tonnes. At present, export accounts for about 35% of milk collection compared to about 20% in 2004. The dynamic import growth makes foreign trade reveal its increasing intra-sectoral intensity. In 2016, the share of import in market supply was 16%, while in 2004 – only about 4%. Products for secondary processing, most of which are then exported, play an important part in import. The share of final consumer products in import remains low (Szajner, 2017, p. 2).

Despite great progress in concentration processes, the fragmentation of the Polish dairy industry is still one of the main factors reducing its competitive edge, in particular in the context of changes ongoing in the market environment (increasing market openness, high price volatility and rising price risk, increasing competition, continued trade concentration and growing consumer demands). In 2004, large enterprises with over 249 employees accounted for 14% of enterprises in the Polish dairy industry. Their share in product sales revenue was 58%, while in employment – about 49%. In 2014, large enterprises accounted for 16% of enterprises in total, their share in sales revenue was over 67%, while in employment – 59%. Small and medium-sized enterprises significantly reduced their market share (Figure 1).

Figure 1. Structure of Operators In The Polish Dairy Industry

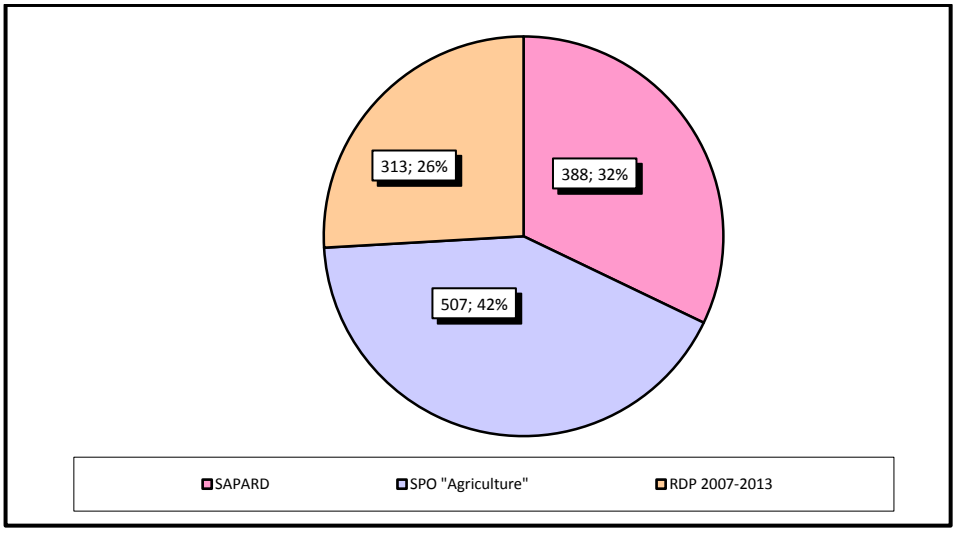


2004 2014

Source: Own elaboration based on unpublished CSO data.

The modernisation processes ongoing in the Polish dairy industry can be divided into three stages: adjustment to market economy conditions, adjustment to veterinary and sanitary standards and EU market regulations, and adjustment to competition on the common EU market and progressive globalisation processes. However, please note that particularly large investment was made between 1998 and 2003, when establishments adjusted to EU standards and investment was made from not only national, but also EU funds (SAPARD – Special Accession Programme for Agriculture and Rural Development, SOP – Sectoral Operational Programme) (Urban, Drożdż and Staszczak, 2008, p.p. 105-106). In 2003-2013, Poland contributed over PLN 1.2 billion under these support programmes to co-finance investment in the dairy industry (Figure 2) which accounted for nearly 14.5% of the total value of capital expenditure incurred in this period in the industry. To co-finance investment activities, an entrepreneur had to contribute own funds as a result of which the final value of completed investment was at least twofold higher.

Figure 2. Support for Investment in The Dairy Industry under EU Aid Programmes in 2003-2013 [Value in Pln '000 000 and Structure in %]



Source: Own elaboration based on: Tereszczuk, 2014, p. 85.

The implementation of mandatory and non-mandatory food safety and quality management systems contributed to improving the quality of dairy products. Poland, just like the EU, has legal regulations in place on the production of and trade in food, including legal regulations rendering the implementation and application of some of these systems mandatory (Morkis, 2014, p.p. 116-117). Mandatory quality management systems in food enterprises include:

- Good Hygienic Practice (GHP),
- Good Manufacturing Practice (GMP),
- Hazard Analysis and Critical Control Point (HACCP).

Data from the Veterinary Inspection reveal that all dairy enterprises in 2015, just like in 2013-2014, implemented and applied GHP and GMP systems. However, the mandatory HACCP system was implemented by only 67% of establishments[2] (Judzińska, 2017, p. 103).

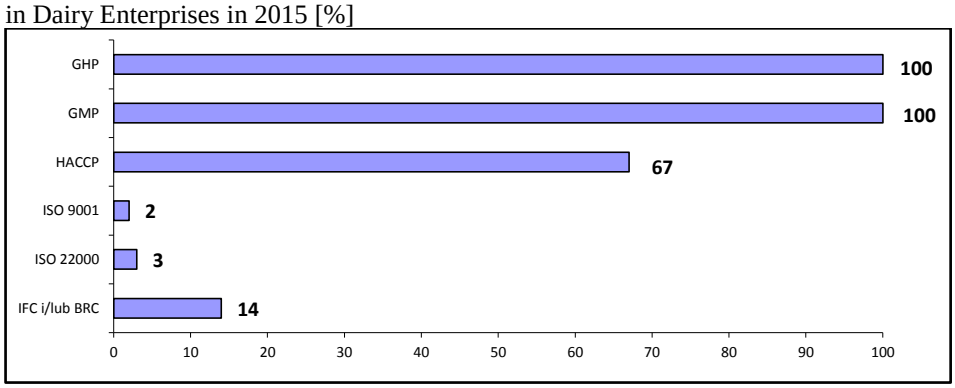
Non-mandatory quality management systems, which can be used in the food industry both in Poland and in the EU, are primarily: an ISO 9000-series (ISO 9001) quality management system, an ISO 22000 (ISO 22000) food safety management system and own internal quality management systems as well as

[2] Other dairy enterprises are micro-enterprises or start-ups which failed to comply with the obligation to implement the system.

audit and certification standards, i.e. the International Food Standard (IFS) and the British Retail Consortium (BRC). The implementation and application of ISO 9000-series quality management ensure that an enterprise's products are of consistent and repeatable quality. The implementation of ISO 9001 is one of factors improving an enterprise's management, i.e. making it more competitive and credible, as well as improving the quality of its products. The ISO 22000 food safety management system brings together HACCP and GP requirements. The primary goal of the IFS and the BRC is to ensure the safety of food sold in retail chains (Morkis, 2014, p.p. 117-118).

The implementation of non-mandatory quality management systems is voluntary. Each dairy enterprise may thus implement them voluntarily or if required by national and mostly foreign recipients (which is increasingly common). The percentage of enterprises applying non-mandatory quality management systems and having them certified by certification enterprises in the dairy industry in 2015 was low (Figure 3).

Figure 3. State of Implementation of Selected Quality Management Systems in Dairy Enterprises in 2015 [%]



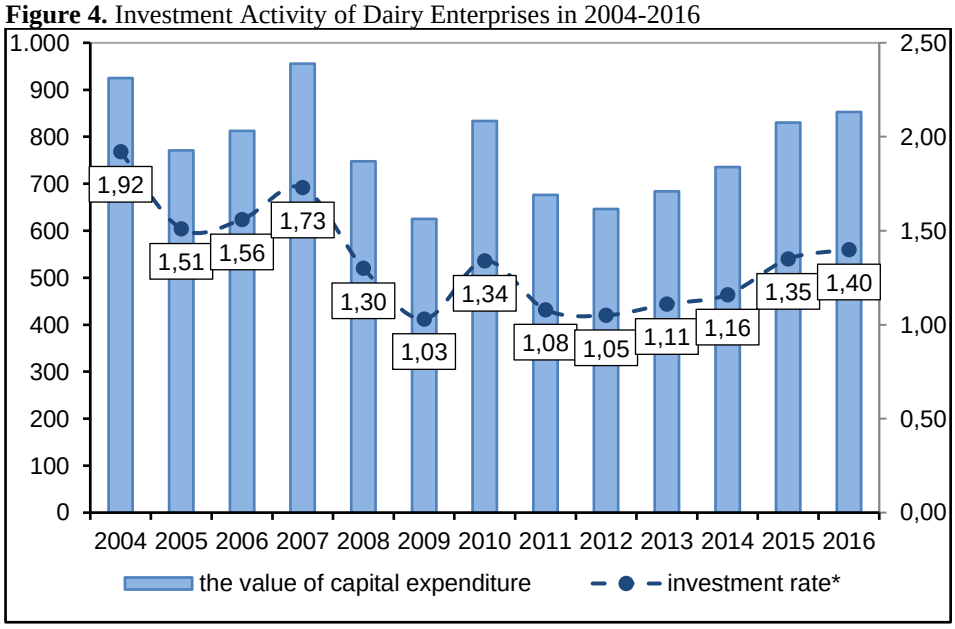
Source: Own elaboration based on: Judzińska, 2017, p.104-106.

The implementation of mandatory quality management systems in the first period of EU membership was one of factors making Polish dairy enterprises, in particular on the international market, more competitive. Thirteen years after accession, the application of mandatory quality management systems is no longer an important instrument of competition on the domestic or international market, but rather a necessary condition for enterprises to operate. At present, the implementation of non-mandatory quality management systems may help make Polish enterprises more competitive (Szczepaniak, 2015, p. 10).

After Poland's accession to the EU, investment in the dairy industry was facilitated by public financial support. Already ahead of accession, Polish entrepreneurs in the sector could benefit from EU co-financing for the development and modernisation of processing establishments, in particular under SAPARD Measure 1. "Improving processing and marketing of agricultural and fishery

products". In the following years, support for investment activities in the dairy sector from EU funds was continued as part of the Sectoral Operational Programme "Restructuring and Modernisation of the Food Sector and Rural Development 2004-2006" (SOP "Agriculture") under Measure 1.5. "Improving processing and marketing of agricultural products", and subsequently as part of the Rural Development Programme 2007-2013 (RDP 2007-2013) under Measure 1.2.3. "Increasing the added value of basic agricultural and forestry production" (Tereszczuk, 2014, p.p. 83-88).

Figure 4. Investment Activity of Dairy Enterprises in 2004-2016



* ratio of the value of capital expenditure to the value of depreciation
Source: Own elaboration based on unpublished CSO data.

In 2004-2016, the total value of capital expenditure in the Polish dairy industry was PLN 10.1 billion, i.e. PLN 0.78 billion per year (Figure 4). The highest share in the structure of capital expenditure was that of expenditure on machinery, equipment and means of transport (77%), i.e. on the so-called active fixed assets directly used for modernising the manufacturing potential of establishments. A relatively high share was also that of expenditure on buildings and structures (21%). However, dairy enterprises invested relatively little in environmental protection or research and development (R&D). In the analysed period, capital expenditure was characterised by fluctuations which were clearly related to the market situation. Investment activity increased in years of high prices of dairy products (e.g. 2007, 2010, 2014). However, capital expenditure decreased in years of global financial crises (2009, 2011).

3. Production of Dairy Products

Restructuring and modernisation processes, which had taken place in the Polish dairy industry, had a major impact on changes in dairy production. In 2004-2016, the production of all dairy products increased which was mainly due to a significant increase in deliveries of raw milk for processing. High dynamics was observed in the production of processed liquid milk, i.e. consumer and processed milk used in secondary processing. A large increase was recorded in the production of yoghurt, fermented beverages and cream (Table 2). Another increase was observed in cheese-making, specifically in the production of curd and ripened cheese. The dynamics of processed cheese production decreased. Large investment in whey production lines made the production of whey powder increase nearly fivefold. Minor changes were recorded in the production of butter whose consumption was stable and export grew very slowly. The production of milk powder increased as well, but not much compared to other products. The highest share in the production of dairy products was that of skimmed milk powder which was mostly exported.

However, the structure of the value of marketed production of the Polish dairy industry did not change much. The highest share in sales revenue is still that of cheese and curd (about 37%). Major commodity groups are also: processed liquid milk (18%), milk and whey powder (11%), as well as yoghurt and fermented beverages (12.5%). This structure presents how important highly processed products are to the sector. The production of high value-added products makes it possible to better use resources of factors of production and facilitates promotion on the internal market and on international markets (Szajner, 2017, p. 4).

However, the production potential of the dairy industry remains largely untapped and the production volume of practically all dairy products is limited only by the amount of available raw materials and the level of sales prices which depend primarily on world prices (Seremak-Bulge and Roman, 2016, p.p. 135-138).

Table 2. Production of Dairy Products ['000 tonnes]

Item	2004	2010	2016	Change ratio 2016/2004
Processed liquid milk	2,080	2,810	3,345	160.8
Fermented beverages	469	723	702	149.7
Skimmed milk powder	139	92.8	163	117.3
Curd	296	267	449	151.7
Ripened cheese	219	371	329	150.2
Processed cheese	59	81	80	135.6
Cream	225	344	349	155.7
Butter	177	175	204	115.3
Dried whey	57	276	283	496.5

Source: Own elaboration based on Rynek Mleka, Stan i perspektywy nr 22-53, „Analizy Rynkowe", 2005-2017.

4. Foreign Trade in Dairy Products

The growing surplus supply of dairy products was primarily exported. This was facilitated by Poland's membership in the EU (free access to the EU market) as well as growing demand and price growth on the world market. In 2004-2016, the volume of export of dairy products increased nearly three-and-a-half fold, i.e. to 1.3 million tonnes, while its value – threefold, i.e. to EUR 1.5 billion. The growth rate of import was much higher than that of export, while its volumes were smaller than in the case of export. Import of dairy products in this period increased eighteenfold in terms of quantity to 600 thousand tonnes, while in terms of value – nearly fourteenfold to EUR 812 million. As a result, the trade balance throughout the analysed period was positive and increased to EUR 666 million, i.e. by 36%.

In 2004-2016, analysed competitiveness ratios, despite multi-directional changes which took place in this period, indicate that the competitive position of the Polish dairy industry on the international market is satisfactory. Certainly, its links with the market strengthened significantly during Poland's membership in the EU. In 2016, the export-import coverage ratio of dairy products reached 182%, the self-sufficiency ratio of the Polish dairy industry was over 118%, the share of export in marketed production of the sector increased to over 29% and the share of import in domestic consumption increased over fourfold to nearly 14% (Table 3).

Table 3. Foreign Trade in Dairy Products

Item	2004	2010	2016	Change Ratio 2016/2004
Value [EUR '000 000]				
export	550.2	1,134.9	1,478.3	268.7
import	59.3	369.0	812.2	1,369.6
balance	490.9	765.9	666.1	135.7
Trade ['000 tonnes]				
export	382.3	818.3	1,309.9	342.6
import	32.6	230.3	600.1	1,840.8
Competitiveness ratios [%]				
– export-import coverage	927.8	307.6	182.0	x
– self-sufficiency[a]	120.1	112.6	118.3	x
– share of export in production[b]	18.7	17.9	29.2	x
– share of import in consumption[b]	3.2	7.5	13.7	x

[a] self-sufficiency = production/national consumption × 100; [b] in terms of quantity (volume of export and import was calculated based on the dry matter content coefficient)

Source: Own calculation based on unpublished data from the Ministry of Finance.

The geographical structure of Polish foreign trade in dairy products is dominated by EU Member States which account for about 75% of export and about 95% of import of dairy products.

Prior to Poland's accession to the EU, Member States' share in the value of Polish export of dairy products was 15-20% and the share of processed products with a high share of the value added (cheese, yoghurt and milk beverages, ice cream) was only 27%. During EU membership, EU Member States' share in the value of export of dairy products from Poland increased to about 70-75%, while of highly processed final products – to about 50%. The EU's share in import was over 90%, while of highly processed products increased to 50% (Seremak-Bulge and Roman, 2016, p.p. 139-141).

The highest share in the commodity structure of export of dairy products is that of cheese and curd (about 40%), followed by milk and cream (17%), milk powder (12%), whey (9%) and butter (8%). Compared to 2004, the structure changed only slightly, in particular the share of milk powder decreased (by 26 percentage points) in favour of milk and cream and whey (up by 12 and 5 percentage points respectively). The changes in the commodity structure of export indicate that the Polish dairy industry adjusted to changes in the international market situation.

Earnings from cheese export in the analysed period increased over threefold to EUR 625 million, and from milk and cream export – nearly tenfold to almost EUR 970 million, while from whey export – sevenfold to EUR 715 million. Only earnings from milk powder sales decreased to EUR 189 million, i.e. by 8.6%.

Despite the export-oriented development of the Polish dairy industry, it is, however, worth noting that import of dairy products grew much faster than their export. The largest increase in 2004-2016 was recorded in import of milk beverages and milk and cream as well as milk powder (Table 4).

Table 4. Results of Foreign Trade in Dairy Products

Item	Year	Milk and cream	Milk powder	Milk beverages	Whey	Butter	Cheese and curd
Value of export	2004	28.9	207.1	35.9	21.0	66.2	191.1
[EUR '000 000]	2010	161.4	220.7	125.2	101.1	85.9	440.6
	2016	280.0	189.2	102.7	150.1	131.1	625.2
Value of import	2004	5.3	10.0	1.5	5.7	9.1	27.7
[EUR '000 000]	2010	43.7	79.1	32.1	22.0	51.2	140.9
	2016	128.0	232.2	72.7	30.0	61.8	287.5
Balance	2004	23.6	197.1	34.4	15.3	57.1	163.4
[EUR '000 000]	2010	117.7	141.6	93.1	79.1	34.7	299.7
	2016	152.0	-43.0	30.0	120.1	69.3	337.7
Export-import	2004	545.3	2,071.0	2,393.3	368.4	727.5	689.9
coverage [%]	2010	369.3	279.0	390.0	459.5	167.8	312.7
	2016	218.8	81.5	141.3	500.3	212.1	217.5
Change ratio of export	2016/2004	968.9	91.4	286.1	714.8	198.0	327.2
Change ratio of import	2016/2004	2,415.1	2,322.0	4,846.7	526.3	679.1	1,037.9

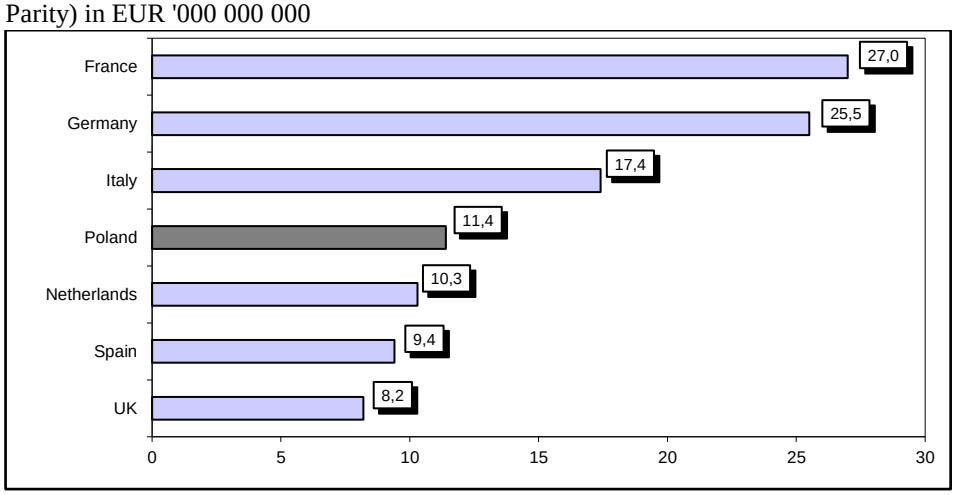
Source: Own calculation based on unpublished data from the Ministry of Finance.

Having analysed export-import coverage ratios of dairy products, it may be concluded that clear comparative advantages in 2016 among the analysed products were recorded with respect to export of whey (500.3%), milk and cream (218.8%), cheese and curd (217.5%), and milk beverages (212.1%). In general, the Polish dairy industry enjoys relatively high competitiveness in foreign trade in dairy products and undergoes the internationalisation process.

5. Development of Production in the Polish and EU Dairy Industry

Poland is a major producer of milk and dairy products in the European Union. Poland's share in EU dairy production (at comparable prices) was 8.0% in 2014 which ranked it fourth among EU Member States. Only France (18.9% of EU production), Germany (17.8%) and Italy (12.2%) were ranked higher. The Netherlands (7.2%), Spain (6.6%) and the United Kingdom (5.7%) held a lower share in EU dairy production (Figure 5).

Figure 5. The Largest Producers of Dairy Products in the European Union in 2014 (Value of Marketed Production at Comparable Prices, Measured by Purchasing Power Parity) in EUR '000 000 000



Source: Own elaboration based on Eurostat data http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en [Access: 30 June 2017]

In 2004-2014, the Polish dairy industry developed dynamically. The growth rate of dairy production in Poland – measured by the value of marketed production – was among the highest ones in the European Union. In the analysed period, the production of the Polish dairy industry (at current prices) almost doubled from EUR 3.4 billion to EUR 6.6 billion, i.e. 6.9% per year. At comparable prices, the increase was lower and amounted to 65% (from EUR 6.9 billion to EUR 11.4 billion), while the average annual growth rate was 5.1%. The largest increase in the marketed production of the dairy industry in this period was recorded in Cyprus (+200%), Lithuania (+112.5%), the Netherlands (+75%) and Denmark (+65%). In the EU-15, the production of this food industry sector increased on average by 37%, while in the EU-12/13 – by 43%. In 2004-2014, the dairy industry in Poland developed much faster than in the EU-15 (Table 5).

Table 5. Production of the EU Dairy Industry

EU Member States	Value of Production [EUR '000 000 000] at				Member States' Share in EU Production[a] in 2014 [%]	Ratio of changes in the value of production[a] 2014/2004	Average Growth Rate of the Value of Production[a] [% per year] in 2004-2014
	Current Prices		Comparable Prices[a]				
	2004	2014	2004	2014			
Austria	1.7	2.5	1.6	2.3	1.6	143.8	3.7
Belgium	2.9	4.6	2.7	4.2	2.9	155.6	4.5
Germany	18.9	26.6	17.8	25.5	17.8	143.3	3.7
Denmark	3.5	5.8	2.6	4.3	3.0	165.4	5.2
Spain	7.2	8.4	8.0	9.4	6.6	117.5	1.6
France	21.8	29.7	19.4	27.0	18.9	139.2	3.4
Finland	1.8	2.3	1.5	1.8	1.3	120.0	1.8
Greece	1.4	1.8	1.7	2.2	1.5	129.4	2.6
Ireland	2.9	3.4	2.4	3.1	2.2	129.2	2.6
Italy	13.0	17.6	12.4	17.4	12.2	140.3	3.4
Netherlands	6.4	11.3	5.9	10.3	7.2	174.6	5.7
Portugal	1.4	1.4	1.6	1.8	1.3	112.5	1.2
Sweden	2.3	2.4	1.9	1.8	1.3	94.7	-0.5
UK	8.1	9.7	7.3	8.2	5.7	112.3	1.2
Luxembourg	0.2	0.2	0.2	0.2	0.1	100.0	0.0
Poland	**3.4**	**6.6**	**6.9**	**11.4**	**8.0**	**165.2**	**5.1**
Czech Republic	1.4	1.6	2.6	2.5	1.7	96.2	-0.4
Hungary	0.9	0.9	1.5	1.6	1.1	106.7	0.6
Slovakia	0.4	0.6	0.8	0.9	0.6	112.5	1.2
Slovenia	0.2	0.3	0.3	0.4	0.3	133.3	2.9
Lithuania	0.4	1.0	0.8	1.7	1.2	212.5	7.8
Latvia	0.2	0.4	0.4	0.6	0.4	150.0	4.1
Estonia	0.2	0.3	0.4	0.4	0.3	100.0	0.0
Cyprus	0.1	0.3	0.1	0.3	0.2	300.0	11.6
Malta	0.2	0.2	0.3	0.2	0.1	66.7	-4.0
Romania	0.4	0.8	1.1	1.6	1.1	145.5	3.8
Bulgaria	0.2	0.4	0.6	0.9	0.6	150.0	4.1
Croatia	0.4	0.6	0.6	1.0	0.7	166.7	5.2
EU-15	93.5	127.7	87.0	119.5	83.6	137.4	3.2
EU-12/13	8.4	14	16.4	23.5	16.4	143.3	3.7
EU	101.9	141.7	103.4	143.0	100.0	138.3	3.3

[a] at comparable prices, i.e. at current prices adjusted by EUR purchasing power parity in the Member States referred to above

Source: Own elaboration based on Eurostat data http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en [Access on: 30 June 2017]

6. Labour Productivity in The Polish and EU Dairy Industry

There are about 34 thousand employees in the Polish dairy industry which account for about 11% of total employment in the dairy industry of the European Union. This ranks Poland fourth among EU Member States. Higher employment is recoded only in ('000 persons): France (56), Germany (37) and Italy (35), while lower employment – e.g. in the United Kingdom (22) and Spain (19). In 2004-2014, the number of employees in the EU dairy industry was subject to changes, i.e. employment in the EU-12/13 dairy industry decreased by nearly 5%, while in the EU-15 dairy industry increased by 2.2%. At the same time in Poland, it decreased by over 20% which was reflected in a 7.5% increase in labour productivity.

Table 6. Labour Productivity[a] in the EU Dairy Industry in EUR '000 Per Employee

EU Member States	2004	2010	2014	Change ratio 2014/2004	Average growth rate [%] in 2004-2014
EU-15	370.2	438.5	528.8	142.8	3.6
EU-12/13	137.1	198.9	276.1	201.4	7.3
EU	303.1	372.6	459.7	151.7	4.3
Netherlands	583.2	771.4	811.0	139.1	3.4
Belgium	505.6	594.6	763.6	151.0	4.2
Germany	509.2	639.1	692.9	136.1	3.1
Italy	340.2	406.6	500.0	147.0	3.9
Spain	409.7	430.8	497.4	121.4	2.0
France	340.4	399.2	482.1	141.6	3.5
UK	274.1	311.6	371.0	135.4	3.1
Poland	**164.8**	**248.9**	**339.3**	**205.9**	**7.5**
Czech Republic	240.0	250.0	304.9	127.0	2.4
Hungary	169.7	194.2	258.1	152.1	4.3
Lithuania	80.6	193.0	239.4	297.0	11.5
Romania	67.5	114.6	146.8	217.5	8.1
Bulgaria	86.0	106.0	113.9	132.4	2.8

[a] at comparable prices

Source: Own elaboration based on Eurostat data http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en [Access: 30 June 2017]

Labour productivity is identified with the volume or value of production produced in a specific time by 1 employee in a given sector of the economy. It depends on numerous factors, *inter alia*: qualification and experience of employees, technical condition of machines and equipment, their modernity, labour organisation and an incentive pay system (Mroczek, 2014, p. 28). In 2004-2014, labour productivity in the dairy industry improved generally in all EU Member States and resulted

mostly from higher production value and higher expenditure on improving the capital-labour ratio. The highest increase in labour productivity in this period (at comparable prices) was recorded in Lithuania – nearly threefold (from EUR 81 thousand to EUR 240 thousand per employee), followed by Slovenia with a 122% increase (from EUR 180 thousand to EUR 400 thousand) and Romania with a 117.5% increase (from EUR 68 thousand to EUR 147 thousand per employee). In this period in Poland, labour productivity in the dairy industry more than doubled from EUR 165 thousand to EUR 340 thousand per employee, but it is still twice less than in the Netherlands (EUR 811 thousand per employee), Belgium (764) or Germany (693) (Table 6).

7. Concentration of Production in the Polish and EU Dairy Industry

In the Polish dairy industry in 2014, there were about 270 enterprises[3] which accounted for nearly 3% of EU dairy enterprises and ranked Poland ninth among EU Member States. In 2004-2014, their number decreased by 37% which was the largest drop among all EU Member States. Such a large decline in the number of enterprises in the Polish dairy industry was due to the ongoing restructuring and consolidation process in this sector. At the same time, the number of dairy enterprises in the EU-15 remained similar to the 2004 level, although it declined during the global economic crisis. However, the number of such enterprises in the EU-12/13 increased by nearly 15%. Among EU Member States, the largest increase in the number of active dairy enterprises in 2004-2014 was recorded in the Netherlands (by 31%) and Germany (by 24%).

[3] Including micro-enterprises.

Table 7. Average Value of Turnover of a Dairy Enterprise in the EU Measured by The Value of Production* Per 1 Dairy Enterprise [EUR '000 000]

EU Member States	2004	2010	2014	Change ratio 2014/2004	Average growth rate [%] in 2004-2014
EU-15	10.6	12.9	15.5	146.2	3.9
EU-12/13	8.6	11.6	14.5	168.6	5.4
EU-27/28	10.3	12.7	15.3	148.5	4.0
Germany	80.8	70.8	93.4	115.6	1.5
Netherlands	36.8	39.5	49.0	133.2	2.9
Belgium	26.5	27.8	36.8	138.9	3.3
France	17.0	22.3	31.4	184.7	6.3
UK	21.4	24.3	23.0	107.5	0.7
Spain	6.7	7.5	7.2	107.5	0.7
Italy	3.8	4.9	5.6	147.4	4.0
Poland	**16.2**	**29.4**	**42.2**	**260.5**	**10.0**
Czech Republic	20.0	22.0	25.5	127.5	2.5
Hungary	18.0	13.5	18.2	101.1	0.1
Slovakia	22.3	10.6	13.0	58.3	-5.3
Lithuania	31.9	44.2	40.5	127.0	2.4
Rumania	1.6	3.3	3.7	231.3	2.2
Bulgaria	1.5	3.5	3.5	233.3	8.1

* at comparable prices

Source: Own elaboration based on Eurostat data http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en [Access: 30 June 2017]

Having analysed the average turnover of dairy enterprises, it may be concluded that the economic strength and competitiveness of Polish producers on the European market increased. In 2004-2014, the average turnover of a dairy enterprise in Poland increased over two-and-a-half fold (from over EUR 16 million to EUR 42 million); it was 172.2% higher than the EU-15 average and 191.0% higher than the EU-12/13 average. In this respect, Poland falls behind Germany (EUR 93.4 million) and the Netherlands (EUR 49.0 million). However, the average turnover of dairy enterprises was lower, *inter alia*, in France (EUR 31.4 million), the United Kingdom (EUR 23.0 million), Spain (EUR 7.2 million) and Italy (EUR 5.6 million) (Table 7).

The concentration and consolidation process in the dairy industry is progressing throughout the European Union. In Poland, however, it is ongoing much faster than in other EU Member States. The gap between the Polish dairy industry and dairy sectors in countries with highly concentrated dairy production is thus narrowing.

8. Sources of the Polish Dairy Industry's Competitive Edge

The greatest market success of the Polish dairy industry following Poland's accession to the European Union was the dynamic growth of export and the

strengthening of the position of Polish producers on the EU market (in terms of revealed comparative advantages). The enterprises responded very positively to new trading conditions, in particular to free access to the large market characterised by high prices and high consumer purchasing power. They welcomed the EU market regulation system which helped stabilise prices and processing conditions. Many enterprises found it a major investment challenge to conduct adjustment processes, but most of them succeeded. They also successfully coped with high competition from foreign enterprises on both the domestic market and international markets.

In the first period of Poland's membership in the EU, lower prices of products were the primary factor in building the competitive edge of Polish dairy enterprises. Over time, however, their edge started declining and it became increasingly obvious for producers that other sources of the competitive edge would gain in importance, such as: quality and health safety of products, quality of raw materials (raw milk offered for buying-in), innovativeness and assortment of products, promotion and advertising, traditional technologies, access to information, digitisation, etc. The continuation of restructuring processes presented also large potential for improving the effectiveness of processing and trade in the dairy sector. In fact, the scale-up of milk production and processing makes it possible to derive greater benefits from the economies of scale and the value added, and thus to make better use of resources of factors of production (thereby increasing the share of capital employed and diminishing the importance of labour costs).

Polish dairy enterprises have hitherto sold their products on foreign markets on their own thanks to a favourable price-to-quality ratio of products. As mentioned, however, this cost-price competitive edge of Polish producers is gradually declining. Exporters should therefore consider trading through a system of agri-food exchanges (basically, such a system in Poland would need to be established from scratch), since world trade in agricultural raw materials and foodstuffs is pursued in no other way than through stock exchanges. Obviously, Polish producers will thus have to create joint sales groups and produce uniform standardised batches of products, but it is worthwhile, as these projects may have a positive impact on the further development of Polish export of dairy products.

This activity will also require more active promotion on external markets. Due to high promotion costs and the relatively low economic potential of most domestic enterprises, it seems justified to apply a promotion strategy which would cover at least a group of dairy operators, if not the entire dairy sector. Promotional activities should lead to increasing the share of Poland-specific products in export which would be offered under brands of domestic producers. Given the highly fragmented Polish dairy industry and difficulties in selling large batches of products by producers, it may be crucial to developing the sector and making it more competitive.

9. Summary

Poland's economic transformation and accession to the European Union in 2004 as well as related reforms triggered the accelerated development of the dairy industry, thus making it one of the most modern industries in Europe. It could thus present an attractive offer of good quality dairy products at acceptable prices to consumers and compete effectively on international markets. Processes of adjustment to the market economy were facilitated by the price policy of dairy establishments which rewarded high milk quality and progressive delivery concentration. The removal of barriers to intra-EU trade and free access to the market of Member States were crucial to the intensification of investment and the development of modernisation processes in the dairy sector which led to export development, price growth as well as improved milk production and processing effectiveness in Poland.

Thirteen years after accession to the European Union, the dairy industry in Poland stands out from other EU Member States. Poland is the EU's fourth largest producer of dairy products with a share of 8% in EU dairy production. In 2004-2014, the value of marketed production of the Polish dairy industry (at comparable prices) increased by 65% (EUR 11.4 billion in 2014), while in the EU-15 – by 46% (EUR 119.5 billion), and in the EU-12/13 – by 83% (EUR 23.5 billion). At the same time, labour productivity in the Polish dairy industry more than doubled. Although it is still much lower than in highly developed EU Member States with the highest dairy production, the gap is narrowing each year.

The Polish dairy industry has successfully competed on the EU food market so far, but its confrontation with foreign competitors on the market will require Polish producers to take dynamic actions to find new sources of their competitive edge.

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FINANCING CONSTRAINTS ON SMES IN EMERGING MARKETS: DOES FINANCIAL LITERACY MATTER?

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Abstract

In the current context, SMEs in emerging markets are facing a number of obstacles to accessing financing sources. Therefore, various studies have discussed determinants of SMEs' accessibility to finance. Yet to expand the conceptual framework in this research area, this article proposes that financial literacy of owner/managers is a key influencing factor of SMEs' access to financing sources. The collaboration between firms' characteristics and owner/managers' characteristics, specifically financial literacy of owner/managers, develops the unification of power resources. This would lead to an improvement to the quality and efficiency of financial decision making of SMEs to overcome constraints on the access to financing sources in emerging markets.

Keywords: Financial Literacy, Credit Constraints, SMEs Financing, Emerging Markets.

JEL Classification: D14, G32, O1, O16.

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1. Introduction

Small and medium enterprises (SMEs) play an important role in both developed and developing countries. SMEs contribute to job creation for the workforce and GDP growth in nations. They also contribute to economic diversification and social stability, in particular in the private economic sector. However, the majority of SMEs literature impresses that these firms face bigger barriers to external financing than large firms and this impacts the growth and development of SMEs (Ardic et al., 2011). For example, small firms find it difficult to obtain commercial bank financing, especially long-term loans. Normally, the reasons are lack of collateral, weak cash flow, difficulties in assessing credit rating, inadequate credit history, high risk premiums, and high transaction costs (IFC, 2009). In addition, financial system in emerging markets also shows some constraints such as low domestic savings, poverty and lack of information between applicants and suppliers of credit (De la Torre, et al., 2011).

To examine financing constraints on SMEs, in previous studies, most literature on determinants of financing pattern and access to credit for SMEs focused on indicators such as collateral, interest rate, firm performance (Rupeika-Apoga, 2014; Harvie, et al., 2013), firm's size, age of the firm, characteristics of the firm, technological capabilities and location (Cenni, et. al., 2015). Over the same period, in emerging markets, a number of research focused on the determinants of capital structure of firms (Berger & Udell, 2006; Nha, et al., 2016; Noulas & Genimakis, 2011; Vo, 2017). However, Hatega (2007) found that most SME owner/managers have limited information on financing products and financial market, financial knowledge, skills and abilities to conduct budgeting, proper book-keeping and financial planning. To expand and understand deeply other constraints, this paper provides additional insight into financial literacy of SME owner/managers because financial literacy is defined as the ability to make informed judgments and to take effective decisions regarding money management, wealth, portfolio allocation and debt literacy (Lusardi & Tufano, 2015; van Rooij, et al. 2011; Cole et al., 2009; Hilgert et al., 2003;). In addition, a very limited number of studies analyze and identify the role of financial literacy of owner/managers' SMEs as an important factor which also influences choices and access to external sources of SMEs. In order to fill this gap, it is necessary for researchers to do more research into this area to contribute to the improvement on financing constraint problems of SMEs especially in emerging markets.

Accordingly, this paper expands the current problem of financing constraints on SMEs in emerging markets in two contributions. First, this paper proposes a conceptual model to suggests that besides the characteristics of SMEs in the previous studies, whether financial literacy of SME owner/managers is also considered as an important factor that drives SME owner/managers' access to proper financing sources and financial decision making in their capital structure in emerging markets. Second, the author also proposes to construct a combined

financial literacy score index for SME owner/managers based on Lusardi, A. (2006) and OECD (2005).

The paper has three more parts: literature review; development of framework and implementation including objectives, empirical models, measuring financial literacy; and conclusions.

2. Literature Review

Based on economic literature on financing constraints on SMEs, this section focuses on reviewing factors determining access to credit of firms from previous studies and especially, the author emphasizes the role of financial literacy of SME owner/managers in decision and access to external financing sources.

2.1 Factors Determining Access to Finance of SMEs

Most literature review on determinants of access to credit of firms has focused on four main groups namely, owner's characteristics, firm's characteristics, firm's location and ownership types (Akoten, et al., 2006; Beck, 2007; Beck & Demirguc-Kunt, 2006). Furthermore, in recent years, some studies in developing countries emphasized the role of networks and relationship between banks and firms and it is also a vital indicator which impacts on access to credit for SMEs (Cenni, et. al., 2015; Le & Nguyen, 2009; Malesky & Taussig, 2009).

2.1.1 Characteristics of Owner

Owner/managers' characteristics of a firm are mentioned in prior research as owner/managers' education, experience, gender and age. These indicators have been reliably supported to impact on firms' access to credit. For example, in terms of education of owners, early empirical research in of 4400 firms of Bates (1990) found that owners who attend a study in the university could access formal credit more easily but this research only focused on bank capital and there is no evidence supporting high education level to improve access to other financial sources in financial markets such as non-bank capital Coleman (2004) proved that managers with education and experience will help themselves to manage and present information that a lender wants to see in their loan application form. To confirm that experience of owners is also important to apply for a bank loan, Thanh et al. (2011) conducted a research into emerging market in Vietnam and they found that owners' lack of experience is normally the probability of bank loan rejection.

In terms of gender, Yaldiz (2011) argued that gender of owner/managers also impacts to access to formal credit. The result of this research showed that business women seem to be better educated and more talented compared to business men. Consequently, female owner/managers are likely to have more ability to access formal credit than male owner/managers. In addition, this research also found that

owner's age and working experience can support the firms to reduce their financing obstacles when they apply for formal credit. Moreover, Nakano & Nguyen (2011) took a different approach to analyze owner/managers' age and they argued that older owner/managers are more risk-averse and prefer to use more formal credit than informal credit.

In brief, owner/managers' characteristics should be considered an indicator which affects the ability to access formal and/or informal capital of the firms. However, this research proposes one more indicator of owner/managers' characteristics: financial literacy of owner/managers, a main indicator which impacts on SMEs' choice and access to external financing sources.

2.1.2 Characteristics of Firms

Various researches have pointed out that characteristics of firms such as firm's size, firm's profit, firm's age, and location of the firm are energetic indicators of firms to approach credit. According to Beck, (2007) and Beck, et al., (2006) size of firms is a vital indicator of firms' financing obstacles especially micro firms and small firms. It is not difficult to understand because this issue can be explained by theoretical models related to fixed transaction cost and information asymmetry problems. For example, Beck and Levine (2004) proved that normally small firms use informal sources to finance their investment such as moneylenders or their relatives and their friends because they are regularly informational opaque, whereas it is easier for larger firms to access formal external financing sources from stock markets, commercial banks and other financial institutions because they raise fund relatively informational transparent. Consequently, large firms face fewer constraints when looking for credit than small firms and large firms are likely to have more opportunities to access and choose alternative financing sources. In an empirical study, Black (2012) showed that firms with small size have a high signal of risk level related to credit and bankruptcy. Therefore, banks and other formal credit sources which are risk-averse have limited financing for these small firms. Besides, Coleman, (2002) proposed that profit of the firms has also been found to be critical to access to formal credit.

Age of a firm has also been found to be a factor which affects financing constraints and it is also related to the information asymmetry problems in financial market. Results from some empirical research showed a positive relationship between firm's age and holding debt from formal sources (Akoten, et al., 2006; Beck, et al., 2006). Hence, young firms such as newly-established firms are likely to seek informal than formal financing sources. However, Rand, (2007) found different result with a negative relationship between age's firm and formal source of credit and it's the same as a result of the study of Le, (2012) which argued that old firms are preferred to use their internal capital to finance for financing themselves as the

first choice and this result also supports evidence for pecking order theory (Myers, 1984).

In developing countries or emerging markets, the role of networking can be used as a tool to reduce the problem of information symmetries between lenders and borrowers (Shane & Cable, 2002). Networking and relationships are an effective pattern for SMEs to access external credit and they support SMEs' access to credit. For instance, Rand, (2007); Safavian & Wimpey (2007) and Straub (2005) found that networks have positive relationship with low cost of capitals because lenders rely on their observation and information of profitability performance that they pick up through contact over time with SMEs. Moreover, Bougheas, et al., (2006) proved that firms have good networks and energetic relationship are less likely to face financing constraints. It is akin to the result of the empirical study of Le & Nguyen, (2009), in which there is a significant and positive association between firms' relationship and accepted bank loans, but it does not impact on the amount of bank lending approval. Furthermore, firm's location and ownership types also contribute to financing obstacles. Yaldiz (2011) and Gine, (2011) mentioned different locations such as big city or small city or country side which also impact on the sources of financing credit of the firms and the transaction cost to evaluate firms' creditworthiness.

2.2 The Role of Owner/managers' Financial Literacy in External Financing Sources

To illustrate how owner/managers' financial literacy could link with financial decision-making choices of external financing and access to credit of SMEs, we start with the definition of financial literacy. Noctor et al., (1992) first defined "financial literacy as the ability to make informed judgments and effective decisions related to the use and management of money". In this definition, people's ability to make judgment and decisions is the main priority. After that, according to the Jump$tart Coalition for Personal Financial Literacy (Mandell, 2008), financial literacy is a combination of knowledge, skills and actions: 'Financial literacy is the ability to use knowledge and skills to manage one's financial resources effectively for lifetime financial security'. This comprehensive definition has been used by Hung, et al., (2009). Accordingly, financial knowledge is reflected in perceived financial knowledge and impacts of financial skills and it helps manage and distribute efficient financial resources. It could be understood as people with financial literacy know how financial systems work and it is also an important foundation for financial skills such as negotiating terms, navigating low cost facilities and this is also supported by researchers who believe that being able to make the right decisions is an additional component. For example, Association of Chartered Certified Accountants, (2006) and Johnson, (2004) confirmed the view that financial literacy clarifies variances in access to credit by borrowers. Moreover, Lusardi and Tufano (2015) and Stango and Zinman (2009)

also proved that people with low level of financial literacy tend to borrow at higher interest rates and participate less in formal financial systems. To support the use of formal credit related to financial literacy, Cole et al. (2009) and Hilgert et al. (2003) found that there is a positive relationship between financial literacy and using bank services and it also strongly influences banking behaviour. Particularly, Hilgert et al. (2003) stated that individuals with lower levels of financial literacy may have less interest in financial matters, or have different discount rates with higher interest rates when they touch a loan. This implies that the level of financial knowledge tends to influence attitudes, financial behaviours that in turn affect the cost when they approach or use financial services.

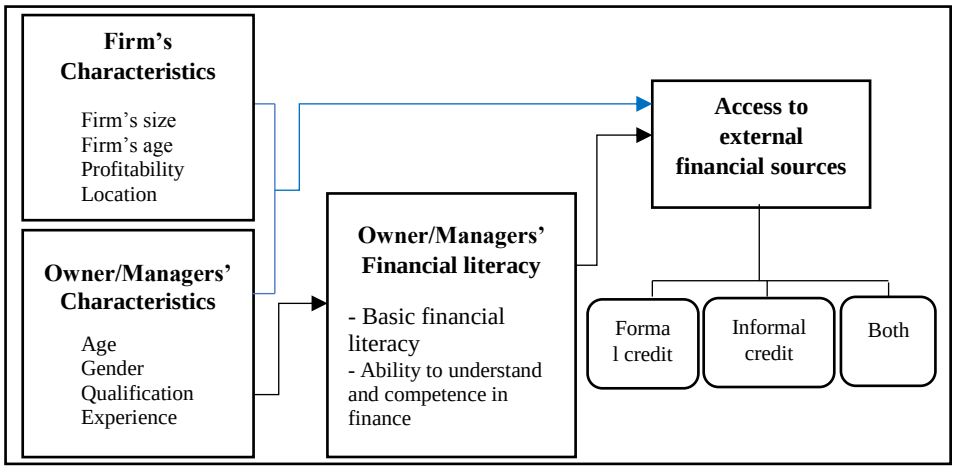
Obviously, SMEs can gain benefits from owner/managers who have financial knowledge. They can diversify portfolios in financing resources and utilize facilities of loans from financial institutions. There is some evidence to support the existence of relationship between financial literacy and access to financial products such as formal credit. For example, the study by Miller et al. (2009) pointed out that lack of financial literacy is often diffidence to access financial products and SMEs also fail to use them. Beck et al. (2007) argued that those who are not familiar or comfortable with products will not demand them. Calvert et al. (2005) also proved that those with high level of basic and sophisticated financial literacy are more likely to participate in financial markets with risky assets and they also invest more efficiently. Therefore, Lyons et al., (2006) stated that financial education can improve perceived financial literacy and there are consistent findings of a positive relationship between financial knowledge and access to credit. In addition, Coleman, (2004) also pointed that owner/managers with education and experience could drive them to better prepare and present a loan application in the form that a lender wants to see. Hence, it provides SMEs with an opportunity to know how to approach funding from financial markets through exploring what requirements from the third parties to support their capital.

Accordingly, SME owner/managers' financial literacy plays a critical role and might have effect on the accessibility of financing sources.

3. Development of Framework and Implementation

This research proposes a framework (figure 1) in which owner/managers' financial literacy is a critical indicator in financing constraint problems with SMEs. Particularly, inside this framework financial literacy is divided into two components which are basic financial literacy and ability to understand and competence in finance of owner/managers' SMEs besides other factors such as firm's characteristics and owner/managers' characteristics.

Figure 1. Financial Literacy and Access To Extremal Financial Sources of SMES



Source: Researcher developed

The data will be assembled from primary and secondary data. Primary data is provided by business owners or top managers of firms via telephone and face-to-face interviews using paper-based questionnaires. This part consists of main characteristics of the owner/managers of SME section such as financial literacy questions, experience, qualification, and information about the access to credit of firms such as formal credit, informal credit or both. Secondary data is also collected from financial statements of the firms which cover characteristics of firm section.

After being completed successfully, data will be coded and analyzed through statistical descriptive analysis. Regression analysis is also run to test the hypotheses to achieve objectives. Particularly, accessing financing sources can be modeled as a dichotomous dependent variable which is used to access formal credit, informal credit and both. All of these three variables are dichotomous ones taking the value of 1 if SMEs participate and 0 if otherwise. According to dependent variables, researcher proposes to use one of the models such as a linear probability model, logit and probit model to capture the existing relationship between variables in the access to financing sources of SMEs. In addition, this paper also estimates the relationship between financial literacy and owner/managers' characteristics by Ordinary Least Squares (OLS) model.

3.1. Objectives

The main objective is to propose a conceptual framework to examine the relationship between financial literacy and access to financial sources in emerging markets.

Specifically:

(1) To measure the level of financial literacy of SME owners or managers

(2) To estimate the relationship between financial literacy and SME owners/managers' characteristics

(3) To examine the impact of owners/managers' financial literacy on the access to formal and informal financing sources of SMEs

(4) To identify the differences in financial literacy of SME owners/managers in making decisions for a firm to select what kind of financing such as formal and informal credit.

3.2. Empirical Model

$$FL = \alpha_0 + \alpha_1 X_i + \varepsilon_i \quad (1)$$

$$AF = \beta_0 + \beta_1 FL_i + \beta_2 Y_i + \beta_3 X_i + v_i \quad (2)$$

FL: the level of financial literacy of SME owner/managers (basic financial literacy and competence in finance)

$X_{i:}$ SME owner/managers' characteristics (age, gender, qualification and experience)

AF: Access to financing sources (formal credit, informal credit or both)

Y_i: Firm characteristics (Firm size, age of the firm, firm profit ability, firm location and industry)

$\varepsilon_{i,}$ v_i: random error term

In equation 1, the author uses OLS to estimate the relationship between financial literacy and SME owner/managers' characteristics. The independent variables comprised in the model are age, gender, qualification and experience of the owner/managers.

In equation 2, this paper proposes one of the models such as linear probability model, logit and probit model to identify the relationship between the access to external financial sources and financial literacy of SME owner/managers. The independent variables included in this model are firm's characteristics (firm's size, firm's age, profitability, location, industry), financial literacy of

owner/managers, and owner/managers' characteristics (age, gender, qualification and experience).

Table 1: List of Variables Used in Empirical Models

Equation 1:	
Dependent variables	
o Basic financial literacy	Scale variable
o Competence in finance	Scale variable
Independent variables	
SMEs owner/managers characteristics	
o Age	Dummy variable: 0: under 35 age; 1: over 35 age
o Gender	Dummy variable: 0: female; 1: male
o Qualification	Category variable (0: under diploma degree; 1: diploma/university degree; 2: post graduate degree)
o Experience	Scale variable (years)
Equation 2:	
Dependent variables	
o *Access to formal credit*	=1 if accessed formal credit; otherwise = 0
o *Access to informal credit*	=1 if accessed informal credit; otherwise = 0
o *Both of them*	=1 if accessed both of formal & informal credit; otherwise = 0
Independent variables	
Firm characteristics	
o Firm size	ln (Total assets); ln (Net sales)
o Age of the firm	Scale variable (years)
o Firm profitability	EBITD/Total assets
o Firm location	Dummy variable: 1 = urban; otherwise = 0
o Industry	Category variable (0: manufacture; 1: retails; 2: services)
Financial literacy of SMEs owners/managers	
o Basic financial literacy	Scale variable
o Competence in finance	Scale variable

Source: Researcher developed

3.2. Measuring Financial Literacy of SME Owner/Managers

Financial literacy has been defined and measured in several ways. However, there is a lack of consensus on financial literacy definition although the importance of financial literacy has been widely acknowledged. Due to a wide range of conceptual definitions, various methods have been used to measure financial literacy. For example, in prior surveys (the Washington Financial Literacy Survey, the Jump$tart Coalition Survey, or the Survey of Consumer Finances 2001 module) which were deliberately designed to measure financial literacy, detailed information about individuals' financial education and variables associated with financial decision making were seldom collected sufficiently. Recently, some sets of questionnaires were designed to measure the level of financial literacy of individuals, but the content of the questionnaire do not focus on specific purposes but financial concepts in general (Lusardi, 2006; Lusardi and Mitchell, 2007b; van

Rooij, et al., 2011). Therefore, this paper proposes a set of questionnaires (table 2) to measure financial literacy of owner/managers in the context of accessing financing sources. This questionnaire was divided into two main parts. The first part measures basic financial concepts according to Lusardi, (2006). The second part assesses the ability to understand finance and competence of SME owner/managers. The author relied on OECD, (2005) to select the questions and these questions were adjusted to fit the specific purposes of SME owner/managers and they are also appropriate for financial instruments and lending terms in emerging markets.

Before applying financial literacy in the model to run regression, factor analysis and Cronbach's alpha test should be used because these techniques provide insight into the interrelationship and they also assess whether these factors are internal consistent reliability or not.

Table 2. The Questionnaire to Measure Financial Literacy of SME Owner/Managers

Basic financial concepts *(select the correct answer)*
Q1. Compound interest
Q2. Inflation
Q3. Risk diversification
Q4. Money illusion
Competence in finance *(raise your opinion)*
Q5. Do you receive financial records of payment methods or financial products/services? Do you read these at all? And how well do you understand them?
Q6. For financial products or services that you use, please indicate how well do you know about the fees and charges that apply (business account, payments and cash management, working capital financing, short-term lending, project finance, leasing)?
Q7. When arranging a new financing sources, do you take any advice from experts and shop around?
Q8. How well do you understand the following terms? (credit capacity, collateral, repayment period, interest charge)

Source: Researcher developed

4. Conclusion

In this paper, the author expands a framework to examine and understand the factors that drive SMEs to access financing sources in emerging markets and proposes two main points. First, SMEs must face lack of information to use and access financial instruments in financial markets and information asymmetry also contributes to their financing constraints. Second, the level of owner/managers' financial literacy tends to influence attitudes, financial behaviors that in turn affect the cost when they approach or use financial instruments and financial services. Hence, SME owner/managers' characteristics including their financial literacy might have effects on accessibility of financing sources.

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THE EFFECT OF RELATIONAL RISK PERCEPTION ON SUPPLIER'S PERFORMANCE; AN EMPIRICAL STUDY ON TURKISH STRATEGIC ALLIANCES

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Abstract

The aim of this research is to find answers to two principle questions: what is the effect of buyer's relational risk perception on supplier's expected performance? And how do strategic alliances manage relational risk in their enhanced supplier-buyer partnerships. In order to formulate hypotheses a review of the general literature on strategic alliances and the specific literature on relational risk, governance structure and trust in alliances has been provided. The hypotheses were tested using data from 135 questionnaire sent to the directors and key managers of alliances from Turkey's main industrial sectors. The results of this study show that there is a negative link between perception of relational risk and supplier's expected performance. However our results do not support any significant correlation between opportunism and expected performance. The results of study also confirm that higher perception of opportunistic behavior tends to use of more formal control mechanisms and higher compatibility between supplier and buyer tends to decrease the use of formal control mechanisms such as contract. The main contribution of this paper is to present an empirical support to relational risk management in Turkish strategic alliances.

Keywords: Strategic Alliance, Relational Risk Perception, Supplier-Buyer Partnership, Governance Structure, Contractual Arrangement, Trust.

JEL Classification: D7, G32, G34

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1. Introduction

Strategic alliances have grown in importance over the last few decades. Companies are using such strategic linkages to get competitive advantage and obtain common strategic objectives. Firms are teaming up with other firms and work together to share resources, enter new markets, gain access to new technology, obtain economies of scale and reduce risks. Despite their potential benefits, many alliances fail to accomplish their objectives (Parkhe 1991; Ellis 1996; Das and Teng 1998; Elmuti and Kathawala 2001). Alliance partners can end up wasting valuable time and resources even before the actual collaboration starts (Clegg et al., 2011). Alliances are supposed to reduce risks however they generate a special kind of risk entitled "relational risk" (Delerue, 2005). Studies regard risk in alliances mention the existence of relational risk, which is defined as a specific risk arising from the relationship itself (Ring and Van de Ven 1992; Das and Teng 1996; Nooteboom 1996; Nooteboom et al, 1997). Relational risk is a fundamental and unique feature that distinguishes strategic alliances from all other strategic activities done by a single firm (Das and Teng 1996). Even though many researchers have worked on relational risk in strategic alliances, very few studies in general and almost none in Turkey were tested empirically; Nooteboom et al, (1997) have tested the effects of governance and trust on the risk perceived by agents of firms in the context of buyer and supplier. The hypotheses have been tested on 97 relationships on the customer relations of ten suppliers of electrical/electronic components. Delerue (2005), as well, has carried out a two phase empirical research on relational risk in alliances; firstly, an exploratory research to explore multidimensional concept of relational risk by conducting in-depth interviews on 20 managers. Secondly, she did a confirmatory research to test the hypothesis on 87 partnerships of French biotechnology firms.

The main objective of this paper is to present an empirical support to relational risk management in strategic alliances. In order to examine relational risk on supplier's performance, we address two important questions:

1. What is the effect of buyer's relational risk perception on supplier's expected performance?
2. How do strategic alliances manage relational risk in their partnerships?

The paper begins by reviewing literature on strategic alliances and their various typologies in general and then proceeds to examine relational risk and its management specifically. Finally, we discuss the contribution and implication of this paper by proposing results and findings.

2. Theory and Hypothesis

In this section we first define strategic alliances and different types of risk in strategic alliances in general and proceed to focus on supplier partnership as a

common type of non- equity arrangement (Supplier-Buyer) and relational risk perception as a unique type of risk in alliance relationships. We argue that a partner's relational risk perception could affect other partner's performance and consequently it would affect partners' satisfactory cooperation in alliance. Finally we argue that alliances management is usually established through the contractual agreements and their governance forms and contractual arrangements can change with different governance structure. Since trust affect contractual arrangements in alliances we seek to find out the relationship between perception of relational risk and different level of contractual arrangement from pure trust to formal contracts.

2.1. Defining Strategic Alliances

Theorists have offered a numerous definitions for strategic alliances. However the common characteristics of all definitions indicate alliances as a long term relationship between two or more independent firms that share compatible objectives, strive for mutual benefits, and require a high level of mutual dependence (Mohr and Spekman 1994; Dussauge and Garrette 1995; Faulkner 1995; Gulati 1995; Yashino and Rangan 1995; Das and Teng 1996, 1998b, 1999, 2000a, 2001; Kale et al. 2000; Elmuti and Kathawala 2001). There are a wide range of strategic alliances' types, based on various degrees of inter-firm interdependency and levels of internalization (Kang and Sakai 2000). These alliances range from informal loosely agreements to formal agreements in which the parties may exchange equity or form a joint venture corporation (Elmuti and Kathawala 2001). To organize such a large collection of alliance structures, theorists have categorized them in different forms e.g. equity and non-equity alliances (Kang and Sakai, 2000), non-equity, minority equity and joint ventures (Yashio and Rangan 1995) and etc. Das and Teng (2001) offered a typology that categorize alliances in four different structures; unilateral contract-based alliances, bilateral contract-based alliances, minority equity alliances, and joint ventures. For the purpose of this research the late typology is preferred over others because it covers all possible forms of alliance. The first two are non-equity alliances and the last two are equity alliances. The difference between non-equity and equity alliances is whether the alliance agreements include equity creation or equity exchange. The distinguishing characteristics of strategic alliances' structures could be defined as following (Das and Teng 2001);

Equity joint ventures have joint equity ownership structure. The degree of inter-firm integration in equity joint ventures is high and their control mechanism is hierarchical. Duration of alliance in equity joint ventures is medium to long term and their unplanned termination is very difficult.

Minority equity alliances have one-way or cross-equity ownership. The degree of inter-firm integration in minority equity alliances is substantial and their control mechanism is interest alignment through equity stake. Duration of alliance in

minority equity alliances is also medium to long term and their unplanned termination is difficult.

Unilateral contract-based alliances have no shared ownership involved. The degree of inter-firm integration in unilateral contract-based alliances is light and their control mechanism is contract law. Duration of alliance in unilateral contract-based alliances is short to medium and their unplanned termination is fairly easy. Licensing, distribution agreements, and R&D contracts are the main forms of unilateral contract-based alliances.

Bilateral contract-based alliances have no shared ownership involved. The degree of inter-firm integration in bilateral contract-based alliances is moderate and their control mechanism is reciprocity. Duration of alliance in bilateral contract-based alliances is short to medium term and their unplanned termination is fairly difficult. Joint R&D, joint marketing and promotion, enhanced supplier partnership, and joint production are the main forms of bilateral contract-base alliances.

Common types of strategic alliances consist of Joint venture, minority equity alliance, joint production, joint marketing and promotion, joint R &D, enhanced supplier partnership, R&D contract and licensing agreement. "Enhanced Supplier Partnership" is one of the main forms of bilateral contract-based alliances. The supplier not only provides a particular type or line of good/services, but also becomes an integral part of buyer's operation through extensive cooperation. In this kind of supplier partnership a higher level of reciprocal interdependence could be found than the traditional buyer-supplier relationship (Borys and Jemison 1989, p. 246). Supplier partnerships refer to more exclusive relationships between organizations and their upstream suppliers and downstream customers in an alliance in order to reduce uncertainty and enhancing control of supply and distribution channels. Such alliances are usually created to increase the financial and operational performance of each channel member through reductions in total cost and inventories and increased sharing of information (Maloni and Benton 1997). Rather than concerning themselves only with price, manufacturers are looking to suppliers to work co-operatively in providing improved service, technological innovation and product design. This development has produced a significant impact by expanding the scope of supply chain management through greater integration of suppliers with organizations (Gunaskaran et al. 2004). According to Todeva and Knoke (2005) one of the strategic motives for organizations to engage in alliance formation is achieving vertical integration, recreating and extending supply links in order to adjust to environmental changes.

2.2. Risk in Strategic Alliances

Despite all the potential benefits, strategic alliances have also been known for the relatively high rate of failure. There are several reasons for the underperformance and failure of strategic alliances. Alliances involve difficulties of coordination and mutual dependence (Nooteboom et al, 1997). For interdependency, a high degree of harmony, flexibility and management are required which would not be the case if the company operates as a single firm (Delerue, 2005). Moreover, the greatest difficulty lies in the management of inter-firm dynamics, as inter-firm relationships in alliances go substantially beyond that of competitors or of buyer-suppliers. Opportunistic behavior, hidden agendas, cultural clashes, and excessive contractual and managerial controls are just some examples of relational uncertainties and problems in strategic alliances. Besides the usual "business" risk, strategic alliances attract the additional dimension of risk to prospective partners in terms of the level of mutual co-operation Das and Teng (2001).

According to Ring and Van de Ven (1992), the total risk in an alliance is made up of two distinct sets of uncertainty; "uncertainty regarding future states of nature" and "uncertainty whether the parties will be able to rely on trust". Proceeding along similar lines Das and Teng (1996) differentiate between relational risk and performance risk. Relational risk is about "the probability and consequences that a partner firm does not commit itself to the alliance in the desired manner". On the other hand, performance risk is concerned with "those factors that may jeopardize the achievement of strategic objectives, given that the partners co-operate fully".

One of the most important sources of relational risk is the concern about the partner's opportunistic behavior- that is, "self-interest seeking with guile" (Williamson, 1975, p.9). Examples of opportunistic behavior include "withholding or distorting information, shirking or failing to fulfill promises or obligations, appropriation of the partner firm's technology or key personnel, late payments, and delivery of substandard products" (Parkhe, 1993, p. 828). The threat of opportunism is considerable. In order to constrain opportunism two means have been suggested in literature; contract and monitoring. Trust, coercion and incentives such as shared ownership of specific investments have been considered as relevant dimensions of governance (Nooteboom et al, 1997).

Besides deliberate opportunistic behavior, relational risk also arises from partner firms' inability to make inter-firm cooperation work. Firms simply may not have enough experience and knowledge to collaborate effectively with other firms in alliance (Kanter, 1994). In international alliances, a perception of opportunism may be attributed to a lack of cultural understanding and responsiveness (Lane and Beamish, 1990).

Literature suggest that the degree to which managers perceive relational risk influence their expectation of the performance, hence

H1. Buyer's perception of relational risk affects supplier's expected performance.

2.3. Governance and Trust in Strategic Alliances

Literature suggests two basic approaches for control; external measure–based control (formal control or objective control) and internal value-based control (informal control or social control) (Eisenhardt 1989). The first approach emphasizes on the establishment and utilization of formal rules, procedures, and policies to monitor and reward desirable performance such as legal contracts. The second approach relies on the establishment of organizational norms, values, culture, and the internalization of goals to encourage desirable behavior and outcome, such as organizational culture (Delerue, 2005).

The establishment of governance structure is at the core of alliance management. Alliance governance entails the agreements between partners regard the integration of their interests and the use of combined resources (Clegg et al. 2011). The organization and functioning of alliances are usually established through the contractual agreements and their governance forms. Contract is concerned to deal with allocation of risks and trading benefits resulted from exchanges while governance is institutional context in which the collaboration takes place (Arino and Reuer 2006).

Research on alliances governance largely is based on distinction of equity and non-equity agreements. Researchers argue that equity alliances provide partners with more managerial control than non-equity alliances by virtue of the establishment of an administrative hierarchy that allows them to exercise a right of control (Hennart 1988; Pisano 1989). The general findings in literature indicate that when the cost and chance of opportunistic behavior is high, equity alliances will be preferred (Gulati 1995). The reason is that partners' share ownership of equity decreases their incentive to behave opportunistically (Pisano and Teece 1989). Reuer and Arino (2002) argue that contractual arrangements can change with different governance structure. Contractual arrangements in alliances are influenced by different aspects such as trust or relational quality, the specificity of alliance related investments and the purpose and type of alliance. Alliance contracts also differ in their complexity. Two common types of contract consist of "Explicit" and "Implicit" contracts. Explicit contracts determine roles and responsibilities of parties, the ownership structure, decision rights and policies of conflicts. They also include legal issues such as non-disclosure agreements and intellectual property rights. Implicit contracts, however, are not always enforceable by law but by mutual interest of parties such as trust or desire to maintain a valuable relationship (Clegg et al. 2011).

Researchers believe that inter-firm trust is a critical element in strategic alliances (Ring and Van de Ven 1992; Nooteboom 1996; Sydow 1998, Das and Teng 2001) because it is effective in lessening concerns about opportunistic behavior, better

integrating the partners, and reducing formal contracting (Parkhe 1993). There is extensive support in prior research for the overall beneficial effect of trust. Empirical studies have shown that trust allows for constructive interpretation of partner motives, reduces the potential for conflict, and encourages smooth information flow between partners (Zaheer et al. 1998; Krishnan et al. 2006). Concerning to the social exchange theory (Blau, 1964), it has been argue that since social exchange relies on shared system of beliefs and ethics more than contractual arrangement, trust can reduce the specification and monitoring of contracts and it decrease uncertainty as well (Nooteboom et al, 1997). In an online survey (Linkdin 2014) answers of 286 directors to the question of "In one word, what is the most important challenge facing Alliances/Channel Relationships?" indicated that the most frequently answer was "Trust"(59 answers), the second most frequently answer was "Alignment" (16 answers) and the third one was "Added value" (12 answers). We can argue that besides formal and informal control mechanisms, trust also could be considered solely as control mechanism in partner's relationship. However, the excessive concern with control can be counterproductive (Nooteboom et al, 1997).

Managers have several instruments for reducing risk in strategic alliances. Delerue (2005) showed that when the perception of relational risk is high, more autonomous instrument of control is going to be adopted by managers and decision makers. Adoption of autonomous instrument of control, on the other hand become an obstacle to cooperation. Hence,

H2a. The higher the level of perceived relational risk the higher the level of formal control

H2b. The higher the level of perceived relational risk the higher the level of informal control

On the other hand trust eases the concern about opportunistic behavior.

Hence,

H3. The higher the level of perceived relational risk the lower the level of inter firm trust

3. Research Design and Methodology

The questionnaire used in this study contained measures of perceived relational risk, supply chain performance and control mechanisms. All measures have been adopted thorough literature review. The scale of perceived relational risk includes four major aspects based on the definition of relational risk: opportunistic behavior, inter-firm trust, incompatible cultures and objects of partners (Das and Teng 2001)

For the purpose of this study, criteria for measuring supplier-buyer partnership's performance have been selected based on "perfect order-index" and "flexibility". Three critical service elements as the components of the perfect order-index have been selected as "on time delivery", "order completeness", and "error-damage free delivery"(Borghesi and Gaudenzi 2004). Flexibility can measure a system's ability to accommodate volume and schedule fluctuations from suppliers, manufactures and customers. To achieve the goal of flexibility four types of system flexibility; "volume flexibility", "delivery flexibility", "mix flexibility" and "new product flexibility" have been considered in this study (Slack 1991). The scale of risk reducing mechanisms includes formal control (contract), informal control (organization behavior) and inter-firm trust (Bradach and Eccles 1989).

3.1. Questionnaire Development and Sample Selection

The hypotheses were tested using data from questionnaire which have been sent to the directors and key managers of 2000 companies in Turkey. A small group of managers and expert reviewed a preliminary version of the questionnaire to assess the validity of selected items. Convenience sampling method has been used to prepare database, although in data gathering special consideration has been taken for using most relevant sources, such as Turkish Business and Professional Network, Network of Risk Management in Turkey, Turkish companies Network, and etc. A mix of service/product, national/international and SME/large size alliances from main industrial sectors (Agriculture, IT, Construction, Consumer electronics and home appliances, Textiles, Automotive, Steel and Energy sectors and Transport, Financial and Tourism services) located in Turkey was sampled. In order to get in contact with directors and top managers directly, questionnaires have been sent via "LinkedIn" to their personal account. Of 2000 director which received questionnaire, 8 percent responded. Finally 135 respond have been selected for analysis.

3.2. Descriptive Statistics

All data have been check for outliers before any statistical analysis. The reliability values of variables exceed the recommended value of 0.70 except for one construct for which Cronbach's Alfa was 0,676. After dropping two items from the measure we get an acceptable Cronbach's Alfa as 0,725. Table1 provides descriptive statistics such as mean, variance, standard deviation, and the number of items and Cronbach's Alfa of each variable.

Table 1. Descriptive Statistics of Variables

Variables	Mean	Variance	Standard deviation	Items no	Cronbach' s Alfa
Relational Risk Perception (RRP)	34,597	21,518	4,638	13	0,691
RRP after modification				*11*	*0,725*
Performance	6, 991	2,582	1,606	9	0,903
Risk Reducing Mechanisms	7,168	0,588	0,766	14	0,732

Factor analysis has been performed for every variable. The results of factor analysis for 11-items "Relational Risk Perception" variable suggested a two factors solution, for 9-items "Performance" variable, items were loaded on two factors and for 14-items "Risk Reducing Mechanisms" variable, items were loaded on four factors. Table 2 provides the results of factor analysis of the variables.

Table 2. Results of Factor Analysis of Variables- Cronbach's Alfa

Factor 1. Opportunistic behavior	**0,716**	**Relational Risk Perception**
Our firm is generally doubtful of the information provided to us by our supplier.		
Sometimes the supplier firm alters the facts slightly in order to get what it need.		
The supplier firm may turn out to be dishonest.		
The supplier firm sometimes promised to do things without actually doing them later.		
The supplier firm may do anything within its means that will help it further its interest.		
Factor 2. Conformity	**0,667**	
In our contacts with this supplier we can understand each other well and quickly.		
Our partner expresses himself in a language which is close to ours.		
Our partner interprets the events related to our cooperation in the same way as we do.		
The supplier firm may have incompatible objectives.		
Factor 1. Perfect order	**0,886**	**Performance**
How is your supplier's performance as compared to your expectation after placing an order?		
Your supplier's ability to On time delivery		
Your supplier's ability to Order completeness		
Your supplier's ability to modify the quantity of your order		
Your supplier's ability to modify the variety of products to meet your requirement		
Factor 2. Flexibility	**0,835**	
Your supplier's ability to modify the existing products or introducing new products based on your requirement.		
Your supplier's ability to change planned delivery dates.		
Your supplier's ability to meet your expectation at the lowest possible cost.		
In your overall assessment how would you characterize the performance of your primary supplier?		
Factor 1. Formal Control (Contractual arrangement)	**0,840**	**Risk Reducing Mechanisms**
In addition to an agreement we sign a detailed legal contract with this supplier.		
The contract with this supplier is as complete as possible.		
The contract forms the core of our relation with this customer.		
We sign an agreement specifying price, delivery, quality specification and estimated annual usage.		
Factor 2. Trust & Interaction	**0,778**	
We chose this supplier because we trust his good intention.		
We chose this supplier because we trust his competences.		
Our cooperation is characterized by mutual respect with this supplier.		
Our cooperation is characterized by high reciprocity with this supplier.		
There is a close, personal interaction between us and this supplier.		
Factor 3. Responsibility & Honesty	**0,735**	
The supplier firm carries out its duties even if we do not check up on it.		
The supplier firm always provides us a completely truthful picture of its business.		
Factor 4 Informal Control (Organizational culture)	**0,702**	
The organizational cultures of our supplier are compatible with ours.		
We undertake no contractual agreements with this supplier beyond each order as it is placed.		

The reliability values of all factors exceed the recommended value of 0, 70 (Hair et al 1995) except for one construct for which the coefficient is 0,667. In this study,

we used subjective performance indicators (expected performance). According to Saxton (1997) there is a positive relationship between subjective and objective measures of the alliance performance.

3.3. Correlations and Regression Analysis

We used Pearson Correlations, linear regression analysis and ANOVA to test the hypotheses. Table 3 provides correlation analysis of relational risk perception and expected performance. From two factors of relational risk perception just one of them (conformity) was found to be significantly correlated with two factors of expected performance; perfect order and flexibility. In other words, higher expectation of flexibility and perfected order tends to higher perception of conformity between supplier and buyer. The correlation between Opportunistic behavior and expected performance are not significant.

Table 3. Results of Correlation between Relational Risk Perception and Expected Performance

Variables	**1**	**2**	**3**	**4**
Opportunistic behavior	1	,036	,070	,040
Conformity	,036	1	,554**	,343**
Perfect order	,070	,554**	1	,488**
Flexibility	,040	,343**	,488**	1

**Correlation is significant at the 0,01 level (2-tailed).

According to the results, Table 4, both factors of relational risk perception, Opportunistic behavior and Conformity was found to be significantly correlated with risk reducing mechanisms. In other words, higher perception of opportunistic behavior tends to more use of formal control mechanisms and higher conformity between supplier and buyer tends to decrease the use of formal control mechanisms such as contract. The correlation between risk perception and organizational culture are not significant.

Table 4. Results of Correlation between Relational Risk Perception and Risk Reducing Mechanisms

Variables	**1**	**2**	**3**	**4**	**5**	**6**
Opportunistic behavior	1	,036	,181*	,120	,263**	-,076
Conformity	,036	1	-,428**	,556**	,308**	,109
Contractual arrangement	,181*	-,428**	1	-,416**	-,116	,067
Trust & Interaction	,120	,556**	-,416**	1	,234**	,108
Responsibility& & Honesty	,263**	,308**	-,116	,234**	1	,057
Organisational Culture	-,076	,109	,067	,108	,057	1

*Correlation is significant at the 0, 05 level (2-tailed)
**Correlation is significant at the 0, 01 level (2-tailed)

We use linear regression analysis to test the hypotheses regarding the effect of perceived relational risk on expected performance and risk reducing mechanisms. The results of regression analysis yielded partly support for hypothesis 1(Table 5). From two factors of relational risk perception just one of them (conformity) was found to be significantly correlated with two factors of expected performance; perfect order and flexibility. Jia et al. (1999) showed that risk perception increase when the estimated results are negative and remain constant when estimated result is positive. In the same line Delerue (2005) confirmed that the results of her study partially supported her hypothesis regards the effect of risk perception and perceived performance. The author concluded that some risks do not have a negative effect on performance perception and the ways by which managers perceive relational risk influence their perception of performance.

Table 5. Results of Regression Analysis for Relational Risk Perception and Flexibility

Independent Variables	**B**	**Beta**	**t**	**Sig.**
(Constant)	3,339		3,720	.000
Std. Error	,898			
Opportunistic behavior	,067	,027	,333	.739
Std. Error	,201			
Conformity	1,063	,342	4,185	.000
Std. Error	,254			
Dependent variable		**Flexibility**		
R		.344a		
R2		.119		
F		8,876 Sig,000		
(Constant)	1,519		1,430	,155
Std. Error	1,062			
Opportunistic behavior	,166	,051	,698	,487
Std. Error	,238			
Conformity	2,290	,552	7,622	.000
Std. Error	,301			
Dependent variable		**Perfect Order**		
R		.556a		
R2		.309		
F		29,518 Sig,000		

Table 6 provides the result of regression analysis for relational risk perception and risk reducing mechanisms. Many instruments of control are used to reduce relational risk perception. Some of these instruments are more informal such as relational capital (trust) and some of them more formal like legal procedures and contractual agreements. Delerue (2005) showed that perception of relational risk is influenced by a combination of several instruments of control. The author argues that some instruments of control are appropriate for some risks but increase the perception of other risk. For example contractual arrangement can become an obstacle to cooperation. The results of our study also confirm that effect; higher perception of opportunistic behavior tends to more use of formal control mechanisms and higher conformity between supplier and buyer tends to decrease the use of formal control mechanisms such as contractual arrangement. Results of our research partially support hypothesis (H2a, H2b).

Table 6. Results of Regression Analysis for Relational Risk Perception and Risk Reducing Mechanisms

Independent variable	**B**	**Beta**	**t**	**Sig**
Constant	14,621		11,089	,000
Std. Error	1,319			
Opportunistic behavior	,759	,197	2,567	,011
Std. Error	,296			
Conformity	-2,117	-,436	-5,671	,000
Std. Error	,373			
Dependent variable		**Contractual arrangement**		
R		,472a		
R2		,222		
F		18,875 Sig ,000		
Independent variable	B	Beta	t	sig
Constant	1,606		1,579	,117
Std. Error	1,017			
Opportunistic behavior	,318	,100	1,394	,166
Std. Error	,228			
Conformity	2,213	,553	7,691	,000
Std. Error	,288			
Dependent variable		**Trust & Interaction**		
R		,565a		
R2		,319		
F		30,977 Sig,000		
Independent variable	B	Beta	t	sig
Constant	1,429		2,466	,015
Std. Error	,580			
Opportunistic behavior	,410	,252	3,155	,002
Std. Error	,130			
Conformity	,614	,299	3,744	,000
Std. Error	,164			
Dependent variable		**Responsibility & Honesty**		
R		,398a		
R2		,159		
F		12,432 Sig,000		
Independent variable	B	Beta	t	sig
Constant	4,337		7,644	,000
Std. Error	,567			
Opportunistic behavior	-,119	-,080	-,932	,353
Std. Error	,127			
Conformity	,208	,112	1,298	,197
Std. Error	,161			
Dependent variable		**Organisational Culture**		
R		,136a		
R2		,018		
F		1,235 Sig,294		

In our study trust has been considered as an instrument of control. Trust is characteristic of successful alliances and it has negative relation with relational risk perception. According to the results of our study there is a significant relationship between Trust & Interaction and relational risk perceived by partners. The results support hypothesis H3. The correlation between risk perception and organizational culture are not significant in our study. However it is impossible to conclude by generalizing this result for all alliances, it may happen due to cultural differences.

Finally we used ANOVA test to analysis variance between groups based on sector, form of alliance and size of company. Results of the study did not indicate any significant variance.

4. Conclusion

The key argument put forward in this study is consisting of two principle questions: what is the effect of relational risk perception on supplier's expected performance? And how do strategic alliances manage relational risk in their vertically integrated buyer-supplier partnerships.

The results of this study show that there is a negative link between perception of relational risk and expected performance. Although the literature on strategic alliances had been focused strongly on negative effect of partners' opportunistic behaviors, our results do not support any significant correlation between opportunism and expected performance. Since risk perception is decision makers' subjective assessment of probability of different outcomes, personal characteristic, culture and task environment may affect decision making process and exhibit different risk behaviors in strategic alliances' risk management. A strict interpretation of results emphasizes the need of focusing on personal trait of decision makers based on their nationality, cultural differences and location in future studies.

Alliances use several instruments in order to control relation risk. Literature on risk management suggests variety of instruments range from rigid contractual arrangement to inter-firm trust. The result of our study confirms that higher perception of opportunistic behavior tends to more use of formal control mechanisms. In other words the more specific and complex the contract, the less probability there is for opportunistic behavior of alliance partners. Meanwhile higher conformity between supplier and buyer tends to decrease the use of formal control mechanisms such as contract. The correlation between risk perception and organizational culture are not significant in our study. Our conclusion show that trust between partners is effective in lessening concerns about opportunistic behavior and reducing formal contracting.

Even though many researchers have worked on relational risk perception in strategic alliances, very few studies in general and almost none in Turkey were tested empirically. So the main contribution of this paper is to present an empirical support to relational risk management in Turkish strategic alliances. Though there are similar works, but among few works that have been done empirically, almost none of them have been addressed enhanced supplier partnerships directly. In the present work the effect of relational risk perception on supplier partnerships have been studied exclusively.

Several limitations to the current research should be recognized. First, the theory presented here is limited to relational risk perception in strategic alliances. Further research is needed to extend it to other type of risk in alliances such as performance risk. A second limitation is that we have focused on supply chain performance in supplier-buyer relationship. We expect that the theory can be empirically examined on different industries, different type of strategic alliance and alliances with different governance structure. Finally as mentioned before nationality, cultural differences and location of partner firms are critical factors for presenting satisfactory performance and gaining common objectives in strategic alliances. So the theory developed in this study requires empirical testing in different multinational alliances.

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A REVIEW OF THE ROLE OF COLLECTORS IN VIETNAM'S RICE VALUE NETWORK

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Abstract

According to the announcement by the Asian Development Bank (ADB), the UK Department for International Development (DFID) and the Ministry of Planning and Investment (2012), from six to nine per cent of Vietnam's rice product is bought under written contracts, while most of the remaining rice is delivered to the market through indirect channels, in which the farmers rely on collectors or intermediaries. Interestingly, this business partnership is a verbal agreement that is not enforced by a legally binding contract; instead, it is a long-term cooperation. Through analyzing the characteristics of the collaborative culture and the small-scale production of Vietnamese farmers, we found that the advantages of these transactions and the trust between collectors and farmers lead to ease of cooperation. In the past, when there were no large traders or enterprises in Vietnam economy, the collectors played an important role in the flow of goods; they were the connector in the small-scale peasant economy. In their current role, collectors understand what farmers need, such that 90 per cent of farmers get market information from the collectors. This study shows that Vietnamese collectors are acting as connectors between farmers and enterprises. Therefore, this force needs to be considered an important component of the rice value network of Vietnam.

Keywords: Farmers, Collectors, Rice, Verbal Agreement, Trust, Vietnam.

***JEL Classification*:** D91, Q12, Q13.

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1. Status of Vietnam's Rice Production

Rice is the staple food and the revenue source of millions of farmers, especially the poor in Vietnam.[1] After nearly 30 years since historical milestones of socio-economic reform in 1986 (Doi Moi),[2] one of the greatest achievements of Vietnamese agriculture has been the development of the rice industry. From a country lacking food in the seventies and early eighties, by 1989, Vietnam became a rice exporter. Recently, according to the FAO (2017), Vietnam ranks fourth in Far East Asia in terms of rice production and fifth in the world for rice exporting (p.p.23, 34). The General Statistic Office and General Department of Vietnam Customs reported that in 2016, total rice production in Vietnam was about 43.6 million tons, of which about 4.88 million tons were exported, accounting for 11.2 per cent of the total amount of rice produced.

In Vietnam, national rice production is distributed in six basic economic zones, of which three of the most important are Red River Delta, North Central and Central coastal areas and the Mekong River Delta (Table 1). The Mekong River Delta contributes half of the country's rice production and over 90 per cent its export output (Trung Chanh, 2017). With nearly 2 million households cultivating on more than 2 million hectares of land, the Mekong River Delta is a fragmentary assemblage of millions of small-scale farmers (Vo, Le, and Nguyen, 2015, p.128). In terms of the season, there are 3 rice crops per year, winter-spring (from February to April), summer-autumn (from June to August), and minor winter (from October to December); winter-spring is the main crop with the best quality of rice (Nguyen, 2013, p. 3).

[1] According to Vu and Glewwe (2011, p.18), about 86 per cent of rural Vietnamese were farmers, and two-thirds grow rice. Overall, 76 per cent of rice farmers were in the poorest quintile, while 18 per cent were in the richest quintile.

[2] The Reform in 1986 was the early stage of economic development in Vietnam. From this time, the private property rights and the private economy began to be recognized, which helped farmers to produce crops and individuals to take part in agribusiness. This led to incredible growth of the agriculture sector.

Table 1: Rice Acreage and Production in Vietnam

Year		Vietnam	Red River Delta	North Central and Central Coastal Areas	Mekong Delta
2010	Planted area (thousand hectares)	7489.4	1129.9	1214.1	3495.9
	Production (thousand tons)	40005.6	6805.4	6152	21595.6
2013	Planted area (thousand hectares)	7902.5	1150.1	1230.4	4340.3
	Production (thousand tons)	44039.1	6655.4	6599.7	25021.1
2015	Planted area (thousand hectares)	7830.6	1110.9	1220.5	4304.1
	Production (thousand tons)	45105.5	6729.5	6855.1	25598.2
2016	Planted area (thousand hectares)	7790.4	1093.9	1215.4	4295.2
	Production (thousand tons)	43609.5	6578.8	6878.9	24226.6

Source: GSO, 2016.

Despite many achievements in the rice sector, small-scale production[3] has not improved to reach the level of specialized commodity production due to land fragmentation (Hoang, 2008). As the most farmers have been cultivating on small cropland for generations, the agricultural production is highly fragmented. According to a Vietnam Development Report by the World Bank (2016, p. 10), in 2011, 95 per cent of Vietnam's agricultural households cultivated on less than two hectares of cropland (Figure 1). In 2017, the country had more than 14 million farm households, 80 per cent of which produced on about 0.56 hectares of agricultural land.[4] Additionally, infrastructure and transportation in many regions of Vietnam are of low quality, making it difficult to transport agricultural products from the fields to warehouses. Rice in the northern and central regions is mainly

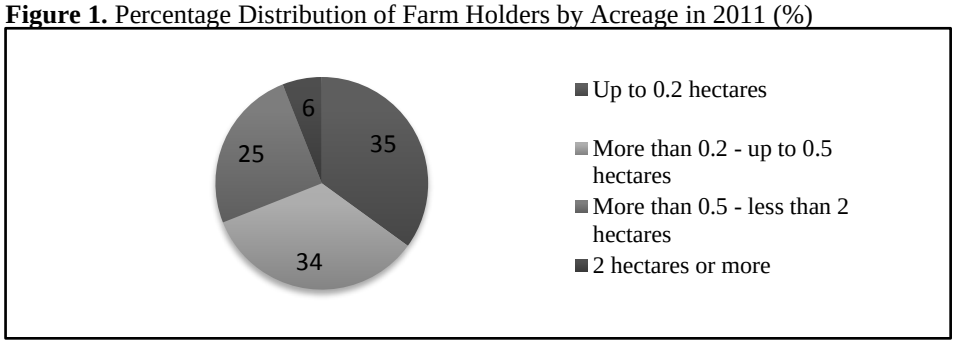
[3] Smallholders are farmers with less than two hectares of cropland (World Bank, 2003, p.6, citing Okidegbe 2001).

[4] Nguyen (2017) reported that there are more than 14 million farm households producing over 70 million land plots, with a total area of more than 10 million hectares. Most of the households have four land plots for cropping, where each plot is an average of 0.14 hectares. See more on

http://www.nhandan.com.vn/chinhtri/item/33298402-can-minh-bach-cong-bang-trong-don-thua-doi-ruong.html

transported by collectors on bicycles and "cyclos" due to the narrow and sloped roads, while in the south, carts and boats are used due to the dense waterway network (Alavi and Others 2012, p,117; IFPIR, 1996, p.p.121, 124; Ishikawa 2009, p.10). These conditions have allowed the role of collectors to become more prominent in Vietnam's agricultural sector.

Figure 1. Percentage Distribution of Farm Holders by Acreage in 2011 (%)



Source: World Bank, 2016, p.10

According to the economic opinions of scientists and management officers, the large number of collectors involved in Vietnam's rice production might be expected to incur a transaction cost, making Vietnam's supply of rice cumbersome and inefficient. This would mean that farmers have to sell rice at cheaper prices and food companies have to buy it at more expensive prices than if farmers and firms were to directly cooperate. In addition, if collectors do not have appropriate storage and milling conditions, this may lead to reduced the rice quality by the time it arrives at the food companies' warehouses. Therefore, collectors are seen to have negative impacts on the value of Vietnamese rice. To reduce these negative consequences, researchers have proposed that agricultural contracts between farmers and food companies would help to increase the value of rice and ensure a higher income for the farmer (ADB, 2005; Glover and Kusterer, 2016; Minot and Roy, 2006; Nguyen, Dzator and Adolny, 2015), indicating eliminating the intermediate actors (Nham, 2012, p.p. 162, 163). However, the reality is that the percentage of contract farming is minor, i.e. only a small proportion of farmers can adopt this kind of cooperation. For the majority of farmers, the collectors are the only ones who deal with their output.

This research, which explores this issue from the viewpoint of the farmers, demonstrates the benefits that collectors bring to farmers and asserts that, in the context of weak linkages between farmers and food businesses, collectors need to be recognized as having an important economic role.

2. The Paddy/Rice Supply Chain in Vietnam

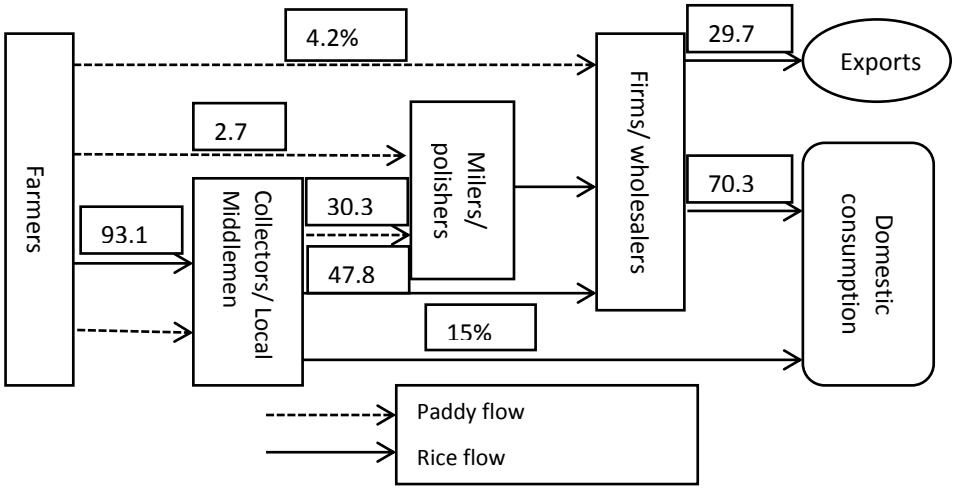
Vietnam's paddy/rice network has basically been in place for a long time. Many actors are involved in the activities of planting, purchasing, and transporting rice. So far, Vietnam's paddy/rice supply chain has two main flows (Figure 2).

First, food companies can sign written contracts directly with farmers. This channel has not yet been widely applied, as it occupies six to nine per cent of the rice product (Tran and Do, 2013, p.77). According to Article 2, Decision 80/2002/ĐQ-TTG and a report by the Ministry of Agriculture and Rural Development, there are currently three main types of contracts in Vietnam, depending on the level of association: (1) *Consumption contract*, in which, before crops, a company makes a contract with farmers. Here, the quantity and price of products are determined in advance. Typically, large firms do not operate under this kind of contract due to the risk of product quality and actual price volatility. (2) An *underwriting contract* is when a firm provides seed, credit, and some equipment necessary for farmers to produce crops according to technical requirements. After evaluating the products and subtracting the investments, the company will pay the farmers. This contract is often used by large enterprises to ensure product quality and corporate reputation. However, in such cases, firms are considered monopolists in supporting agricultural facilities and examining the product quality, and they are likely to be distrusted by farmers, as the firms may use exploitative practices to earn more profits. For instance, firms may set higher prices for input materials and underestimate the quality of outputs to reduce the amount they must pay to farmers. In addition, there also may be some proportion of unfaithful farmers, who sell a portion of the product to collectors if the market price is higher than the contracted price. (3) Finally, *large fields* are a collection of conveniently located cropland, that is used by food companies. Farmers of this cropland will then contract with the business to produce crops on their own plots, according to the firms' technical requirements and inputs. In this way, the farmer is regarded as a worker of the enterprise and is paid depending on their productivity. This type of association is mainly funded by corporations or state-owned enterprises via government projects. The strength of this contract is that it avoids fragmented production, ensuring the uniform quality and stable supply of crops for firms. However, it requires a lot of time and money to gather many plots. Furthermore, uneven soil quality also requires time and recovery costs. Most importantly, when such contracts are terminated, there are usually disputes between farmers during re-division of the field. Among the three contract farming types mentioned above, only the last one is a secure long-term contract; the other two are short-term business deals with higher chances of deception.

The second flow, which is common in Vietnam, is where enterprises collect raw rice from intermediate actors like collectors, traders, or mills, and then process rice for domestic consumption or exportation. In this type of operation, collectors play an important role and are the main actor in agricultural product flow.

According to the Vietnam Food Association, it is estimated that every year, collectors buy 90 per cent of farmers' paddy/rice, then distribute them to other places. In the Mekong Delta, 93.1 per cent paddy/rice is directly sold to collectors, while a small proportion of products is traded with food companies (Vo and Nguyen, 2011, p.100).

Figure 2. Paddy/Rice Chains in the Mekong Delta, Drawing on Vo and Nguyen (2011)



In the rice industry, collectors emerged very early on and have continued to play an important role in the rice supply chain in Vietnam due to the small-scale agricultural production characteristics of the peasants and the unfavorable traffic (narrow and steep roads in the north and a network of rivers and canals in the south). According to the Vietnam Research Center for Development and Agricultural System, there are numerous small-scale collectors operating independently in the market, doing simple business without speculation or hoarding. In the Mekong River Delta, only 0.02 per cent of collectors are private firms that own warehouses and stores and 8.3 per cent represent an organization or an enterprise; the remaining are small dealers. Additionally, most Mekong River Delta collectors have small-scale capital, whereby 70 per cent of collectors own USD12,500-20,800 (VND300-500 million) and 22 per cent own USD20,800-50,000 (VND500-1,200 million) of capital capacity.

The cooperation between farmers and collectors is described as follows: Before the crop season, a collector comes to a farmer to set up a trading relationship with verbal agreements on paddy/ rice production, payment methods, and transportation. If the farmer does not agree, he can choose to cooperate with another collector. Otherwise, he will carry out the cultivation. After harvesting, the collector comes to evaluate the quality of paddy/rice and determine the price. As the farmer already has some information about market prices, he can negotiate

until both are satisfied. Then, the collector pays in cash and takes the product immediately. However, due to the non-written contract, there should be risks for the farmer, such as if, after harvesting, the collector does not come to farmers or underestimates the quality of products to avoid purchasing them. In this case, the farmer would be relegated to a passive position where he could not look toward any legal agency to help him. In most cases, he would have to sell to other dealers or consumers at a lower price to ensure the process of reproduction. As the result, the farmer would suffer a loss.

In economics, a written and legally enforceable contract may protect the farmer. Even with the risk of repression by the firms or price fluctuations, farmers can still sell products to their partner companies. Conversely, a verbal arrangement carries more risks, as mentioned above. Interestingly though, Vietnamese farmers prefer to cooperate with collectors rather than with agricultural enterprises because they find more trust and more conveniences in interacting with collectors.

3. Propelling Factors in the Relationship Between the Farmers and Collectors

3.1. Convenient Transaction Method

Considering the cooperative relationship between actors in Vietnam's rice supply chain, farmers are more closely related to the collectors than to the milling or food companies due to the advantageous transaction in terms of logistics, price and payment methods.

The collectors offer a convenient transportation method to their partners. While food enterprises face enormous difficulties in transporting products due to unstable capital and lacking variety of resources (human resources, professional experience, and infrastructure, including transportation vehicles, drying machines, and warehouses), the huge number of collectors uses diversified means of transportation and can also handle also drying and milling (Vo, Le and Nguyen, 2015, p. 130). According to a survey of 123 households by Tran and Do (2013) in An Giang, 20.6 per cent of respondents said that enterprises did not buy or delayed buying all rice as contracted at the harvesting time (p. 81) due to the firms' poor storing abilities, so that farmers had to wait to sell their products, potentially affecting the paddy/rice quality. In addition, enterprises' transportation vehicles are normally vans, trucks or lorries, which may not reach the farmers' rice fields. Furthermore, farmers cannot transfer a large amount of paddy/rice to enterprises' warehouses. By contrast, by using local knowledge, collectors are very flexible in transporting agricultural products, allowing them to do business even in rural areas with less developed transport infrastructure. Cao (2010) determined that firms prefer buying paddy/ rice at their stores, while farmers only want to sell it at their fields. This study also found that farmers do not have the means to transport to the firms' stores, while firms cannot afford to buy small-scale products. Importantly,

the collectors can meet the needs of both parties. It is possible that if there were no collectors, enterprises would likely to be trapped at the issue of input materials, because they cannot sign contracts directly with farmers since the farmers prefer to sell paddy/rice to collectors (Nguyen and Bach, 2012, p. 66). According to a survey of 100 farmers in An Giang, Bac Lieu and Soc Trang provinces by Vo, Le and Nguyen (2015, p. 129), 76.5 per cent of farmers did not have the means to transport their products, whereas collectors were able to come to their homes or their fields after harvesting, so that farmers would not have to bear the cost of transporting and drying. This is particularly beneficial for farmers in remote areas.

In addition, collectors are very flexible in determining the paddy/rice price, the payment method and also the support methods (if necessary). The status of production and consumption in Vietnam's agricultural sector usually fluctuates, so it is difficult to predict the price before the crop season. Therefore, signing contracts that state a fixed price may cause farmers' that large enterprises may breach the contract (ADB, 2007; Rehber, 2007, p. 107). Meanwhile, in cooperating with collectors, prices are determined at the time of trading under the agreement of both parties, which reduces the risk of price volatility. Additionally, collectors pay by cash as soon as they receive the goods. This helps to solve the farmers' problem of lacking capital of farmers. In contrast, due to the complex procedures related to accounting, food enterprises often pay farmers slowly (Tran and Do, 2013, p. 81), and farmers must go to the head office to receive their payments (Ministry of Agriculture and Rural Development, 2008). According to a survey by Vo, Le and Nguyen (2015, p. 129), 92 per cent of farmers said selling rice to collectors is easy due to not having to sign a contract. In addition, collectors have a great experience in evaluating the quality of goods and they have good knowledge of farmers' psychology (Nguyen and Bach, 2012, p. 72). Furthermore, some collectors are willing to make a deposit (grants) to farmers to cover the cultivation and harvesting costs, or to buy the less quality products in case of force majeure, whereas, firms usually strictly adhere to the written contract. Thus, it can be said that collectors share the risks with farmers.

In short, contract farming provided by firms sometimes cannot compete with the interests and convenient services that collectors bring to farmers (Roberts and Khiem, 2005), which means that farmers prefer to choose collectors as their partners. However, the above advantages in the transaction are not enough for most farmers to cooperate with collectors, since companies can overcome these issues to better support farmers. Indeed the source of long-term relationships between farmers and collectors lies in socio-cultural factors.

3.2. Cultural - Social Induction

Cultural influences based on historical and religious differences will lead to a variation in cooperative behaviors. In the Western countries, the rational

instrumentalism separates business and social-emotional concerns (Weber, 1930); in contrast, in countries influenced by Confucianism, especial in Vietnam, it is emphasized that cooperation can be combined with affectionate relationships (Martison, Pham and Palacio, 2012, p. 5 citing on Markus and Kitayama, 1991). Further, an important element in a relationship is that the partners must play symmetric roles in creating value (Brandenburger and Nalebuff, 2011, p. 21). Hence, farmers and collectors can trade on the basis of promises because they interact in inherent social relationships and they are equal in cooperation.

Usually, collectors and farmers have some sort of relationships, such as locality/ dialect, kinship, friendship, acquaintances, or membership in a business association/social club. This is in direct contrast with the relationship between enterprises and farmers, which only see each other as producers or buyers, respectively. The Vietnamese people value personal relationships, which they see as fundamental to supporting a good business. Therefore, farmers feel more familiar and safe in coordinating with collectors. These relationships lead to an initial trust, which supports the decision for farmers to partner with collectors. A close relationship between the two parties allows them to do business without a written contract, which is likely to lead to transaction flexibility, consisting of sympathy for the partner's troubles. For instance, if unfavorable weather conditions mean that the quality of paddy/rice does not meet the standard requirements, the collectors may still be able to buy products but at a lower price. On the other hand, since collectors' activities are affected by milling and food companies, if companies pay late, they may also be in a money shortage and may not be able to pay farmers all at once. In this case, farmers can allow late payments. This is in complete contrast to a written contract with an enterprise that fulfills the principles of the firm but does not offer sympathy to farmers.

The relationship between farmers and collectors is a horizontal relationship with equal cooperation, while farmers and firms are in a vertical relationship.[5] In terms of social status, Vietnamese collectors are farmers doing individual small-scale business per se, they collaborate with farmers, small-scale producers, to share risks and benefits together. Meanwhile, representatives of Vietnamese enterprises, directors or chairmen of the management groups, generally have high positions in society and are powerful. Cooperating with an enterprise means that farmers must deal with an aggregation of employees and a board of directors. Regarding the amount of capital, a collector may have higher financing capacity than a farmer, but this is not significant compared to the assets of a firm. Additionally, there is no legal obligation between farmers and collectors due to their oral engagements, thus, farmers may feel free to negotiate with their partners to get maximal benefits for both parties. In contrast, contracts with enterprises are legally bindings, which

[5]Explained by Granovetter (2000, p.p.2, 3), "horizontal relationships may involve trust and cooperation, and vertical relationships contain power and compliance".

sometimes hurts farmers since farmers lack bargaining power (Rehber, 2007, p.104), resulting in opportunistic behaviors by enterprises (Cook, Hardin and Levi, 2005, p.40).

As trust is the foundation for cooperation (Walker and Ostrom, 2009, p.117), once credibility has been established, both sides need to enhance trust by reciprocity activities. For the Vietnamese people, such interactions between two individuals may simply involve gossip, not only about business cooperation, but also about health and life status, sharing private meals or making informal visits (Meyer, Tran and Nguyen, 2006). In addition to having familiarity and equality, these simplistic interactions can strengthen relationships between farmers and collectors. As a result, collectors understand what farmers need and desire, and vice versa. These interactions have positive effects on the business of both parties.[6] Meanwhile, due to power inequalities, there is almost no interaction between the farmers and firms, which leads to weak business links.

3.3. Reputation Mechanism

After a period of trading, the trust between farmers and collectors may be consolidated or destroyed, depending on the level of reciprocity of both sides. The collaboration between collectors and farmers is a repeated cooperation until someone betrays the other. Once the trust has been established, its maintenance depends on the success of the business and the reliability of both parties. As mentioned in section 2, the deal between collectors and farmers is not based on legal constraints and may lead to opportunistic behaviour. However, the Vietnam rice business cycle is so small that everyone seems to know each other, leading to the existence of a social net. If a collector abuses the trust, he or she may gain something during the period of deviation, but will destroy potential collusion in later periods (Tirole, 1988, p.246). In addition, in an iterated cooperation, both sides tend to reciprocate with positive reciprocity to the other (Cesarini and Others, 2008, p.3721) due to the effect of tit-for-tat. The collectors understand that betrayal at any time is disadvantageous (Lahno, 1995, p.p.500-505), because no one wants to cooperate with the cheaters. Therefore, keeping farmers' trust is crucial to the survival of collectors, so that they have an incentive to be faithful and maintain their credibility.

Furthermore, a collector and a farmer can establish long-term trust and emotional attachment after some successful transactions (Collet, 2003, p.3). Although economic transactions do not eliminate profit considerations, however, once existing the cohesion, a good familiar collector is always the first choice for the farmer. In fact, even if there is competition among collectors in one area, and each

[6] Gächter (2006, p.2) argued that people are "conditionally cooperative", if they believe someone does not betray, they will cooperate.

collector can make attractive offers to farmers, such as equipment rental or making loans to engage in cooperation. For farmers choosing a new partner may be risky because they do not know their level of credibility. Thus, instead of taking time to consider a new partner, the farmer will likely still predominantly chooses to cooperate with his former partner. Due to the reputation built on their previous cooperation, the current collectors are likely to be trusted in the future. Furthermore, this relationship can be widened if the farmer helps the collector to build a coalition of partners through the farmer's connections, which is a great benefit to the collector. Thus, reliability and trustworthiness guarantee a higher payoff in the long - run for collectors.

4. Conclusion

More than 15 years after the implementation of Decision 80 by the Prime Minister to encourage the consumption of agriproducts through contracts, the proportion of contract farming between farmers and enterprises is very modest due to the lack of trust and risk sharing among stakeholders. As a result, most of the paddy/rice is distributed through collectors before making its way to firms. With advantages in logistics and payment methods, collectors are the important link between producers and buyers. Additionally, based on their social connections, collectors know what farmers need and then build trust to achieve long-term cooperations. In reality, the collectors are the intermediary, acquiring information about the production status of farmers and enterprises, so that they act to connect the two actors. Due to the weak link between farmers and firms, collectors are an indispensable force in the rice supply chain in Vietnam.

However, the role of collectors has not been recognized due at least in part to some negative cultural attitudes toward small-scale traders. Recently, collectors have been doing spontaneous business beyond the legal framework, i.e. they can participate in and withdraw from the market without oversight by the government. This leads to collectors potentially engaging in illegal behaviours, including tax evasion and fraud in food safety, which harms the reputation of Vietnamese rice. Therefore, I suggest that collectors need to be acknowledged for their essential role in Vietnam rice production and be forced to register their business. From there, the government can reorganise the collectors to help them access to the government's economic and market management support and policies and to ensure the efficiency of the rice supply chain in Vietnam.

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THE ROLE OF E-LEARNING IN SUSTAINABLE BUSINESS: A CASE STUDY IN VIETNAMESE SMEs

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Abstract

Small and medium-sized enterprises (SMEs) play an important role in Viet Nam, especially in the Vietnamese economy. In Viet Nam, a developing country, the process of globalization brings many chances for businesses. However, many Vietnamese companies, especially more than 97% of SMEs are facing to some challenges such as the competitiveness of SMEs in the market, the lack of information technology, the challenge of shortage of high-quality human resources, employee management, and sustainable business. With the dramatically developing of multimedia and networking, it creates a new environment to meet the requirement for human learning's needs. The new and innovative method of getting education everywhere and every time is E-learning. E-learning can offer potential benefits in learning, make high–quality and cost-effective in training for many people; therefore, it can help SMEs achieve their sustainable business goals. E-system concerns with the instructors, learners, workers and employers who use the laptops or computers to surf the websites to facilitate and update their work. The primary advantages of e-learning consist of learning anytime and anywhere by accessing the Internet, cost reductions, flexibility and more effectiveness. In order to explore the role of e-learning in sustainable business as a novel way of boosting the development in Vietnamese SMEs, this paper first summarizes key concepts in the field of e-learning, sustainable business, Vietnamese SMEs. Then, go on to describe the impact of e-learning in sustainable business, and its particular relevance in SMEs. Finally, we investigate the practice e-learning in Vietnamese SMEs and gives some recommendations to help Vietnamese SMEs get success in applying e-learning in their sustainable business objectives.

Keywords: E-learning, Impact of e-Learning, Vietnamese SMEs, Sustainable Business, SMEs.

JEL Classification: O12, M15, D00, I25

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1. Introduction

E-learning may be a great potential technology in developing countries for speeding up the education development. In fact, Vietnam is at the first rank within the top ten countries in the world in high-growth in e-learning revenues over the following few years (2011-2016), Vietnam projected growth rate in e-learning of 44.3% (Adkins, 2013; Maria, Carmelo, Taniar, Apduhan, & Hutchison, 2014). Moreover, e-learning is not just an alternative method of delivering information as a resource for learning but it can help people teach and learn at any time and in any place (Slevin, 2008). This article, the authors described the role of e-learning in sustaiable business in Vietnamese SMEs. Moreover, the researchers figured out the recommendations to help SMEs approach their goals effectively by applying e-learning in their business.

2. Theorical Background

2.1. E-learning

Nowadays, with the boosting of information technology, it creates a new environment for delivering information, sharing knowledge, connecting people, and the like. Moreover, it is a new potential tool to meet the need for human learning. One of the most innovation technology ways of transmitting education resources all over the world is through e-learning (Tao et al., 2006). E-learning is related to online studying such as distance learning, network learning, Internet learning, virtual learning, computer-based learning and web- based learning (Ally., 2004). Moreover, e-learning may become a greater potential source of online learning in developing countries than does it in developed countries because of the urgent need of education to stimulate the development (Kwofie, Benjamin; Henten, 2011). It is the best way to build up the knowledge for the users not only for schools and universities but also for the companies, organizations or working places in comparing to the traditional teaching method. Firstly, e-learning offers a various forms of information including sounds, videos, texts and the like. Secondly, it creates a storage place over a long period of time and enables the access from a long distance. Thirdly, e-learning can make employers delighted about a greater degree of flexibility in the way work or any learning tasks is organized /delivered. Furthermore, e-system offlers a lot of advantages for the users and the managers such as centralized data storage, benefits for teachers and students or instructors and employees and so on (Costinela -Lumini & Nicoleta -Magdalena student, 2012). Firstly, it stores many valuable materials (ebooks, videos, texts, images, etc.) in a website, as a result, it makes the users connect directly and use them easier. For instance, people can use their multi-media devices such as laptops, computers, mobile, ipad with the high speed of internet connection, they can surf the website and take the resources fast

and simply. Secondly, regarding online materials, the students or the employees can learn the course from anywhere at any time. Thirdly, all resources of E-learning are located in one place in a website, therefore, the network administrator can control the flow of data from inside and outside facilely instead of monitoring a huge of users' computer in a school or a company. In addition, e-learning can make employers delighted about a greater degree of flexibility in the way work or any learning tasks is organized /delivered (Oye, D Mazleena, S. Noorminshah, 2012), (Pocatilu & Alecu). In short, workers can apply their knowledge from training to daily work more effectively. Employers and employees also can perceive that e-learning is the best choice to narrow the gap between home-based business and office work, or between at the office work and learning.

2.2. Vietnamese SMEs

Small and medium-sized enterprises play a vital role in Viet Nam, especially in the Vietnamese economy. Viet Nam is a developing country and is approaching the process of globalization as well as other countries in the same region. Hence, it brings many chances for big firms and SMEs. However, many Vietnamese companies, especially more than 97% of SMEs (table 1) are fighting against to some challenges such as the competitiveness of SMEs in the market, the inadequacy of information technology, the challenge of shortage of high-quality human resources, employee management, and sustainable business.

Table 1. SME Conditions in East and Southeast Asia in 2012 (Source: Asian Development Bank (Warr, Menon, & Yusuf, 2009)

	Number of Enterprises (% of total)	**Number of Employees (% of total)**	**Contribution to GDP (%)**
East Asia			
Japan	99,7	69,4	47,7
Korea	99,9	87,7	47,6
China	99	75	58,5
Southeast Asia			
Brunei	98,4	58	22
Cambodia	98,5	-	85
Indonesia	99,9	97	56,5
Lao PDR	99,8	83	6 to 9
Malaysia	99,2	59	31,9
Myanmar	92	-	-
Philippines	99,6	63,2	35,7
Singapore	99,4	62,3	46,3
Thailand	99,8	78,2	36,7
Vietnam	97,4	77,3	26

With the boosting of multimedia and networking, it offers a new environment to meet the requirement for customer's needs. The best method of gaining

knowledge everywhere and every time is E-learning. E-learning can offer potential benefits in training employees and approaching new technology for workers; therefore, it can also help SMEs achieve their sustainable business goals quickly. E-learning is related to the instructors, employers, workers and learners or employees who use the laptops or computers to surf the websites to learn or work online. The primary advantages of e-learning consist of learning anytime and any where by accessing to the Internet, flexibility and more effectiveness. In briefly, due to the quick shift in many kinds of working places, employees need to improve and upgrade their information technology's skills in working with new high-tech equipment to meet the developping of globalization's process in Vietnam in specific and in the world in general. E-learning is the best choice not only for big firms or organizations but also for SMEs in improving the workers 'skills and their capacity.

2.3. Sustainable Business

The concept of sustainability has been considered from variety of perspectives and contexts in which the term sustainability is used, such as philosophical, historical, economic, political, social, and cultural perspectives (Becker, Jahn, & Stieß). However, the concept of sustainability is closely associated with environmental science, and often described as the "goals or endpoints of a process called 'sustainable development'" (Diesendorf, 2000). Regarding (Brundtland, 1987), sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The new 17 global goals for sustainable development that adopted by 193 countries at UN at September 2015 provide the roadmap that will help the wold achieve substainable development. In the same contexts, the concept of substainable business, or corporate substainability also varies depending on the field and has strong social component. For example: In agribusiness, substainable business can encompass concepts such as organic farming, urban horticulture and permaculture; In manufacturing, sustainability efforts may include waste elimination, greenhouse gas reduction, finding the most efficient and profitable use of existing resources (such as oil, gas, ores and forests) and creating energy-efficient infrastructures; In retail, sustainability experts often focus on the supply chain, evaluating ways to minimize waste in packaging, facilitate energy use in stores, transport goods in more eco-friendly ways and recycle old products. Substainable business requires firms to adhere to the principles of sustainable development and it often defined as managing the triple bottom line - a process by which companies manage their financial, social and environmental risks, obligations and opportunities. These three impacts are sometimes referred to as profits, people and planet. Therefore, sustainable business is the management and coordination of environmental, social and financial demands and concerns to ensure responsible, ethical and ongoing success. It can be said that substainale

business is an enterprise that has minimal negative impact on the global or local environment, community, society, or economy. The sustainable business perspective takes into account not only profits and returns on investment but also how business operations affect the environment, natural resources, and future generations. Sustainability at the business level can be thought of as taking steps, such as recycling and conserving nonrenewable material and energy use to reduce the negative impact of a business's operations on the environment. While managing operations to reduce negative environmental impact is an important part of business sustainability, these types of activities are increasingly part of a deeper strategic perspective on sustainability for businesses.

3. Impact of E-learning in Sustainable Business

E-learning creates a virtual environment to deliver knowledge via electronic information. This method narrows the gap between work and learning (Oye, D Mazleena, S. Noorminshah, 2012), (Nguyen, Zoltán, & Binh, 2016). In fact, employees can combine their learned-knowledge from the training period into work more efficiently because they can use the same technology for work and learning. Regarding virtual environment learning, e-learning helps workers decrease the distance between workplace and home through updating information online and learn new things immediately. In particular, with the booming of information technology, people can cut down the travel expenses, time-consuming and extend chances for learners to learn outside institutions, transforming conventional views on education (Collins & Halverson, 2010). Conventional teaching method requires people move to and from the training place several times during a week (Oye, D Mazleena, S. Noorminshah, 2012). For example, workers can concentrate on the knowledge that they really want to learn via multi-devices as smart phones or tablets, thus, helping them to take online courses whenever or wherever they need. Moreover, the employers can create, upload, and share online course during a few hours with their workers. Furthermore, e-learning system can reduce the cost for both workers and employers (Sajjad Hashemi), (Kwofie, Benjamin; Henten, 2011). There are many various learning products and packages as computer based training materials or online learning management system. The employees can choose some products or packages which are suitable with their money. Otherwise, it is also easy for the implementers when the company wants to recruite workers because the human resource division must train the employees to know what they can work with the applications. This procedure is duplicated many times in a year and it also takes a lot of time and money for the firm. In another hand, the companies do not need to invest high initial in deploying each machine for the workers' data storage regarding e-learning system.

4. E-learning in Vietnamese SMEs

Regarding the hypothesis, type of variables, the purpose of testing, type of data, etc., the authors selected appropriate methodology for testing. This hypothesis was tested with 0,05 level of significance and was done by SPSS. The hypothesis is tested and evaluated specific results which is presented below [table 2].

a. The requirement of e-learning for workers and employers in SMEs in Vietnam By the Chi- Square test (Howell, 2000), our results are described as below**:**

H1: the requirement for studying in e-learning does not rely upon working status not only for full time workers but also for part-time workers.

- ✓ **H_0:** The requirement for studying e-learning does not rely upon working status (full time or part-time)
- ✓ **H_A:** The requirement for studying e-learning rely upon working status (full time or part-time)

Table 2: Chi-Square test for **H1** (source: own data)

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	3.856[a]	3	.277
Likelihood Ratio	3.932	3	.269
Linear-by-Linear Association	.144	1	.705
N of Valid Cases	152		

From the [table 2], the authors can observe that Chi-Square = 3,856 and its corresponding P value is 27,7% > 5%, we accept hypothesis **H_0**: the requiremnet for studying e-learning does not rely upon working status and we reject **H_A**. 54% full-time workers believed that they need e-learning during their training time and 59% part-time employees and employers shared similar views.

5. Conclusion

E-learning is the best way which far outweighs the conventional teaching method. Internet-based training can facilitate learners and instructors or workers and employers in working environment. Moreover, e-learning is a vital and useful tool not only for the employers or managers to train workers but also for workers to learn new technologies in diffent ways. In this research, we recognized that Vietnamese workers extremely need e-learning not only for their full-time working but also for part-time workers during their training program. Moreover, online materials are quite valuable for their own learning regarding their training status. The authors belive that e-learning will become more popular and effective in the future in order to make profit for company and contribute to sustainable development not only for SMEs but also for big organizations.

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DISRUPTIVE INNOVATION: AN APPROACH FROM BUSINESS MODEL FOR THE LATIN AMERICAN CONTEXT

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Abstract

The importance of disruptive innovation in the business context, is essential to go deeper into the application of the concept in Latin America, based on the worldwide learned lessons. The purpose of this conference paper is to propose disruptive innovation as a driver to address the challenges in organizations of the region regarding the limited investment in Research and Development (R & D) activities, weakness in the identification of opportunities offered by existing technologies, the difficulty in opening up new markets and rigid business models. Disruptive innovation —understood as a type of innovation based on the impact on the market rather than on the technological trajectory— is addressed through an analytical-descriptive approach due that the secondary information obtained helps to establish the application and relevance of the concept in the emerging practices of the Latin American context. The review of the literature —from the first definition made by Christensen in 1997 to the recent authors— through a bibliometric study —in which the volume of academic production, its main exponents, fundamentals and characteristics were analyzed— is done to establish how disruptive innovation can help to meet the challenges previously described. The three stages of the documentary research process were adopted (Montemayor, 2002) and the methodological tools were qualitative in order to determine: 1. The attributes of disruptive innovation, 2. The particularities of Latin American countries and 3. The articulation of the two previous components to face the challenges of the region. Based on the findings, new designs of business models with disruptive potential are proposed, based on the identification of opportunities in marginal markets, that add value in product creation using technologies that are more economical, simpler and accessible as a mechanism to improve the innovative activity of organizations in the region.

Keywords: Disruptive İnnovation, Disruptive Technology, Business Model, İnnovation in Latin America, Disruptive İnnovation in Emerging Countries.
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1. Introduction

Innovation is one of the pillars that affects the competitiveness of countries. According to Schumpeter, the immaterial factors of which innovation forms part, are economic development forces that have a decisive and dynamic impact, and that is how Montoya (2004) shape it in the production equation proposed by him. Consequently, innovation is a fundamental resource of economic growth, industrial change and competitive advantage of organizations. (Damanpour, Walker & Avellaneda, 2009). For the UK's science and innovation office, innovation is "the engine of modern economics, turning ideas and knowledge into products and services." In an economy where companies seek to generate growth and sustainability, it is imperative for companies to move towards innovation, because they run the risk of being left behind by others that lead to changes in their offerings, operational processes or business models (Joe & Bessant, 2009).

Disruptive innovation was a strategic mechanism used by Japan for its economic development after World War II. Companies such as Nippon, Steel, Toyota, Sony and Canon offered to the market products with lower initial performance, thus capturing a marginalized market. As these products were improving, these companies succeeded in establishing themselves within main markets and displacing dominant firms (Markides, 2012). In the 1950s, Honda started selling motorized bicycles to small distributors in war-torn cities (WWII) and they were being rebuilt, the company developed a business model in which it generated revenues by offering products to really low prices.

When Honda entered the American market with the Supercub, the simplicity of the product and the low cost led to low-income people who had not had access to the products —because of their costs— to have access to them, which consequently, allowed to obtain a competitive advantage since the established companies were not interested in that emerging market by the low profit margins. On the other hand, Toyota and Sony followed the same path that led to successes, focusing on markets neglected by companies established by the low appeal in terms of revenue and profitability. Christensen and Hart (2002) mention that companies that sustained this disruptive strategy were the engine of economic development in the decades of the 60's to 80's and that precisely changing in national policies has led to this type of innovations not occurring and lagging behind these economies (Christensen, 1997; Christensen & Hart, 2002; Christensen & Raynor, 2003; Markides, 2012).

On the other hand, there is a wide literature that has addressed disruptive innovation in the context of emerging markets, however, it has been focused mainly in countries as China and India (Hang et al., 2010; Johnson, Christensen, & Kagermann, 2008; Williamson, & Yin, 2015); for Latin American countries there is little literature as reaffirmed by Nogami & Veloso (2017) who took Brazil as the reference country and found that there is a gap in literature for the region.

All these aspects led this research to propose disruptive innovation as a mechanism to address the challenges in organizations in the region regarding the limited investment in Research and Development (R & D) activities, weakness in the identification of opportunities offered by existing technologies, the difficulty in opening up new markets and rigid business models. The study is approached from an analytical-descriptive perspective due that through secondary information can be established the application and relevance of the concept in the nascent practices of the Latin American context. Initially with a conceptual review of the term and the process of disruptive innovation. Additionally, the characteristics are determined from the literature consulted and consequently the characteristics of the disruptive innovation are contrasted against the particularities and remains of innovation of the organizations in the Latin American contex which leads to propose considerations its applicability from a business model approach.

To fulfill this, three stages of the documentary research process were adopted (Montemayor, 2002) and the methodological tools were qualitative to determine: 1. Theoretical review that approaches conceptual approaches to the definition of disruptive innovation, as well as its process and characteristics-attributes of disruptive innovation-, 2. The particularities of Latin American countries and 3. The articulation of the two previous components from a business model approach to face the challenges faced by organizations in the region.

In 1997 appears the theory of disruptive innovation[1], as a strategic practice and important way for the expansion and development of new markets, which has created a significant impact on management by opening up the debate within academia (Yu & Hang, 2010). It generates growth in industries where it penetrates or completely creates new industries through the introduction of products or services that, due to their simplicity, offer a basic, convenient, differentially

The term disruptive ―which is related to the word disruption― is commonly used within the literature to express an abrupt change. According to the Royal Spanish Academic, the disruption comes from the english *disruption*, which in turn has roots of the Latin disruptio, and that means abrupt rupture or interruption. The term has been used to describe the impact of an innovation from a technological change perspective and has been related to the terms: discontinuous, radical and destructive of competences among others. Brenner and Christensen (1995) use the term to refer to disruptive technologies and subsequently Christensen and Raynor (2003) extend it to disruptive innovations, Christensen (2006) clarifies "The disruptive term has many connotations in the English language as "failure" and "radical", in addition to the phenomenon to which I applied it. I fear that is why we see post hoc definitions by the uninformed" (P.42); Christensen, Raynor and Mcdonald (2015) remarked, "There is another worrying concern: in our experience, too many people who speak of "disruption" have not read a serious book or article on the subject, often use the term loosely for many researchers, writers, and consultants use "disruptive innovation" to describe any situation in which an industry is shaken and successful established businesses stumble, which is why its use is too much broad. "(P.46). so that, although the term disruption is synonymous with abrupt rupture or interruption, it depends on the perspective from which it is analyzed, and the disruption under the context of disruptive innovation refers to the change of the dynamics of a market; that is, how new companies can displace those established and how new technologies change the attributes most valued by customers.

economic performance, transforming the market dynamics (Gemici & Alpkan, 2015; Kostoff, Boylan , & Simons, 2004).

Disruptive innovation has been defined from different perspectives. For Lettice & Thomond (2002) disruptive innovation is "a successfully exploited product, service or business model that significantly transforms the demand and needs of an existing market and excludes previous players" (p.4). Danneels (2004) addresses disruptive innovation from the market perspective by stating "it is a technology that changes the basis of competition by changing the performance metrics under which firms compete" (p.249). On the other hand, Nagy, Schuessler, & Dubinsky (2016) made an approach from the technological perspective, realizing a reconfiguration of characteristic aspects of the disruptive innovation and define it as: "An innovation that changes the metrics of performance, or the expectations of the consumers, of a market by providing radically new functionality, discontinuous technical standards or new forms of ownership "(p.122). In this context, Christensen (2006) emphasizes that disruptive innovation must be understood as a process and not as a product or service in a given point; therefore, it is difficult to determine at what point an innovation becomes disruptive.

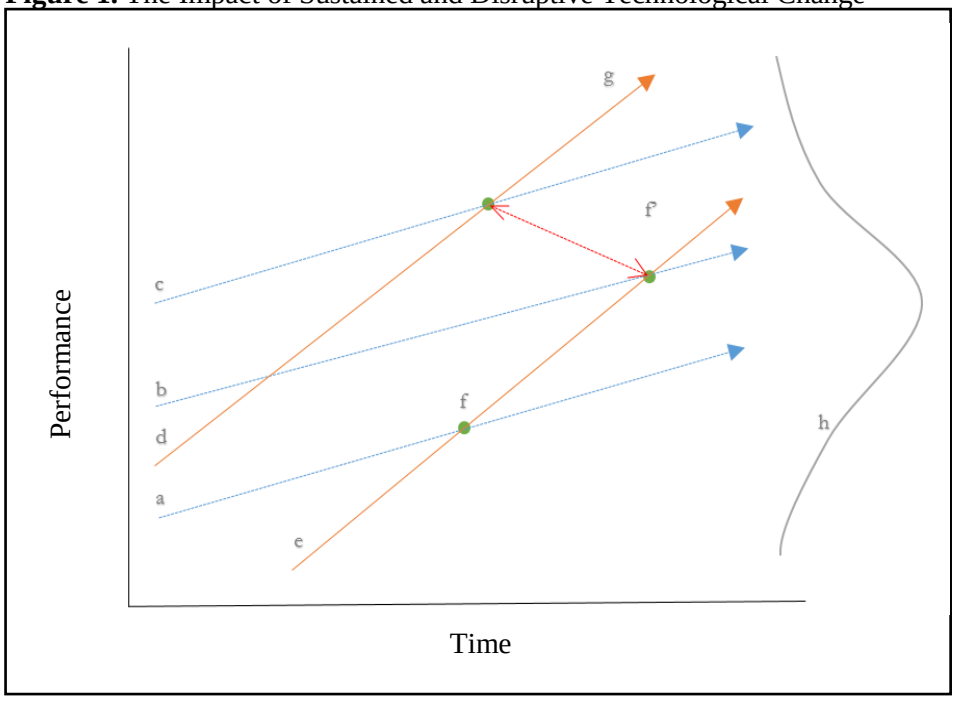
2. Disruptive Innovation Process

Christensen (1997) explains this process in Figure 1, which contrasts what he calls product performance trajectory (d and e) —as products improve over time— with customer demand trajectories (a, b and c); that is, willingness of customers to pay for performance. Initially disruptive innovations do not satisfy the performance of the main demand market, which is why consumers in this market consider them unnecessary. However, over time and as an iterative process, disruptive innovation improves performance attributes in such a way that it meets the demands of the established market (f and f '). —It satisfies the low market and the main market—. At the same time, the established innovation trajectory maintains *sustained innovations* in order to meet the needs of high-level (g) —most profitable customers— that exceed the absorption capacity of low-level customers and main customers, reducing their marginal utility, which is reflected in the provision of payment for the dominant innovation (Adner, 2002, Danneels, 2004). Because of this, customers are influenced to the performance offered by disruptive innovation (Adner, 2002, Danneels, 2004, Yu & Hang, 2010).

Disruptive innovation assumes that the performance levels demanded by customers within an existing market segment are normally distributed between the low-end and high-end (h) customer extremes. Customers in the main market represent the average level of performance demanded. Similarly, Rogers (1983) uses the normal distribution to differentiate between different categories of

adopters, which includes: *innovators, early adopters, early majority, late majority, and laggards.*

Figure 1. The Impact of Sustained and Disruptive Technological Change



Source: Authors' compilation, using information from Christensen (1997)

a. Performance demanded by low-level markets
b. Performance demanded by the established or traditional market
c. Performance demanded by high-level markets
d. Performance trajectory of existing (sustained) innovations
e. Performance trajectory of disruptive innovationf. Point of invasion in low-level markets
f'. Point of invasion in established markets (disruptive innovation is established)
g. Over-performance of existing innovations
h. Normal distribution of customers by performance demanded

3. Characteristics of Disruptive Innovation

Christensen (1997) argues that disruptive innovations tend to be technologically simpler because the components are usually already available but are assembled differently. This leads to a product architecture that is often simpler than previous approaches and states that disruptive technologies bring a very different value proposition to the market than had previously been available. Usually, disruptive technologies offer lower performance than products established in the core market. But on the other hand, have other characteristics that some marginal customers —and generally new ones— value. Products based on disruptive

technologies are generally cheaper, simpler, smaller, and generally more convenient (p. xv).

A fundamental aspect of the disruptive innovation process is that products are valued in markets that were initially neglected or ignored by established firms (Adner, 2002; Christensen, 1997; Christensen & Raynor, 2003; Govindarajan & Kopalle, 2006). To these spaces, Christensen & Raynor (2003) call them marginal markets and are divided into low level and new market. a) *Low Market Level* refers to gaps that are generated due to the attention that the established companies lend to the demanding and more profitable customers offering products and services each time with better performance in the dimensions traditionally valued, and they stop paying attention to the less demanding customers. This creates a vacuum that is addressed by disruptors focused on providing "good enough" products and services to these ignored consumers and customers. b) *New Market*: Disruptors create new markets in a way that turns non-consumers into consumers. Christensen & Raynor (2003) claim that a disruption of the new market is: "an innovation that allows a larger population that previously lacked money or skill, now start buying and using a product and doing things themselves" (p.102).

Table 1 collects some characteristics found within the consulted literature, in which aspects that converge from the different positions arise and which are testable with the conditions in Latin American countries. Disruptive innovations initially serve marginal markets, have attributes lower than those valued in the main market, offer different attributes (simpler, cheaper, more convenient).

Table 1. Characteristics of Disruptive Innovation

Christensen (1997)	I. Disruptive technologies are generally simpler, cheaper and more convenient II. Disruptive technologies emerge in low-level segments of the market. In general, they are ignored by established companies. Disruptive technology improves performance to meet the needs of the main market.
Thomond & Lettice (2002)	I. Start its success by addressing the unmet needs of an emerging or niche market. II. Its set of performance attributes, highly rated by niche market customers, are not initially appreciated by major markets. Customers in the main market, as well as competitors, value different sets of performance attributes and, therefore, see innovation as deficient. III. The adoption of niche markets allows investment in the product, service or business model to increase its performance. Then you can create or enter new market niches and expand the number of clients. IV. Knowledge of the product, service or business model is increased, forcing and influencing the change in the perception of the main markets of what it values. V. The change in the perception of the dominant market of what it values is the catalyst that allows innovation to interrupt and replace existing products, services or business models.
Adner (2002)	I. The technologies of the established companies are displaced from the main market by technologies that have inferior performance in the dimensions that the main clients value II. The main clients are willing to acquire the disruptive technologies even though they offer inferior performance in main attributes III. Established companies do not react on time.
Christensen y Rayror (2003)	Disruptions "*low end*" directed to the low level of an existing value network, new market disruptions, which create a new value network.
Tellis (2006)	I. Disruptive technologies initially have inferior performance (with respect to established ones) II. It offers features that marginal customers value (cheaper, simpler, smaller or more convenient) III. Established companies reject disruptive technologies IV. They are initially marketed in emerging and insignificant markets (seen from the main market) V. Disruptive technologies improve continuously until reaching the main market VI. Disruptive technologies replace existing ones VII. The established companies are displaced from the main market.
Govindarajan & Kopalle (2006)	I. Innovation has a lower performance on the attributes that traditional customers value II. The new features or attributes offered by the innovation are not valued by the main clients III. Innovations are usually simpler, cheaper and are offered at a lower price than existing IV products. At the time of its introduction, innovation attracts low-level and price-sensitive customer segments, which limits the potential for profitability of established companies and V. Over time, development improves the performance of innovation in the attributes that the main customers value attracting these customers more and more.
King & Baatartogtokh (2014)	I. Established companies advance on a trajectory of sustained innovation II. These innovations generated by established companies exceed the needs of clients III. Established companies fail to face disruptive innovations.
Nagy, Schuessler, & Dubinsky (2016)	I. Technical standards II. Functionality III. Property

Source: Prepared by the authors

4. Latin American Context

Low-income countries or regions have been referred to as emerging economies, developing countries, BoP markets or the Pyramid Base. Data from the World Bank show that about 3 billion people lived in 2003 with incomes below $ 2 dollars per day (Word Economic Forum, 2009). Consequently, the Economic Commission for Latin America and the Caribbean (ECLAC, 2005) points out that in the context of Latin America - which has a population of approximately 597 million inhabitants-,and in the Caribean only 3 of the 33 countries in the region have high income, while the rest, they are predominantly middle-income according to per capita income. Consequently, the Human Development Report (2015), which uses the Gini index to determine country inequality placed the countries as follows: Haiti (0.608), Colombia (0.535), Paraguay (0.517), Brazil (0.515), Panama (0.507), Honduras (0.506), Chile (0.505), Guatemala (0.487) and Costa Rica (0.485) among the 20 countries of the world.

This gap in income distribution limits the purchasing power of people, who sometimes do not meet their basic needs such as food, education and health with existing products or services (Silva, Parente, & Kato, 2009). Disruptive innovation is presented as an opportunity for organizations to meet these potential markets -population that has large unsatisfied basic needs because existing products offer an oversupply of performance or the price is hardly accessible for this population-.

On the other hand, Latin America's innovative activity in countries such as Mexico, Colombia, Brazil, Argentina and Chile lags behind other regions, including conditions such as low investment in R & D, product undifferentiation, limitation in the opening of new markets and lack of sophistication in business models. Placing Colombia as a reference, the problem is centered on the low innovative activity in the productive apparatus in which the percentage of companies in the manufacturing sector and services classified as non-innovative was 60% for the period 2009-2010, a percentage that increased to 73.6% in the period 2011-2012 for the manufacturing sector and 71% in the services sector for the period 2012-2013 (National Council of Economic and Social Policy of Colombia, 2016).

Therefore, organizations in Latin America to improve aspects of innovation - as a process and as a result - that are reflected in competitiveness have as challenges: 1. Identify technological and market opportunities - considering the low investment in R & D- 2. Develop products and services designed for people with low purchasing power and limited access to existing products; 3. Design business model architectures that generate greater customer value - taking into account the limitations of income, access and and 4. Create, configure, and reconfigure competencies and resources to adapt to changing environments.

According to the characterization of disruptive innovation, its relevance is stablished to organizations in Latin America from two perspectives: *market* and *organization*. From the *market perspective*: 1. Disruptive innovation addresses marginal markets; that is to say, it arises in contexts where low incomes predominate, existing products have an oversupply of performance or do not have access to these are limited-difficult in the access to the product or service by supply by centralized location or by logistics and infrastructure- 2 It offers features that marginal customers value; that is, they are usually simpler, cheaper and more convenient. From the *Organizational perspective*, the relevance of disruptive innovation is proposed as follows: 1. Products with disruptive potential are usually based on new combinations of existing technologies and 2. Disruptive business model design allow revenue generation at discount prices (Christensen, Johnson, & Rigby, 2008; Christensen, 1997; Christensen & Hart, 2002; Govindarajan & Kopalle, 2006; Hang et al., 2010 and Tellis, 2006). Forged business models in low-income markets can be applied in more places profitably than business models designed in and for high-income markets. On the other hand, developed country markets in different contexts are saturated while markets such as Latin America present an opportunity to compete against non-consumption; that is, offering a product or service to people who do not have access to existing products and are happy to be able to access simpler products and more modest versions of what the advanced markets offer (Christensen & Hart, 2002, Hang, Chen, & Subramian, 2010; Markides, 2012; Nogami & Veloso, 2017).

5. Business Models in Organizations Adapted to the Context of Latin America

Disruptive innovation does not constitute a rupture within the technological trajectory as it could be a radical innovation; in general, arises from existing technologies in new combinations or uses and are not inherently disruptive or sustained (Christensen, 1997). Although many technologies are developed in large R & D laboratories, companies do not always find the technologies they develop useful because they do not identify a clear market within the established business model (Chesbrough & Rosenbloom, 2002; Christensen, 1997). However, these technologies that are rejected because they do not fit into the business model are taken advantage of by companies entering alternative uses in a different value network. So the disruption does not come from the technology itself but in the way it comes, it generates value for the customer.

Having a differentiated "strategic architecture" -difficult to imitate- and at the same time effective and efficient reflected in a company's business model is a basic aspect of an organization's competitiveness (Chesbrough & Rosenbloom, 2002, Johnson, Christensen & Kagermann, 2008, Teece, 2012, Teece, 2007). The business model does not discover new products or services, its importance lies in that it defines how to deliver value from these to customers. A product with high

disruptive potential will not necessarily succeed if it is not interrelated on how it delivers value to customers; as Chesbrough points out (2010) "a mediocre technology integrated into a large business model can be more valuable than a technology exploited through a mediocre business model" (p.354). For example, AirBnB was not a pioneer in offering commercial air transport service, but defined a new way of delivering the service and make it accessible to a group of people who previously had not been able to take advantage of this service, while Amazon did not discover the sale of books, but redefined how to deliver it to the customer through a different value proposition. Success requires that business models be shrewdly crafted; otherwise, technological innovation will not result in commercial success for the innovative company.

According to Johnson, Christensen & Kagermann (2008), the business model "consists of the gear of 4 elements that, taken together, create and deliver value" (p.60). Christensen & Raynor (2003) mention that the needs are identified through work that needs to be done. The 4 elements that cause disruption from a new business model which - initially - must establish what is called the value proposition of the client. This requires the definition of what product, technology, and service will be offered and how the consumer or customer will use it; that is, how the company helps to solve a problem or to meet a need by offering new and better solutions at a reduced cost - doing better work at a more appropriate price. This occurs when the consumer or customer feels that the satisfactors offered by the market do not fully meet the need or exist non-consumers. It is in this part where the architecture of the product or service is paramount since it defines the implicit characteristics to access such customers, in which it must be taken into account that the products or services offered, although they have a lower performance, are good enough to be valued by the consumer in the dimension that values, the main market. In addition, they offer value in another dimension that the main market has not usually valued.

Table 1. Elements of a Business Model Applied to a Nano Vehicle

Elements of a business model	**Ratan Tata —Tata Group—**
The context takes place in Mumbai, India. Large number of motorcycles cross dangerously with vehicles on the tracks that transport complete families -the two parents and several of their children-	
Customer Value Proposición (CVP) - involves helping clients to do important work for them; that is, how precise is the solution offered to the client to get his job.	This organization detected a critical job to be done: to provide a safer alternative for families that are transported through motorcycles - an affordable, safer, and weather-proof motorcycle. This value proposition to the client had the potential to reach 10 million people who were not part of the vehicle market.
Developing a benefit formula - profit formula- means defining how the organization creates value for itself while creating value for the client	They decide to break the barrier of wealth by lowering the price of the vehicle to bid at $ 2,500 USD - less than half of what the cheapest vehicle on the market costs. The profit margin would also go down; however, it could be sustainable and increased sales volumes given that its target market was potentially large.
Identify key resources are assets such as people, technologies, products, facilities, equipment marketing and distribution channels and brand.	The organization hired young engineers that reduced the number of pieces that the vehicle needed -minimizing the costs-. Likewise, it reconfigured the strategy of its suppliers by outsourcing nearly 85% of the vehicle's components and employing 60% less of the vendors-reducing transaction costs to improve the economy at scale. Additionally, the company plans to ship modular components of its vehicles and deliver them to a network of assembly plants -whose owners are entrepreneurs-. Nano - the name of the vehicle - will be built, distributed and delivered to customers in a new way, radically improving traffic safety throughout the process.
Identificar procesos clave	

Source: Prepared by the authors using data form Johnson, Christensen & Kagermann (2008)

In addition, it must offer ease of use, the skills required for an optimal use, management or use of the same should be basic in order to reach a larger market, taking into account the characteristics of Latin American countries, price, is decisive within this composition. Products should be differentially more economical than those offered by the main market in such a way as to allow access to a population that previously could not enjoy such satisfac- tors and should finally be accessible, should not be centralized.

6. Identification of Marginal Markets

Identifying whether there is potential for disruption in new market or low-level market dimensions is the basis for progress in developing a disruptive strategy. The disruptive innovation of a new market competes with non-consumption because the products resulting from this innovation have characteristics such as: 1. Usually more affordable, 2. Easy to use, and 3. Lower price. These attributes can open the possibility to a whole new population to begin to appropriate and use the product within a more convenient environment - easy access to the product.

The challenge is to create a new value network in which the objective is not to overcome established companies but to return to non-consumers. To the extent that innovation improves sustained innovation performance-it acquires greater ability to move customers from the original value network to the new one, starting with the least demanding level. Disruptive innovation in a new market does not invade the dominant market. Instead, it displaces customers from the dominant value chain to the new one, starting with the low-level ones, since they are more comfortable using the new product. On the other hand, low level disruptive innovation is rooted within the network of original or dominant value; however, it does not create new markets, it offers low-cost business models (Assink et al., 2006; Christensen & Raynor, 2003; Johnson et al., 2008).

Within this decision-making process and to identify the disruptive potential, Christensen & Raynor (2003) propose a detection premises for both new market and low market. 1. Whether the technology can be developed in such a way that a large population with less skills or with less purchasing power can obtain it and use it in a more convenient context - something that historically was only available to people with more skills and high purchasing power in centralized locations - then there is potential to shape an idea towards new market disruption. 2. Innovations that allow low-level disruption are often improvements that reduce costs and overheads, allowing the company to obtain sufficient returns with lower gross margins supplemented with improvements in manufacturing or management processes that rotate the inventories quicker.

The focus on identifying customer groups that have similar characteristics that lead them to purchase a product or service - a process known as market segmentation - is a key component of marketing. However, predictable marketing requires an understanding of the circumstances in which customers buy or use products or services, "nobody wants a ¼-inch drill ... what everyone wants are holes in the wall of ¼ of inch "Theodore Levitt, quoted by Johnson et al. (2008, page 68). That is to say, "companies should focus their efforts on identifying the circumstances in which customers are to produce products rather than on customers themselves - the unit of analysis is the circumstance not the customer" (Christensen & Raynor , 2003 p.89). For this, observation becomes the most appropriate means to identify the true needs that customers have and are not deductible from the traditional delimitation of market segments - demographic and psychographic aspects. "Akio Morita, founder of Sony, was a master of the art of observing what consumers were trying to accomplish or satisfy, and of combining those reflections with solutions that would help them to do it better" (Christensen & Raynor, 2003: 93). In this aspect, the intuition of the entrepreneur manager plays a fundamental role, because not necessarily following a strict order of segmentation parameterized are able to identify needs and work to perform correctly and can cause what is called marketing myopia (Levitt, 1960).

7. Networks of Value

As mentioned, the products offer no value in isolation. Christensen & Rosenbloom (1995) and later Christensen (1997) affirm that innovations are integrated into networks of value. These networks created around a business determine the role of suppliers, customers and complementary in the capture of value for the marketing of an innovation. The value network increases the supply of complementary products or services from a supply perspective, and can increase the effects of the network among consumers from a demand perspective. The synergy between the value network can catalyze the value of a technology, likewise a weak link within the value network can lead to the failure of the technology to be commercialized.

A market approach is necessary to begin the process in order to know in what technological attributes development should be focused, how to define and configure supply, and how to solve the many trade-offs that may arise within development-attributes valued by the main market vs. new attributes. The management team should establish when a product or service has been oversupplied by a rigorous examination at each market level, to the extent that customers are willing to pay premium prices for improvements in functionality, reliability or convenience of a product or service. As soon as a company can maintain the price by improving one level of these, customers are not over-served and therefore there can be a disruption.

8. Structure of Income and Costs

The business model must establish a clear and accurate revenue and cost architecture; that is, how much the customer will pay for the product or service, and how the value created between the company and the suppliers will be distributed. To create economic value - profitability - the cost structure must be established according to the value promised to the client. In each component decisions must be made for optimization. Care must therefore be taken in structuring the revenues and costs that should be directed towards minimizing costs in order to offer competitive prices, as well as an optimal portfolio policy and high turnover of inventories and assets complements the financial structure of the business model, so one should keep in mind:

Income structure: sales (Price x Volume) are the neuralgic aspect due disruptive innovation is characterized by low prices, for there to be sustainability, volume plays a fundamental role. The volume of sales must be boosted, attracting more and more consumers and customers.

Cost structure: Direct and indirect costs can be reduced through negotiations and collaborations with suppliers.

Spending structure: one aspect that stands out within the business models that accompany the disruptive innovation is that they do not make up a significant percentage within the overall structure. Christensen (1997) points out that the established organizations and leaders analyzed should earn an average gross margin of 40% to leverage the administrative and sales costs associated with them. While incoming companies captured a margin of only 20%. However, established companies had an inventory turnover of 4 times a year, while incoming inventories rotated an average of 8 times a year, allowing them to compete in financial terms.

Profit margin: the profit margin must be carefully established, since it must directly affect the price offered to the buyer and must be competitive as offered in the final value proposal.

Rotation of assets: It is important to establish how quickly it is necessary to rotate inventories, fixed assets and other assets - how effective these resources are - to support sales volume and achieve expected profitability.

9. Resource Management and Key Processes

These resources include people, technology, infrastructure, equipment, as well as communication and distribution channels, as well as the brand. The resources are directly related to the financial structure, since it can facilitate or make disruptive innovations fail. In this context, reconfiguring the resources available to the organization can help catalyze disruption, while other resources must be created. A brand can easily be established by a dominant company to exploit a disruptive technology, usually these require new distribution channels, as in the case of Honda when introducing the motorcycle in the US market, who opted to open new channels for distribution, different from those traditionally used by Harley Davidson, the market leader. Within the business model of business must establish which are the fundamental processes that the company develops and which processes do not belong to the core of the business - referring especially to the operational processes. For example, in an organization that provides intensive services of knowledge, the key processes are focused on people and their skills and knowledge to deliver value (the key processes are related to the development of skills and knowledge) while in a manufacturing company can be given in the NPD.

It is important to clarify that the business model must be dynamic and flexible, precisely because of the changing conditions of the environment and the market, which in turn requires that processes and resources can be made more flexible. Teece (2007) argues that "the ability of a company to create, adjust, refine and, if necessary, replace the business model is essential for dynamic capabilities" (p.1330).

10. Conclusions

Organizations in Latin America to improve innovative activity face challenges such as: 1. Identify technological and market opportunities - taking into account the low investment in R & D- 2. Develop products and services designed for people with a low purchasing power and limited access to existing products, 3. Designing business model architectures that generate greater customer value - considering the limitations of income, access and knowledge.

It is proposed the disruptive innovation as a mechanism to face these challenges due that it is characterized by: 1. Attending marginal markets 2. Offers characteristics that marginal customers value - usually simpler, cheaper and more convenient - 3. They are based on new combinations of existing technologies, and 4. involves the design of business models that generate income at the discount prices required to capture the business of marginal customers. Disruption should be identified in New Market or Low Market Level and. take advantage of identified opportunities, designing products or services framed within a business model with disruptive potential.

Within the value proposition for the customer, products and services should be designed that are cheaper, simpler and more accessible with respect to the existing offer - making efforts to customers with low incomes, lack of knowledge and difficult access. On the other, they must establish the value networks of the organization and establish relationships with suppliers who develop new technologies, customers and complementary to increase the value capture.

Complementarily, the architecture of Income and costs must be determined; ie income generation from economies of scale and scope, low gross margins, minimization of administrative and selling expenses and high turnover in assets. Resource management and key processes: both operational and organizational processes that allow disruption must be designed and configured.

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THE IMPORTANCE OF QUALITY MANAGEMENT SYSTEM IN COMPANY USING THE METHOD OF STATISTICAL TABLES

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Abstract

In this research, we will be studying the importance of quality management system in Company using the method of statistical tables. To demonstrate the importance of quality management system in Company, we will focus on five elements that have an impact on the application of the quality management system in company, the impact of application of the quality management system in job, the relationship between quality management system and the worker, the relationship between quality management system and performance and finally, the relationship between quality management system and information. Thus, five questions were asked to demonstrate the importance of the application of quality management system in Companies, and the results expected from it. This research aims to present the results of the field study, and by clarifying the study procedures, tools and describe the characteristics of the study population, and the statement of the importance of quality management system in Company.

Keywords: Company, Quality, Quality Management System, Performance, Relationship.

JEL Classification: M1, L1, L25.

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1. Introduction

Quality was applied in the industrial sector in 1900, then was applied in the service sector (Ludovic de gaillande and Rose derenne, 2007), Where the quality is defined as conformance with specifications (PH. Kotler and B. Dubois, 1997). Accordingly, quality management has evolved in four phases, namely quality inspection, quality control, quality assurance, and the total quality.

Total Quality is a modern way to manage the organization, based on the cooperation of all parts of the organization, improve product quality and customer satisfaction (K.ishikawa, 1986).

2. Definition of Terms Related to the Study

The Company administration must make sure to specify the financial, material and human resources to implement a quality management system (Frédérique ritchie, 2006), kartesz says quality management system applies to all departments and functions in Company (Christine kartesz, 2006). Therefore, The application of quality management system in the organization aims to exploit the quality data in decision-making (Daniel boeri,2012).

2.1. The Definition of Quality:

Quality defined by the International Standardization Organization:

Is a measure of the extent to meet the needs of customers, and requirements stated and implied.

Quality defined by the American Society for Quality Control:

Is a set of advantages and characteristics of the product or service that can meet the needs of consumers.

2.2. The Definition of Quality Management System(SMQ):

Quality management system is the organizational structure, responsibilities, procedures, tracks, processes and resources needed to manage the quality of the organization.

This system is based on the management and control of human resources in the organization, and is designed to work with the integration of the necessary mechanisms to ensure quality in all phases of activity.

The quality management system determining the quality policy, and work to implement them. To achieve the quality must be the commitment and participation of all human resources organization, and be the senior management is responsible for the quality management system of the organization.

3. Methods

To demonstrate the importance of quality management system in the Company, we will focus on five elements that have an impact on the application of the quality management system in job, Relationship quality management system with the worker, Relationship quality management system with performance, Relationship quality management system with information.

Previously, five questions were asked to demonstrate the importance of the application of quality management system at the Company, and the results expected from it.

3.1. The Field of Study Data Analysis

The questionnaire was distributed to a sample of human resources employees that work with various Companies in Algeria. we will analyze the different responses obtained and then get the results of the study.

3.2. Study Procedures

The study population is consisted of all human resources working in Companies in Algeria, related to the preparation and application of quality management system activities. The study population is consisted of 90 employees, distributed to various constituent units of the Company. The researcher distributed the questionnaire on the study population and afterwards he collected the entire 90 questionnaires, which represents 100% of the total distributed questionnaires. Consequently, the researcher analyzed questionnaires statistically.

4. Analysis of the Results

4.1. The Impact of the Application of the Quality Management System in Careers and Jobs:

Individuals are considered the core of the organization at all levels. We must involve them in defining the goals of the organization and decision-making (Christine kartesz, 2006). Where Crosby convinced of the importance of the human factor in the implementation of quality (S. Mizino, 1990)

The following table (01) represents the answer to this question in accordance with the proposed alternatives:

Table 1. Results of the Impact of the Application of the Quality Management System in Careers and Jobs

	There are several obstacles to job performance	**No impact on job performance**	**There is independence in job performance**
Number of Answers (%)	34.5	21.1	44.4

Source: Table is designed on data questionnaire.

We note that there is a convergence in the number of answers according to the available alternatives. There are 44.4% of the respondents believe that the application of quality management in the Company system would lead to the existence of independence in the performance of the work, and 21.1% of the respondents believe that the application of a quality management system in the Company does not affect the performance of the work, and 34.5% of the respondents believes that the application of quality management system at the Company, hinder the performance of the work, which represents a significant share of workers who do not want change at the Company, and in particular to change the way of working.

4.2. Quality Management System Leads to Self-Reliance in Doing the Job, Without Consulting the Responsible for the Work

The following table (02) represents the answer to this question in accordance with the proposed alternatives:

Table 2. Results of Quality Management System Leads to Self-Reliance in Doing the job Without Consulting the Responsible for the Work

	I agree	**A little**	**Not agree**
Number of Answers (%)	33.33	38.89	27.78

Source: Table is designed on data questionnaire.

The application of a quality management system in the Company leads the ease and independence of the employee to perform his work, which is justified by the percentage of 72.22% of the interviewer sample, while 27.78% believe that the application of a quality management system in the Company leads to resistance to change by the employee.

4.3. Quality Management System is a Hindrance in the Performance of Work

The following table (03) represents the answer to this question in accordance with the proposed alternatives:

Table 3. Results of Quality Management System is a Hindrance in the Performance of Work

	I agree	**A little**	**Not agree**
Number of Answers (%)	1.1	18.89	80

Source: Table is designed on data questionnaire.

The goal of the application of the quality management system is to facilitate the performance of various activities in the Company, where 98.9% consider that the quality management system is not considered a hindrance in the performance of work at the Company, while 1.1% believe that the quality system is a hindrance in the performance of work at the Company, which is a very small percentage, which means easy to persuade them to adopt this system.

4.4. Quality management system improves the information relating to the activities of the Company

Improving the quality of health care is the most important concern in the Company (Sébastien doutreligne, 2009).

Thus, improving health services is the justification for the existence of the Company, so they must spread the culture of continuous improvement of health care service (Christine kartesz, 2006).

The following table (04) represents the answer to this question in accordance with the proposed alternatives:

Table 4. Results of Quality Management System Improves the Information Relating to the Activities of the Company

	I agree	**A little**	**Not agree**
Number of Answers (%)	90	10	0

Source: Table is designed on data questionnaire.

The application of a quality management system in the Company requires a training of human resources with new methods to perform tasks and functions, and leads to the improvement of information and knowledge of the employee, which is the consensus of the interviewer sample at the Company by 100%.

4.5. Quality Management System Focuses On the Work Control, and This Leads to Increased Tension Workers

Controls are necessary in the field of manufacturing (Idem, p: 07.) and according to Taylor, the inspector is responsible for the quality of work(J.M. Gogue, 1997)

The following table (05) represents the answer to this question in accordance with the proposed alternatives:

Table 5. Results of Quality Management System Focuses on the Work Control, and This Leads to Increased Tension Workers

	I agree	A little	Not agree
Number of Answers (%)	18	39	43

Source: Table is designed on data questionnaire.

During the application of a quality management system in the Company, there will be a review of the quality and control work, where we find that 43% of employees say that there is no tension during work control, and 39% say that there is some tension, and 18% say that there is a high tension during work control by auditors of quality in the Company. According to Deming should reduce the fear, and promote mutual contact in the organization

5. Results and Findings

The determination of the importance of quality management system in the Company, mainly based on the following elements:

- The impact of the application of the quality management system on job;
- The relationship between quality management system and the worker;
- The relationship between quality management system and performance;
- The relationship between quality management system with information;

The conclusions of the above that the quality management system determines the area of responsibility, as this system is a source of independence at work, and the source of training for human resources in the Company.

5. Conclusions, Implications and Significance

In this paper, we have identified the importance of quality management system in Company using the method of statistical tables, using a questionnaire to a sample of human resources in Companies that operate in Algeria. By using a questionnaire, five questions were asked to demonstrate the importance of the application of quality management system at the Company, namely:

-What is the impact of the application of the quality management system in your job?

-Quality management system leads to self-reliance in doing the job, without consulting the responsible for the work.

-Quality management system is a hindrance in the performance of work

-Quality management system improves the information relating to the activities of the Company

-Quality Management System focuses on the work control, and this leads to increased tension workers.

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