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New Economic Endogenous Growth Theories and Sustainable Growth Theories – An Empirical Evaluation On Latin American Countries

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ABSTRACT
Industry, politics and trade desire and benefit from steady economic growth. This study evaluates the main policy implications of the new endogenous growth theories and whether economic growth without harming the environment can be reconciled for four Latin American countries: Argentina, Brazil, Mexico and Chile. Firstly, the policy implications of the new endogenous growth theories have been broken down into variables to examine if they have a positive influence on economic growth. Secondly, environmental variables were analysed to examine their behaviour with changing GDP levels over time. In both cases most of the variables studied exhibit a strong correlation with Economic growth / GDP levels. The results are the recommendations that policy makers in the analysed Latin American countries should give more consideration to the new economic endogenous growth theories and to the investigated environmental factors.

Keywords: New Economic Endogenous Growth; Sustainable Growth; Latin America; Environment, International Business and Economics

INTRODUCTION
Brazil has always been a country with great economic potential. The country with its rich land and population is in both parameters after all, the fifth largest in the world and has huge agricultural land and mineral resources. But an economic breakthrough has never happened due to unfavourable structures in politics and business. Policy makers are uncertain what measures must be taken to foster economic growth (Prata, 2015).

Moreover a large part of the Amazon rainforest is located in Brazil. The Amazon rainforest is the world’s largest biodiversity region. It produces around 20% of the earth’s oxygen and is home to more than 5 million species of plants, animals and insects. Starting with the rubber boom by the end of the 19th century the exploitation of the Amazon rainforest has steadily increased. In the 90s the total area of forest lost in the Amazon rose from 415,000 to 587,000 km². Thus the environment has been damaged to achieve higher economic growth (Museum, 2013).

Similar situations to that described above can be found in other Latin American countries (Josè, 1992). In connection with the seemingly controversial issues economic growth and sustainable development the following research questions arise: ‘Do the main policy implications of the new endogenous growth theories work to foster economic growth in Latin American countries?’ and ‘Is economic growth in Latin American countries possible without harming the environment? In this paper we try to help analyse these two research questions.

Our contributions the following:
- In the theoretical reference section the new endogenous growth theories of Romer-Lucas as well as growth with environment and sustainable development are discussed.
- The main policy implication of the Romer-Lucas model for selected Latin American countries is evaluated.
- Selected environmental variables and their relation to the GDP development for selected Latin American countries are examined.
The studied countries’ similarities and differences of their economic growth to are derived and general tendencies are concluded.

The results of this study support policymakers in their decision-making in order to foster economic growth in a sustainable and environmental friendly way.

THEORETICAL REFERENCE


The new endogenous growth theory was developed in the 1980s. It was established to criticise and react to the neoclassical growth models (Domar, 1946; Solow, 1956; Solow, 1957). In the neoclassical growth models, the long-term growth is influenced by exogenous factors, such as the growth rate of technical progress and the increase in the labour force (human capital) (Romer, 1986; Lucas, 1988). The endogenous growth theory, however, is trying to overcome these deficiencies by trying to explain the growth in an endogenous way. The models of Romer and Lucas are the most important featuring technological advances that endogenously generate externality effects. In their works the production function has increasing returns to scale, because of spill over effects coming from education and / or knowledge.

The Romer-Lucas model starts with the production side of the economy, specifying a production function, assuming that technology is generated endogenously, first in absolute terms in equation (1) and then in per capita terms in equation (2):

\[ Y_t = F(K_t, L_t, \kappa_t) = K_t^\alpha L_t^{1-\alpha} \kappa_t^\eta \]
\[ y_t = k_t^\alpha \kappa_t^\eta \]

Next the consumption needs to be considered. Therefore specific utility functions are introduced in the model. To complete the model both the consumption and production side need to be put together. The objective is to maximize the combined utility function (demand and supply) over time via a dynamic approach, named optimal control theory, which leads to the following equation:

\[ \text{Maximize } U_t(c_t) = \int_0^{\infty} \left( \frac{c_t^{1-\xi}}{1-\xi} \right) e^{-rt} dt \]

To establish equilibrium in the capital market the total capital needs to be equal to the aggregately sum of individual capital stocks \( \kappa_t = L_t k_t \). This leads to the long-run per capita consumption growth rate:

\[ \frac{c_t}{c_{t-1}} = \frac{(\alpha + n)k_t^{(1-\eta-\alpha)} L_t^{-\eta}}{\xi} \]

Whether or not the long-run per capita growth rate of consumption is positive depends on the difference between the marginal productivity of capital \( (\alpha + n)k_t^{(1-\eta-\alpha)} L_t^{-\eta} \) and the discount rate \( r \) in equation 4, considering that is positive. For a given country the model suggests continued long-run growth, depending on how productive its technology is (Romer, 1986).

The policy implications from the Romer-Lucas model are focussing on the potential for externality spill overs, which can result from the stock of knowledge / education and / or labour force training / skills (Easterly, 1998). Regions that have plenty of those factors can grow significantly faster than the ones constrained by shortage of them. This model suggests the improvement of the educational levels as the most important factor to foster economic growth. Consequently education and its positive spill over are decisive for economic growth (Lucas, 1988).

In growth policy both human capital and knowledge spill overs are very important factors that need to be considered. The Romer-Lucas model implies that regions that focus on activities, which result in high skills / learning / knowledge grow sustainably faster than others. Especially in developing regions often having poor educational systems the design and implementation of growth-based policies are of highest importance (Lucas, 1988).
Growth with Environment

In this section two seemingly oppositely inclined concepts will be discussed which being the Industrial growth and its impact on the Environment. Environmental damage is quite a broad area, which can be anything from excessive gas emissions to deforestation.

The industrial growth in countries can be illustrated with the total GDP as a measure. Environmental damage can be assessed in terms of released of the gases like CO2, methane, nitrous oxide and other greenhouse gases. Various models exist arguing about the above topic and most of them find a common ground in the following two aspects:

1. Growth in production using non-reproducible resources
2. The correlation between growth and pollution/waste generation

The first class of models was foremost researched by Anderson (1972). He investigated the impact on production growth when non-renewable resources were depleted. Non-renewable resources are for example fossil fuel reserve or nuclear fuels. A similar approach to model production growth considering exhaustible natural resources was used by Stiglitz (1974). Moreover Amigues, Favard, Gaudet and Moreaux (1998) have formulated an optimal distribution of various natural resources during the production phases.

In the second class of models Chakravorty, Im and Roumasset (2005) developed a model showing discontinuous extraction of natural resources is possible without incurring further setup costs. This not only helps the resources to replenish themselves to a certain extent but also enables the needs of future generations can be met through sustainable development. Similarly Sena (2009) argued how natural resources like water, air and forests can be allocated optimally to the different phases of production, which consequently reduces the damage towards such resources.

Sustainable Development

The pace at which our planet is growing is unprecedented and has brought several comforts like declining mortality rate, increase in literacy and enhanced food production. But the reactions of such changes are unbearable for the planet Earth. Every year around 6 million hectare of productive area is turning barren. Similarly 11 million hectares of deforestation occurs every year, which would amount to the area equal to India if the trend continues for three decades (Im, Chakravorty, & Roumasset, 2005).

According to Brundtland (1987), prior to the global industrialization human activities and their impacts were categorized within sectors such as energy, agriculture, trade and within broad concerning areas like environment, economic and social. But these areas have begun to merge and drawing a line between different issues is a problem. To address such problems the idea of sustainable development emerged which states: ‘Meeting the needs of present without compromising the ability of future generations to meet their own needs’ (Robert, 2005).

Sustainable Development is closely correlated with shift towards Social, Cultural and Environmental concerns rather than just economic area. Sustainable development in social norms is striven for as suggested by Emile Durkheim (1893) and he further states that transition from ‘traditional’ to ‘modern’ society in Europe was made to achieve social harmony and equilibrium. Punishments and legal procedures are introduced to keep the social norms intact and are a clear example of social sustainable development. Development can also be cited as the transition of humans moving from clans to self-relying individuals over the time.

Cultural and social dimensions have shifted since Durkheim analysis when norms and tradition was prevalent in almost everything. German theorist Max Weber argued from a different perspective and analysed from an individual’s point of view while conducting the research on German public in the late nineteenth century. He points out that cultural shift towards economic development has had serious consequences on sustainable development where people are viewing industrial advancement in favourable manner and putting them ahead of the personal value and ultimate rewards like religion (Weber, 2002).

Environmental aspect ends to be one of the most important one as it has been studied for quite some time now but implemented very late on the global scale. The earliest account was noted by Malthus (1798) as he provided the relationship between the sustainability of food resources and growing population concerns. He noted that the food supply hasn’t been able to
cope with the rise of population, as increase in the edible resources is arithmetic whereas the growth of population is geometric.

The main aim of sustainable development is to ensure continuity to resources for forthcoming generation by halting the stress on environment and related areas. However there are a few considerable hurdles in achieving the idea:

**Technological advancement** - Technology offers rapid consumption of limited resources such as fossil fuels and also contributes in producing new forms of pollutants. Urgency for growth in technological terms has outpaced the concern to minimize the side effects of the relevant activities.

**Growing population** - Ever increasing population and far reaching human activities are not only limiting the resources for today’s generation but also leaving a lasting and irreversible impact on future lives.

**International Economic and Political relationships** - The difference among nationalities and ethnicities are making it very difficult being their collective priorities in line. The needs and utilizations for each part of the world vary significantly and global powers need to eradicate the imbalance in usage of natural resources.

One of the latest advancements on sustainable development took place at the United Nations conference in Rio de Janeiro in 2012. It is considered as a cornerstone in the modern standards on sustainable development with wide consensus among the nations on the policies underpinned in the report.

The conference pointed out the adherence to the policies passed in the earlier meetings like Stockholm in 1972 and assured the latest changes are taken into account. The main agenda undoubtedly was to eradicate poverty and undernourishment. According to the report 1 billion people still live in extreme poverty and 14% of the world’s population is undernourished (United Nations, 2012).

Wider issues such as Global Warming, weather patterns and pollution were linked to the future of sustainable development and it was reported that work was underway to make the international legislation more flexible to cater for global environmental needs.

Special recognition was given to African and underdeveloped regions, which prove to be more vulnerable and wider stakeholders, and were considered in outlining the future strategy.

**METHODOLOGY OF THE RESEARCH**

The current research was developed using a quantitative approach, which enables the researchers to evaluate the implications of the growth theories as well as the dilemma between sustainability and economic growth in a direct way with variables. Therefore, the empirical approach is divided into two parts (1) the empirical research about the policy implications of the new endogenous growth theory and (2) the analysis of sustainable growth. The research focuses on the four most important economies in Latin America regarding their absolute GDP and GDP per capita in 2011. Therefore we ranked all countries and chose due to the ranking the four most important countries: Brazil, Mexico, Argentina and Chile. Densely populated Latin American countries were not considered in this analysis (e.g. Trinidad, Tobago), because that would falsify the result. The secondary data used for this research was taken from the World Bank or from the Pennworld Table 8.1 (Developed by Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), University of Groningen). In general the time period between 1990 and 2013 is considered. Due to the lack of data for some periods, the time periods 1990 - 2011, 1990 - 2010 or 2000 - 2010 were used. The relevant data focuses on GDP, derived variables from the new endogenous growth theory and environmental variables.

**Endogenous Growth Variables**

The investigation of the policy implications was realized by analysing the relation between the growth variables (Real GDP) and the influencing variables of the theory. That’s why we picked the following variables presented in table 1:
The new-endogenous growth theory is in per capita terms. Therefore in our investigation almost all variables (except: total patents) are in per capita terms. That is why GDP, Capital Stock and High-technology exports were divided by the relevant population for each analysed country. Furthermore the variable patents results out of the summation of non-residential and residential patents. The degree of openness is described by the sum of imports of goods and services and the exports of goods and services in each country.

This study investigates all variables of the new endogenous theory which are correlated with GDP per capita to analyse the implications and how growth can be explained in the considered economies.

For one variable all four countries are analysed. The variable “total patent” possesses a gap for Argentina, because in the time period 2009-2011 no data was available for Argentina. The consequence is that this study counts a zero for these years and does not analyse this period for Argentina.

Consequently in table 3 all variables are correlated to GDP per capita and averages are drawn. Chile’s correlation between Researchers per Million and GDP per capita was left out due to missing data.

**Environmental Variables**

For the analysis of the environmental investigation we picked eight variables out the World Bank to illustrate the connection between environmental harmless and the economic growth. The structure of the empirical approach is conducted from Sena (2014) and Sena (2015). The variables are described and presented beneath:

**Table 1: Description of the Endogenous Growth Variables - Source: World Bank & Penworld Table 9.1**

<table>
<thead>
<tr>
<th>Endogenous Growth Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP - rgdpna</td>
<td>Real GDP at constant 2005 national prices (in millions 2005 US$)</td>
</tr>
<tr>
<td>Capital Stock - rkna</td>
<td>Capital stock at constant 2005 national prices (in millions 2005 US$)</td>
</tr>
<tr>
<td>Human Capital - hc</td>
<td>Index of human capital per person, based on years of schooling (Barro/Lee, 2012) and returns to education (Psacharopoulos, 1994)</td>
</tr>
<tr>
<td>Total Factor Productivity - ctp</td>
<td>TFP level at current PPPs (USA=1)</td>
</tr>
<tr>
<td>High-technology exports (current US$)</td>
<td>High-technology exports are products with high R&amp;D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery. Data are in current U.S. dollars.</td>
</tr>
<tr>
<td>Exports of goods and services (% of GDP)</td>
<td>Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.</td>
</tr>
<tr>
<td>Imports of goods and services (% of GDP)</td>
<td>Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.</td>
</tr>
<tr>
<td>Researchers in R&amp;D (per million people)</td>
<td>Researchers in R&amp;D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned. Postgraduate PhD students (ISCED97 level 6) engaged in R&amp;D are included.</td>
</tr>
</tbody>
</table>
Table 2: Description Environmental Variables - Source: Worldbank

<table>
<thead>
<tr>
<th>Environmental Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO² emissions (kt)</td>
<td>Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.</td>
</tr>
<tr>
<td>Methane emissions (kt of CO² equivalent)</td>
<td>Methane emissions are those stemming from human activities such as agriculture and from industrial methane production.</td>
</tr>
<tr>
<td>Nitrous oxide emissions (thousand metric tons of CO² equivalent)</td>
<td>Nitrous oxide emissions are emissions from agricultural biomass burning, industrial activities, and livestock management.</td>
</tr>
<tr>
<td>Other greenhouse gas emissions</td>
<td>Other greenhouse gas emissions are by-product emissions of hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.</td>
</tr>
<tr>
<td>Energy production (kt of oil equivalent)</td>
<td>Energy production refers to forms of primary energy-petroleum (crude oil, natural gas liquids, and oil from nonconventional sources), natural gas, solid fuels (coal, lignite, and other derived fuels), and combustible renewables and waste--and primary electricity, all converted into oil equivalents.</td>
</tr>
<tr>
<td>Fossil fuel energy consumption (% of total)</td>
<td>Fossil fuel comprises coal, oil, petroleum, and natural gas products.</td>
</tr>
<tr>
<td>Combustible renewables and waste (% of total energy)</td>
<td>Combustible renewables and waste comprise solid biomass, liquid biomass, biogas, industrial waste, and municipal waste, measured as a percentage of total energy use.</td>
</tr>
<tr>
<td>Energy use (kg of oil equivalent per capita)</td>
<td>Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport.</td>
</tr>
</tbody>
</table>

To visualize the results, eight graphs were created, respectively, one graph for each environmental variable and for the GDP levels. In each graph, the four countries under consideration Argentina, Brazil, Chile and Mexico are illustrated.

In addition to the first part of this study the relationship is not tested between per capita variables but in absolute terms. The variables Methane Emissions, Nitrous Oxide Emissions, Other Greenhouse Gas Emissions have only five observations on the period under consideration. In order to establish the correlation with GDP levels it was necessary to break down the GDP for the respective countries on five averages for the same point of time.

**EMPIRICAL ANALYSIS**

**Romer-Lucas Policy Implications**

The first Graph represents the fast growth of the four countries in the time period 1990-2011. Particularly the GDP per capita from Chile and from Argentina enhances by respectively 2.3 fold (from US$ 6,312 in 1990 to US$ 14,280) and two times (from US$ 7,327 to US$ 14,764). Brazil and Mexico were able to increase their level of GDP per capita at 1.4 and 1.3 times. This shows the contrast in the pace of the four countries. Whereas Argentina and Chile achieved a level of $14,764 and $14,280, Brazil and Mexico achieved a level of $9,390 and $12,575. These numbers show the relevance to investigate what variables can influence growth in GDP per capita terms.
Graph 1: GDP Levels pc 1990 – 2011

Generally two trends can be seen in this graph. In the period 1990-2001 only staggering economic growth was present. The ensuing period 2002-2011 is characterized by a continually rising economic growth in all countries except Argentina and Mexico. Argentina’s GDP per capita decreased in the period 1998-2002. This is due to the financial crisis and the devaluation of the Pesos. Additionally one dip can be recognized for Mexico in the year 2009. This can be explained by the financial crisis in 2008/2009.

The first variable of the new endogenous growth theory is the physical capital accumulation per capita between 1990 and 2011. Argentina has the highest values out of all four countries with the peak in 2011 ($47k). Chile has the highest growth and the physical capital pc increased pc more than two times over the period under consideration (1990: $13.6k to 2011: $41k). The development of Mexico and Brazil regarding this variable is almost the same. Both reach a value in 2011 around $33k. The physical capital accumulation per capita growth can be seen in more detail in graph 6.

The following variable is the Human Capital Index. Chile has over the whole period on the highest values, followed by Argentina, Mexico and Brazil. It is noticeable that the curves move all in a similar manner. All feature a lightweight and steady growth, with Brazil having a growth of almost 35% being the front-runner (in 1990: 182 hc index to 2011: 245 hc index).

The third variable under consideration is the Total Factor Productivity (TFP) of the selected countries. It is noteworthy that for the countries Mexico and Brazil, a slight downward trend can be seen. Thus for the whole period under consideration the TFP for Brazil decreases by around 8% and Mexico decreases even by around 14%. Argentina recorded the highest increase with approximately 63%. In general, the TFP level of all four countries from 1990 - 2011 is highly unstable.

In terms of Patents it can be seen a very strong growth in all four countries. It must be emphasized that Brazil with the initial value in 1990 of 7537 patents has more than tripled to a value of 30884 patents in the year 2013. The second highest number of patents reports Mexico (2013: 15444), followed by Argentina (2013: 4772) and Chile (2013: 3072).

With regard to the High Technology Exports (HTE) per capita from 1990 to 2013 in all four countries, a large increase is determined. Exceptional is the growth of HTE per capita in Argentina, which have reported a growth of around 322% (1990: $11.18 to 2013: $371.27). Comparatively small is the growth in Brazil, Argentina and Chile. Nevertheless they reach the following HTE per capita values in 2013: Argentina $58.72, $41.88 Brazil and Chile $28.74.

Next the Degree Of Openness in % (DOO), which is put together with Exports and Imports of goods & Services in %, shows a positive trend in the four Latin American countries. Chile has the highest values in DOO followed by Mexico, Brazil and Argentina. However, the
largest growth was kept by Argentina, who could almost double their DOO from 15% in 1990 to 29% in 2013.

The last variable is the **Number of researchers per million** from 2000 to 2010. The three countries under consideration Argentina, Brazil and Mexico have a similar strong and steady growth. Argentina has in 2010 with 1178 scientists per million people a big lead in absolute numbers before Brazil (710) and Mexico (382). Chile was not considered due to a lack of data in this statistics.

### Table 3: Correlations GDP pc levels with Romer-Lucas Policy implications variables

<table>
<thead>
<tr>
<th></th>
<th>ARGENTINA</th>
<th>BRAZIL</th>
<th>CHILE</th>
<th>MEXICO</th>
<th>AVERAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>x Physical Capital pc</td>
<td>0.9506</td>
<td>0.9594</td>
<td>0.9759</td>
<td>0.9429</td>
<td>0.9550</td>
</tr>
<tr>
<td>x Human Capital Index</td>
<td>0.8302</td>
<td>0.8932</td>
<td>0.9793</td>
<td>0.9329</td>
<td>0.9130</td>
</tr>
<tr>
<td>x Total Factor Productivity</td>
<td>0.8797</td>
<td>-0.4526</td>
<td>-0.2095</td>
<td>-0.3026</td>
<td>-0.2561</td>
</tr>
<tr>
<td>x Total Patents</td>
<td>0.6364</td>
<td>0.9009</td>
<td>0.6207</td>
<td>0.9628</td>
<td>0.7686</td>
</tr>
<tr>
<td>x Hightech Exports pc</td>
<td>0.9124</td>
<td>0.8493</td>
<td>0.8987</td>
<td>0.9159</td>
<td>0.9055</td>
</tr>
<tr>
<td>x Degree of Openness in %</td>
<td>0.4676</td>
<td>0.5474</td>
<td>0.7588</td>
<td>0.7757</td>
<td>0.6531</td>
</tr>
<tr>
<td>x R&amp;D</td>
<td>0.9100</td>
<td>0.9315</td>
<td>X</td>
<td>0.7542</td>
<td>0.9100</td>
</tr>
</tbody>
</table>

In table 3 the correlations of the GDP per capita and the variables of the new endogenous growth theory for each country and on average are illustrated.

The correlation between the variable **Physical Capital pc** and the GDP pc shows a general trend. It can be observed, that there is a strong connection between the Physical Capital Accumulation pc and the GDP pc. The average is 0.955 that indicates almost perfectly positive correlation. Chile has the strongest correlation with the value of 0.976. Generally speaking an increase in Physical Capital is likely to lead to an increase in GDP pc.

The results of the **Human Capital Index** show also a strong positive correlation. The average correlation is 0.913, which is slightly weaker than the previous one. Again, Chile has in turn the highest correlation with a value of 0.979 and Argentina holds a value of 0.830 and is thus held up the rear. Resulting from this, one can say that the change in the Human Capital Index has a high impact on the GDP pc.

The variable **Total Factor Productivity** shows a negative average correlation with -0.256. It is interesting to see here, that all countries except Argentina have negative correlations with -0.453 (Brazil) as the highest value. Argentina, however, has a value of 0.880 which is consequently a strong positive value. Generally it can be concluded that for Chile, Brazil and Mexico, there is a negative relationship between GDP pc and total factor productivity and hence an increase in the variable has a rather negative effect on the GDP pc in the period under consideration.

The results of the correlations with the variable **total patents** are in line with the endogenous growth theory. With a value of 0.769, the average correlation of the three countries is positive and thus a positive and significant correlation between GDP pc and total patents can be identified. Brazil and Mexico in this case have the highest values, each with 0.900 and 0.963. Nevertheless, the correlations for Chile and Argentina are also positive with values of 0.621 and 0.636. As a consequence the volatility in the variable total patents can have a significant influence at the GDP pc.

The **High-Technology Exports pc** have very strong positive correlations across the observed economies. So is the average correlation 0.901. Thus here for the four Latin American economies a strong significant correlation between the GDP pc and the High-Technology Exports pc can be observed. Particularly the correlation in Mexico and Argentina is strong, with values of 0.916 and 0.912. The bottom of this observation is Brazil with a significant correlation of 0.849.

In general, the results of the correlation of the variable **Degree of Openness** are positively correlated with the GDP pc, but this is not as significant and strong as the previous variables. The average correlation is considered as 0.653. Mexico has the highest value with 0.775 and Argentina
is bringing up the rear with 0.468. For all countries there are positive correlations visible, but the influence is not comparable to the other already studied variables.

The last variable in table 3 is **R&D**. Here one can observe very strong correlations for Argentina and Brazil with values of 0.910 and 0.932. Mexico, which has the lowest value with 0.755, still has a significant positive correlation. The average correlation is 0.910 and thus a significant positive connection can be seen. From this we can conclude that R&D per million is an important variable which can affect due to its strong connection GDP pc in a positive and negative way.

**Environmental Investigations**

In Graph 2 we observe that for all countries the GDP levels are fast growing during the time period 1990-2011. Especially the GDP level in Chile has almost tripled (from US$ 83.2 billion in 1990 to US$ 246.6 billion in 2011). At a slower pace Argentina’s GDP has increased by 2.5 times (from US$ 239 billion in 1990 to US$ 602 billion in 2011) and Brazil’s GDP increased by 1.9 times (from US$ 981 billion in 1990 to US$ 1.8 trillion in 2011). Mexico’s GDP was growing over time by 1.7 times (from around US$ 826.4 billion in 1990 to US$ 1.44 trillion in 2011). These four countries were the best GDP performers based on the authors ranking among the Latin American economies. Even during the hard years of the world financial crisis (2008-2009) the four economies had just a slight downward change of their GDP curves.

Graph 2: GDP Levels In Mio $ 1990 - 2011

Strong economic growth was observed in all four countries. In the period 1990-2001 only staggering economic growth was present. The ensuing period 2002-2011 is characterized by a continually rising economic growth in all countries. We start by descendent ranking the four Latin American countries by GDP levels as seen in graph 1. The objective is to analyse and check if the top performers in GDP levels are also the top performers in gas emissions.

The variable of **CO² Emissions** shows a general growing trend for all countries. It is notable that not the Top Performer of GDP (Brazil) has the highest CO² Emission. In the analysed time period 1990-2011 Mexico has the highest CO² Emission, followed by Brazil, Argentina and Chile. Mexico is the country the with lowest CO² Emission growth over time with 48% (from 314,291 kt in 1990 to 466,548 kt in 2011), whereas Chile has the highest CO² Emission growth over time with 138% (from 33,314 in 1990 kt to 79,408 kt in 2011).

Regarding the **methane emission** in kt a constantly increase in all four countries could be noticed. The top GDP performer Brazil has by far the largest methane emission, which is even greater than the combined one of the other three countries.

The **Nitrous Oxide** indicates that Brazil is by far the largest polluter in Latin America. Unequal as in the methane emissions the countries following Brazil in descending order by
Nitrous Oxide Pollution are: Argentina, Mexico and Chile. The methane emissions for the countries rise constantly and reach their peaks in 2010. Brazil however has the highest value in 2005 with 238,197.7 kt.

The greenhouse gas emission from Brazil and Mexico rise, however the emission from Argentina and Chile declines dramatically. Moreover one can observe, that the GDP top performer Brazil and Mexico have as well the highest values for Greenhouse emissions in the period of 1990 – 2010. It is noteworthy that the absolute numbers of Mexico are very close to those of Brazil (eg Mexico 2008: 9265.8 Brazil 2008: 10326.6) To sum up, the greenhouse gas emission showed that Brazil, the leader in GDP performance, was also a leader in levels of other greenhouse gas emissions.

Subsequently for the energy production in kt of oil for the period 1990-2011 it can be noted that Brazil took over the lead in 2009 as the largest producer of Energy in Latin America with its peak in 2011 (249200.8 kt). Mexico begins the period of time with the highest value of the four countries (194653 kt) and reached its peak in 2005 (253431.64 kt). This trend can also be observed for Argentina. Chile has out of the four countries by far the smallest energy production. Over time the energy production of Chile is slightly increasing with a growth of 24% (from 7927 kt in 1990 to 9880 kt in 2011) reaching its’ peak in 2009 with 10196 kt.

The fossil fuel consumption in % of all energy consumption illustrates the dependence of countries on fossil fuels. It is very clear to see that the countries Mexico (1990: 87.23% and 2010: 89.34%) and Argentina (1990: 88.66% and 2011: 89.67%) are very dependent on fossil fuels for the time period 1990-2011. Since both countries are not oil-producing countries, this may pose a threat to both economies. Chile’s numbers grow around 6% from 1990 to 2011 until it reaches a level of 76.72% in 2011. Noteworthy are the figures from Brazil. In 1990, the value is 51.22% and in 2011 it is 54.57%. Brazil can be seen here as a role model that has low numbers, even though it is one of the largest oil producers in Latin America and you should expect high numbers like in other oil producing countries.

The combustible renewables and waste (in% of total energy use) over the period 1990-2011 gives an insight into the sustainability of the energy policy in the observed countries. The general trend, which can be seen, is tremendous. For all countries except Argentina declining numbers can be seen over time. The largest decreases are recorded by Brazil (1990: 34.06% and 2011: 28.85%) and by Chile (1990: 22.36% and 2011: 17.62%). In contrast, Argentina has its value minimally increased from 3.74% in 1990 to 3.83% in 2011. Generally one can say that the trend of declining numbers do not speak for the improvement of environmental policy in the observed countries in Latin America. Looking into the future these numbers should be highlighted to be able to foster sustainable economic growth.

The last environmental variable investigated is the energy use per capita in kt for the time period of 1990 to 2011. In all four countries the energy use per capita has increased over time. Argentina has the highest consumption of energy per person with its peak in 2011 with 1967 kt. The second highest consumption has Chile, which has also the biggest value in 2011 with 1939 kt per person. It is notable that Chile has the highest growth over time with 76.71 % (1990: 1060 kt to 2011: 1873 kt ). Mexico is third in this statistics, followed by Brazil. This is surprising, as they are the two top-performers in GDP levels.

<table>
<thead>
<tr>
<th>GDP</th>
<th>ARGENTINA</th>
<th>BRAZIL</th>
<th>CHILE</th>
<th>MEXICO</th>
<th>AVERAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>x CO² Emissions</td>
<td>0.9444</td>
<td>0.9549</td>
<td>0.9583</td>
<td>0.9909</td>
<td>0.9566</td>
</tr>
<tr>
<td>x Methane Emissions</td>
<td>0.9285</td>
<td>0.7167</td>
<td>0.8440</td>
<td>0.9841</td>
<td>0.8862</td>
</tr>
<tr>
<td>x Nitrous oxide emissions</td>
<td>0.8797</td>
<td>0.5997</td>
<td>0.9140</td>
<td>0.7653</td>
<td>0.8225</td>
</tr>
<tr>
<td>x Other greenhouse gas emissions</td>
<td>-0.4267</td>
<td>0.7384</td>
<td>-0.6903</td>
<td>0.9997</td>
<td>0.1559</td>
</tr>
<tr>
<td>x Energy Production</td>
<td>0.8619</td>
<td>0.9854</td>
<td>0.8383</td>
<td>0.8230</td>
<td>0.8501</td>
</tr>
<tr>
<td>x Fossil Fuel Consumption</td>
<td>0.5603</td>
<td>-0.1131</td>
<td>0.7584</td>
<td>0.8271</td>
<td>0.6593</td>
</tr>
<tr>
<td>x Combustible renewables</td>
<td>-0.4523</td>
<td>-0.0740</td>
<td>-0.8636</td>
<td>-0.9793</td>
<td>-0.6579</td>
</tr>
</tbody>
</table>

Table 4: Correlations GDP Levels with Environmental Variables
The variable **CO₂ emissions** and their correlation with the GDP indicates a general positive tendency. It can be seen, that there is a strong relationship between GDP and CO₂ emissions and therefore a growth in GDP would enhance a growth in CO₂ Emissions. This can be analysed from the average correlation (0.957). The highest correlation is recorded by Mexico with 0.991.

Similarly the results of the CO₂ Emission can be applied for the building and interpretation of the **Methane Emissions**. The difference is that the correlations for Methane Emissions are weaker. The average correlation is 0.886, which can be considered as significantly positive. Nevertheless it has to be said, that Brazil is an exception, as it has a correlation of 0.717. This would suggest a positive relation between the two determinants but not significant.

The average correlation of 0.823 in Table 4 presents the relationship between GDP and **Nitrous Oxide Emissions**. Remarkably Chile has a correlation of 0.913, which can be classified as very strong. In contrast, Brazil has a correlation of only 0.599. Mexico scored a correlation of 0.765, which can be classified as medium strong correlation. Argentina’s correlation is 0.880, which in turn is a stronger transition between GDP and Nitrous Oxide emissions than Mexico.

By looking at the correlations between GDP and **other greenhouse gas emissions** one can see a weak average correlation with 0.156. Lowest correlation can be found in Chile with a value of -0.690. The highest correlation has Mexico with 0.99. This means that the lines of GDP and other greenhouse gas emissions move almost parallel. The correlation of Brazil 0.738 is high and indicates also a strong relationship. Argentina’s correlation is very weak with a value of -0.426.

The correlation between GDP and **energy production** clearly shows for all countries with the exception of Mexico a significant positive correlation. Brazil has the highest correlation with 0.985. The average is with 0.850 lower, because of relatively smaller numbers of Argentina (0.822), Mexico (0.823) and Chile (0.838). These figures indicate that there is a trend between economic growth and energy production for Latin American countries.

The results of the correlation with the **consumption of fossil energy** show on average a medium correlation. Here all correlations are positive except for Brazil. The highest value was Mexico with 0.827. Additionally it can be said that the correlations are not as high as for the energy production. Thus the average value is 0.659. Remarkably is the value of Brazil with a negative correlation of -0.113. This implies that economic growth and the consumption of fossil fuels would move during the time period in opposite ways.

The correlations between GDP and **Combustible Renewables and Waste** give more revealing results. All correlations are negative, which results in the average number of -0.658. An exception again is Brazil with a relatively weak negative correlation of -0.074. Mexico has the highest negative correlation with -0.979.

Lastly, the correlation between GDP and **Energy use pc** is presented in Table 3. The average correlation is with 0.953 very strong and significant. The highest value has Brazil with almost a perfect score of 0.992. Mexico has with 0.771 the lowest value of the four countries.

**CONCLUSION**

In this work the New Endogenous Growth model of Romer (1986) and Lucas (1988) are explained and the policy implications are evaluated based on the empirical analysis. These theories in general have a very high focus on knowledge and education based variables. The Romer-Lucas model implies that positive externalities spill overs can be achieved through government top policies. The authors were able to ascertain a strong correlation for most variables with GDP per capita levels. Physical capital accumulation seems to be one big reason for GDP growth in the observed countries, as it has with 0.955 the highest correlation of all variables. Also the variables Human Capital Index, High-tech Exports per capita, Researchers per million and R&D are highly correlated. This indicates that the investigated variables can have positive effects on the economic growth. Thus the implications of the New Economic Endogenous Growth Theories seem to hold true for the Latin American countries analysed. However for a higher degree of representatively one would have to include more educational variables in the research.

After having analysed how economic growth can be fostered, environmental aspects need to be considered. Latin America has been emerging in many aspects yet it lags behind somehow.
in other areas. Being a resource rich region, it faces high exploitation of natural resources and growing demands from emerging economies like China are worsening the situation. Socio-Economic factors like Poverty & Inequality have been on the agenda. Low growth rates, high volatility and highly uneven income distribution have hindered the growth so far. In this work the theory about Economic Growth with Environment and Sustainable Development is discussed, to investigate if GDP growth without harming the environment is possible for the Latin American countries. The authors were able to ascertain in most cases a very strong correlation for environmental variables with the change in GDP levels. Consequently all the investigated Latin American countries are facing a growth-sustainability dilemma, just with differences in intensities. The result of this study recommends that policy makers in Latin America should give more consideration to the environment and in more particular to the environmental variables with a high correlation. They could try to analyse why increased GDP growth is influencing certain environmental variables in a negative way. This allows measures to be taken in these areas, such as improvement of technology or reduction in growth. However for a higher level of detail one would have to include more environmental variables in the research. Ultimately the authors question whether the frequently used GDP value is the right variable to measure the success of an economy. By just focusing on the GDP environmental aspects are not taken into account, but they are necessary for the long-term success of an economy.
REFERENCES


Factors Affecting Customer Satisfaction of Mobile Banking Users in Turkey: A Fuzzy Cognitive Mapping Approach

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Umut Asan, Istanbul Technical University, Turkey

Abstract

Mobile and wireless technology has played an important role in changing the way of delivery of personal financial services. The aim of this study is to explore the factors affecting customer satisfaction in using mobile-banking in Turkey. Fuzzy cognitive mapping is used in this study to explore the factors affecting customer satisfaction in mobile banking and to define the causal relationships among them. The research model includes 12 variables and 25 causal relationships. Qualitative simulations are performed using the constructed FCM to predict possible changes and to observe whether the system reaches to an equilibrium state. Alternative scenarios are taken into consideration for the simulation of the research model. In all scenarios, the system reaches an equilibrium state after six iterations. According to the results, the most important factors in the system are found to be customer satisfaction, service quality, and convenience whereas location free access, 24hr service availability, design, security, and responsiveness are found to be least important factors.

Keywords: Customer satisfaction, fuzzy cognitive mapping, mobile banking

1. Introduction

Increased innovation in information technology has altered “the mode and level of service delivery” in a global business world. Computer based service delivery innovations have been widely adopted by many businesses (Nyabera, 2014). Innovations in banking technology are one example (Adewoye, 2013). Mobile and wireless technology has played an important role in changing the way of delivery of personal financial services (Luarn & Lin, 2005). Since mobile phones have become a huge part of our daily lives, the transformation of banking applications to mobile devices is inevitable (Pousttchi & Schurig, 2004). As a result, the concept of mobile banking has been born.

Mobile banking is defined as “the type of execution of financial services in the course of which - within an electronic procedure - the customer uses mobile communication techniques in conjunction with mobile devices” (Pousttchi & Schurig, 2004). Mobile banking is mainly used for money transaction, payments, account management, and information inquiry. The main advantage of mobile banking is that customers can perform financial activities at anytime and anywhere as mobile applications removes the temporal and spatial limitations (Zhou, Lu, & Wang, 2010).

The aim of this study is to explore the factors affecting customer satisfaction of mobile banking users in Turkey using a fuzzy cognitive map (FCM).

2. Literature Review

In the literature, there are many studies that focus on mobile and Internet banking. Ganguli and Roy (2011) have determined the generic service quality dimensions of technology based banking and have examined the effect of the service quality dimensions of customer satisfaction and customer loyalty. Howcroft, Hamilton, and Hewer (2002) have investigated consumers’ financial services behavior and have assessed their attitude towards home based banking in the United Kingdom. Joseph, McClure, and Joseph (1999) have explored the impact of technology on service delivery in the banking sector in Australia and have assessed service quality dimensions. Jun and Cai (2001) have investigated the key determinants of Internet banking service quality. Laforet and Li (2005) have assessed consumers’
attitudes towards online and mobile banking in China. Laukkanen (2007) has investigated and compared customer value perceptions in Internet and mobile banking. Nguyen and Singh (2004) have proposed a conceptual model to discuss the impact of Internet banking on customer satisfaction and loyalty. Their study has provided an overview of Internet banking. Ibok and Ikoh (2013) have identified the factors affecting customers’ satisfaction with Internet banking in Nigeria. They have conducted linear multiple regression analyses in their study. Nochai and Nochai (2013) have explored the Internet banking service dimensions and their impacts on customer satisfaction in Thailand. They have built a research model in which seven hypotheses are proposed. They have conducted a multinomial logistic regression analysis. Sakhaei, Afshari, and Esmaili (2014) have examined the impact of service quality factors of Internet banking on customer satisfaction in Iran. They have used Spearman coefficient correlation to investigate the correlation between variables.

Based on the literature review, the most important factors related to mobile banking and customer satisfaction are found to be service quality, convenience, ease of use, location free access, 24hr service availability, design, time saving, security, privacy, responsiveness, and performance.

1. **Customer satisfaction** refers to how well a customer satisfied with his/her interaction with a mobile banking application.
2. **Service quality** refers to the degree to which a mobile banking application provides to his/her customers.
3. **Convenience** refers to the usefulness of the system.
4. **Ease of use** refers to the easiness to use the system.
5. **Location free access** refers to the accessibility to the service from anywhere.
6. **24hr service availability** refers to the accessibility to the financial services at any time.
7. **Design** refers to the user-friendly interface design of the mobile banking application.
8. **Time saving** refers to decrease in time spent while interacting with financial services.
9. **Security** refers to the protection of the system by hackers/fraud.
10. **Privacy** refers to the inaccessibility to personal information by third parties.
11. **Responsiveness** refers to the response time of the mobile banking application to the customer inquiries.
12. **Performance** refers to the degree of accomplishments of the mobile banking application.

### Methodology
The Fuzzy Cognitive Mapping approach is used in this study to explore the factors affecting customer satisfaction in mobile banking and to define the causal relationships among them. The research model includes 12 variables and 25 causal relationships.
At first, the variables mentioned in the previous section were determined by an extended literature review in the area of mobile banking and customer satisfaction. Secondly, in order to define the causal relationships between these variables, six experts who are using mobile banking for personal financial services were asked to fill out a form in which causal relationships between variables are questioned. According to their answers and feedback, customer satisfaction cognitive map is constructed. The constructed cognitive map is seen in Figure 1.

Then, the cognitive map is turned into a FCM by adding linguistic fuzzy terms and as a result, a fuzzy survey is formed and used to collect data from mobile banking users. The questionnaire was formed by two main parts. The first part consists of demographic questions designed to elicit information about age, gender, mobile banking applications that consumers use, average weekly mobile banking use, and customer inquiries. A total of 17 questionnaires were collected. The summary of demographic profiles of the participants is given in Table 1.

![Figure 1. The cognitive map of customer satisfaction of mobile banking users](image)

**Table 1. Demographic profiles of the respondents**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Min: 24</th>
<th>Average: 27.64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (%)</td>
<td>Female: 52.94</td>
<td>Male: 47.06</td>
</tr>
<tr>
<td>Mobile banking applications (#)</td>
<td>İÇCep: 8</td>
<td>İÇCep: 1</td>
</tr>
<tr>
<td>iGaranti: 2</td>
<td>Yapı Kredi Mobil Şube: 5</td>
<td>Finansbank: 2</td>
</tr>
<tr>
<td>HSBC Mobil Bankacılık: 3</td>
<td>Akbank Direkt:1</td>
<td>CepteTeb:1</td>
</tr>
<tr>
<td>Denizbank:1</td>
<td>Others: 1</td>
<td></td>
</tr>
<tr>
<td>Mobile banking use in a week (minutes)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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The second part consists of items measuring the relationship direction and degree of the relationship among factors. Firstly, experts were asked to determine the direction (positive or negative of relationship between variables) and then, they are asked to determine the degree of the relationship based on the given linguistic fuzzy weights (very high, high, medium, low, very low). A summary of the second part of the questionnaire can be seen in Table 2.

**Table 2. Causal relationship direction and degree**

<table>
<thead>
<tr>
<th>Performance (PERF)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Responsiveness (RESP)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Privacy (PRI)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Security (SEC)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time saving (TIME)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design (DES)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>24hr service availability (24hr)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location free access (LFA)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ease of use (EOU)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Convenience (CON)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service quality (SERVQ)</th>
<th>Relationship degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship direction</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>+</td>
<td>Very high</td>
</tr>
</tbody>
</table>
4. Data Analysis

The frequency of relationship direction is given in Table 3. According to the data collected, all causal relationships are determined positive.

Table 3. The frequency of relationship direction

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Positive</th>
<th>Negative</th>
<th>Relationship</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERF-SAT</td>
<td>17</td>
<td>0</td>
<td>24hr-SAT</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>RESP-SAT</td>
<td>17</td>
<td>0</td>
<td>24hr-SERVQ</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>RESP-SERVQ</td>
<td>17</td>
<td>0</td>
<td>24hr-CON</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>RESP-PERF</td>
<td>17</td>
<td>0</td>
<td>24hr-TIME</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>PRI-SAT</td>
<td>17</td>
<td>0</td>
<td>LFA-SAT</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>SEC-SAT</td>
<td>17</td>
<td>0</td>
<td>LFA-CON</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>SEC-PRI</td>
<td>17</td>
<td>0</td>
<td>LFA-TIME</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>TIME-SAT</td>
<td>17</td>
<td>0</td>
<td>EOU-SAT</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>DES-SAT</td>
<td>17</td>
<td>0</td>
<td>EOU-SERVQ</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>DES-SERVQ</td>
<td>17</td>
<td>0</td>
<td>EOU-CON</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>DES-EOU</td>
<td>17</td>
<td>0</td>
<td>CON-SAT</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>DES-PERF</td>
<td>17</td>
<td>0</td>
<td>CON-SERVQ</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>SERVQ-SAT</td>
<td>17</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Then, linguistic fuzzy terms converted to quantitative fuzzy weights (Very high = 1; High = 0.8; Medium = 0.6; Low = 0.4; Very low = 0.2), the average of each mutual relationship is calculated, and the FCM of customer satisfaction of mobile banking users is constructed. The constructed FCM is seen in Figure 2.
5. Results

Qualitative simulations were performed using the constructed FCM to predict possible changes and to observe whether the system reaches an equilibrium state. Alternative scenarios are taken into consideration for the simulation of the research model. In each of the test scenarios the FCM is first initialized, i.e. the activation level is identified as $A^{(0)} = [0,0,0,0,0,1,0,0,0,0,0,0]$ where only the factor “24hr service availability” is activated. Then, using the equation, $A_i^{(k+1)} = f\left(A_i^{(k)} + \sum_{j=1, j \neq i}^{n} A_j^{(k)} w_{ji}\right)$, the weights of the factors are calculated. The most common threshold function, sigmoid function with a parameter $\lambda = 1$, is used for calculating weights.

For instance, $A_6^{(6)} = 0.9997$ implies that, after 6 iterations, Factor 6 (24hr availability) is 99.97% of its maximum normalized value. Figure 3 demonstrates a scenario where only the factor “24hr service availability” is activated. In all scenarios, after six iterations, the system reached to an equilibrium state with almost similar steady state values of the factors; that is why, only the average final values are presented. The steady state values of the factors are seen in Table 4.

Table 4. Steady state values of the factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Steady State Value</th>
<th>Factor</th>
<th>Steady State Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer satisfaction</td>
<td>0.9997</td>
<td>Privacy</td>
<td>0.7944</td>
</tr>
<tr>
<td>Service quality</td>
<td>0.9812</td>
<td>Location free access</td>
<td>0.6591</td>
</tr>
<tr>
<td>Convenience</td>
<td>0.9369</td>
<td>24hr service availability</td>
<td>0.6590</td>
</tr>
<tr>
<td>Time saving</td>
<td>0.8786</td>
<td>Design</td>
<td>0.6590</td>
</tr>
<tr>
<td>Performance</td>
<td>0.8690</td>
<td>Security</td>
<td>0.6590</td>
</tr>
<tr>
<td>Ease of use</td>
<td>0.8047</td>
<td>Responsiveness</td>
<td>0.6590</td>
</tr>
</tbody>
</table>

Steady state values give the importance degree of the factors in the systems. According to the results, the most important factors in the system are found to be customer satisfaction, service quality, and convenience whereas location free access, 24hr service availability, design, security, and responsiveness are found to be least important factors.

6. Discussion and Conclusion

This study reveals the critical factors affecting customer satisfaction in mobile banking applications. FCM is used for modeling and analyzing factors involved in this context. The model represents the causal relationships among relative factors to the customer satisfaction behavior. The constructed FCM shows that service quality is the most critical factor to have satisfied customers. It is followed by convenience and time saving. It may be interpreted that appropriateness of the mobile...
banking applications for performing financial services is another way to reach better customer satisfaction and performing financial activities in less time is also important for consumers. On the other hand, location free access, 24hr service availability, design, security, and responsiveness are the least critical factors compared to the others. Performing financial activities wherever and whenever wanted is relatively unimportant for consumers. Moreover, user-friendliness of the application does not seem to have critical importance for users to be satisfied. Security also has less importance than among most others. The ability of protection of the system by hackers or frauds does not seem to have a relevant value in using mobile banking applications compared to service quality and convenience.

Customer satisfaction is an important subject for managers. Satisfied customers are more likely to continue to use a mobile banking application. To make them continue to use these applications and to make other customers to start using these applications, attention should be given to their needs and expectations from the system. Therefore, this study reveals customer insights and expectations in terms of using mobile banking application in Turkey.

References


Market-related Key Influences on the Early and Rapid Internationalization in the Airline Industry: The easyJet Case

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Abstract
This paper analyses the key influences on the emergence of Born Global Firms (BGFs) in the airline industry. At the centre of attention is the question what market-related key influences favoured the early and rapid internationalization in the case of the low cost airline easyJet. In order to answer this question the appropriate methodology of a single case study content analysis approach was chosen. Hence reference is made to various documents and archival records such as books, company documents, company websites, journal articles, newspaper articles, official statistical data and other Internet sources. The time period under consideration is from the 1995 to 2000, which is the start-up phase of easyJet. The results show that the market conditions of the low state protection in the home country, the strong opportunistic behaviour of easyJet when selecting the host country, the high internationality and extensive use of technology in the airline industry has promoted the early and rapid internationalization of easyJet.

Key Words: Born Global Firms, Internationalization strategies, early internationalization, rapid internationalization, airline industry
1. Introduction

“It was 7 a.m., it was a wet, miserable, lousy day in Luton, and equally cold and miserable in Glasgow. I discovered very quickly that this was not going to be glamorous” – Stelios Haji-Ioannou, founder of easyJet, (Calder, 2006)

This is how the young Greek-Cypriot easyJet founder recalls the day of the first easyJet flight from London to Glasgow on November 10, 1995. In the years after the company was founded, easyJet grew extensively into international markets. Already one year after its launch, easyJet started to offer routes to the Netherlands, France and Spain. Today, easyJet has become the second biggest low-cost airline in Europe, boasting a net revenue of around £ 4.686 million in 2015 (EasyJet annual report, 2015).

The internationalization of enterprises is nowadays one of the main tasks of management teams, who seek continuous growth for their companies. If a firm does not want its products and services to bind them to local markets, expanding into foreign countries is often unavoidable.

Traditionally, the internationalization of enterprises is explained with the aid of the very influential process theory approach. This theory examines the internationalization behaviour of the firms. It is therefore assumed that enterprises enter into foreign markets gradually. In other words, firms try first to establish a comfortable position in their home markets before they venture into foreign markets. This procedure of gradual expansion can be attributed to the fact that firms view foreign expansion as a high-risk strategy. Consequently, the theory assumes a very risk-averse behaviour of firms and slow internationalization.

This conservative concept of gradual expansion, which used to be the most widespread and influential, is however increasingly being questioned. The rapid development in information, production and communication technology and changing market conditions due to globalization has further accelerated the process of internationalization (Holtbrügge & Enßlinger, 2004). For example, in the 1970s, it took a newly founded company more than twenty years to conduct its first international activity (Luostarinen & Gabrielsson, 2002). In contrast, one can increasingly observe companies since the 1980s, which engage in international operations almost from day one. This often includes not only exports, but also challenging internationalization strategies such as foreign branches or transnational business cooperation. The internationalization process thus differs significantly from traditional businesses in the past. This dramatic acceleration of the internationalization process makes it necessary to develop new internationalization theories to explain this phenomenon.

By the early 1990’s, scholars had become aware of the new trend of early and rapid internationalization. Michael W. Rennie (1993) was one of the first to study and write about this new business model and contributed to the creation of the term “Born Globals” which many more researchers and scholars enhanced and expanded upon. To date, the majority of studies have focused on the high-tech industries such as Information Technology (IT) where the highest number of Born Global Firms (BGFs) can be found.

This paper aims at examining the airline industry, which has not yet been the focus in most studies on BGFs and therefore differentiates this paper from former analysis. This thesis will shed light on the rapid and early internationalization of one BGF. It will focus on a single case study, the low-cost airline easyJet. EasyJet is a perfect case because the UK-based airline is one of the most successful low-cost carriers in Europe and has an outstanding internationalization speed. Thus, in conjunction with the early and rapid internationalization of BGFs and the easyJet airline, the following research question arises: What market-related key influences favoured the rapid and early internationalization of the low-cost airline easyJet?

This paper is divided into six chapters. After the introduction, the current state of academic knowledge regarding BGFs is discussed in more detail in chapter two. Chapter three introduces a
conceptual model that deals with the key influences of early and rapid internationalization. The fourth chapter deals with the important aspects of the method used in this paper. Chapter five attempts to specifically answer the research question, thus key influences are examined carefully in regards to market conditions. In the paper’s conclusion, the research results will be summarized and interpreted.

2. Born Global Firms

Rennie (1993) was one of the first to investigate on the BGFs phenomena. The scholar discovered in a study designated by the Australian government, that a quarter of the 300 studied Australian enterprises shortly after or at the very beginning of their existence were active in various foreign markets. The research field of internationalization has been strongly influenced by his findings. Rennie’s investigations (1993) created an independent research area, which deals with the so-called phenomenon of BGFs. Even earlier approaches such as by Hedlund (1985) have found that the phase model of internationalization by Johanson and Vahlne (1977) cannot describe all aspects adequately. Many scholars took up the study of Rennie and examined the internationalization of BGFs in respect to other regions, countries and sectors (Benjamin Oviatt & McDougall, 1994; Madsen & Servais, 1997; Persinger, Civi, & Vostina, 2011; Alex Rialp, Rialp, & Knight, 2005; Sharma & Blomstermo, 2003).

Despite the considerable research that BGFs have experienced in the past 22 years the term for that phenomenon varies to some extent within the new field of research. In addition to the introduced term “Born Globals” by Rennie (1993), there are the further designations: “Infant Internationals” (Bell, McNaughton, Young, & Crick, 2003) or “International New Ventures” (Benjamin Oviatt & McDougall, 1994). However, the majority of the scholars adhere to “Born Globals”.

There is also a wide spectrum in the definition of the term BGFs. The definition for BGFs generally represents a major challenge, which is why the topic is addressed very carefully in the literature. Some researchers even avoid a definition for BGFs completely and merely describe the characteristics. This suggests that even experts in the field of internationalization have not agreed yet on a universal definition of this concept. Knight, Madsen and Servais (2004) define the term BGFs as follows:

"Firms less than 20 years old that internationalised on average within three years of founding and generate at least 25 percent of total sales from abroad” (G. A. Knight & Cavusgil, 2004).

Subsequently, this work orients itself on the latter definition. This explanation is very popular and has spread internationally very far.

Most limitations for the BGFs definitions can be found along the components speed of internationalization, geographical reach and degree of internationalization. Both the number of components, as well as their determination between the different researchers varies greatly.

In particular the speed of internationalization is greatly discussed among researchers. This is most often measured by the time between business creation and the first foreign sales. Many scholars consider firms in their research, which start to export only after a few years after its foundation (G. A. Knight & Cavusgil, 2004). Also Rialp et al. (2005) note that the time span between foundation and first internationalization steps varies greatly among researchers. Oviatt and McDougall (1994) define for example as a criterion a 6 year period in which the first form of internationalization should take place. In contrast, Rennie (1993) argues that first foreign activities should be taken only within two years after foundation. In the literature periods can range from 0 - 6 years, however, the majority of researchers have used a time period of 2-3 years (G. Knight et al., 2004; Madsen, Rasmussen, & Servais, 2000; Rennie, 1993).

The number of countries or the number of cultural regions determines the geographical reach of BGFs (Lummaa, 2002). Holtbrügge und Enßlinger (2004) recommend a minimum of two cultural
regions where the BGFs need to be active. In general, this criterion is applied very rarely in investigations.

The **degree of internationalization** is often measured with the share of foreign sales in total turnover of the firms. However, there is also only little agreement among researchers how big the foreign sales share should be. Many scholars recommend a minimum value between 5 to 25 per cent (G. Knight et al., 2004; Madsen et al., 2000; Rennie, 1993).

Further Madsen and Servais (1997) argue that the phenomenon BGFs is not limited only to technology-oriented companies as some researchers did indicate in the past. Thus companies from many different industries such as for example the automotive, energy, electronics, IT, chemical and telecommunications industries are identified as BGFs in the literature. Famous examples for BGFs are Skype, eBay, Logitech, Amazon, easyJet.

BGFs are considered to be among the small and medium sized enterprises (Holtbrügge & Enßlinger, 2004). The definition of small and medium enterprises is similarly vague as the one of BGFs. However, it can be assumed that the internationally recognized characteristics for a small and medium sized firms established by the EU Commission can at least give some guidance.

Most studies on BGFs deal with the three areas: internationalization behaviour, key influences on the early and rapid internationalization and success factors. So far, no concrete model for the internationalization behaviour of BGFs is worked out in the current literature. To date, only a differentiation to the traditional internationalization models is achieved. The way of internationalization of BGFs differs less compared with traditional businesses. For example, other researchers recognize export also as the first step of internationalization for BGFs (Bell, 1995; Madsen et al., 2000; Moen, 2002). Therefore, one can state that the topic BGFs is primarily concerned with the factors that influence rapid internationalization. For this reasons, researchers are focusing their studies increasingly on key influences that can explain the early and rapid expansion.

### 3. Key influences on the early and rapid internationalization – a conceptual model

As a basic conceptual model for this work, we follow the conceptual model in the study proposed by Wessely (2010). In her dissertation “Management of BGFs: Initial forces, success factors, management tools” she develops a comprehensive conceptual model that deals with the key influences on the early and rapid internationalization.

Previous studies showed that key influences on the early and rapid internationalization have occurred that can be attributed directly to the company (e.g. international experience, global vision from the beginning), and factors, which can be assigned to the environment of the firm (e.g. network connections). Wessely (2010) argues that these two sets of key influences can be examined with the resources-based view. The scholar points out that the resource-based view has already been used in several previous studies to investigate on BGFs (Gaba et al., 2002; G. A. Knight & Cavusgil, 2005; A. Rialp & Rialp, 2003; Schmidt-Buchholz, 2001; Yeoh, 2004).

Other key influences could be identified with respect to the home and host country as well as the industry (e.g. weak domestic market, state protection). To operationalize these aspects Wessely (2010) uses the market-based view. Similarly, this approach has already been used in previous studies to investigate on the phenomenon of BGFs (Aspelund & Moen, 2005; Pla-Barber & Escribá-Esteve, 2006).

In the conceptual model the resource-based view and the market-based view are combined in order to categorize the identified key influences on the early and rapid internationalization of BGFs. Thereby the following conceptual model illustrated in figure 1 accurse.
Within the conceptual model, the market conditions and the resources can be seen as key influences, which favour the early and rapid internationalization. Key influences are present either already at the time of the establishment or when the first internationalization steps are taken on.

4. Methodology

This chapter serves as a detailed overview of the research methods to be used in this paper. First, the case study approach is explained in general, before the selection of the case study is presented. Finally, the methods of data collection and data analysis are discussed.

Case studies are generally classified in the field of empirical research (Hampp, 2013). It is a very open form of research, which can vary considerably in their concrete application. Case studies are often used because not enough is known about the area of investigation to use other methods. With a case study, the researcher is allowed to describe, explain, and explore an investigated phenomenon very intuitively.

In terms of the number of cases investigated, this dissertation is limited to a single case study. The use of multiple case studies would be beyond the scope of this paper and therefore would not allow an investigation in great detail. Moreover, in this work theoretical knowledge is questioned and new
insights should be gained from an only little researched phenomenon. With such a goal in mind, Yin (2009) recommends as well to use the single case study approach.

To select in the field of aviation a suitable case it is necessary to apply certain criteria that define a BGF. As described in chapter 2 there is yet no universal definition for the term BGFs. Therefore, the following three criteria that can be found in the definition of Knight (2004) are used:

- Less than 20 years old &
- Internationalize on average within three years of founding &
- Generate at least 25% of total sales from abroad

These three criteria were in the case of easyJet directly tested via a phone call to the press department of easyJet and with the help of official documents. It turned out in the case of easyJet that all three criteria are met for the years under consideration from 1995 to 2000.

In this paper, the content analysis is to be used as a primary method of investigation. Hence reference is made to various documents and archival records such as books, company documents, company websites, journal articles, newspaper articles, official statistical data and other Internet sources. In this secondary data approach, the author have tried to use a great number of multiple sources to comply with the recommendations of Yin (2009) and Robson (2002).

With regard to the analysis of a case study no universal procedure has so far prevailed (Yin, 2009). Often the scholar must therefore rely on his experience to choose the right strategy for the investigation (Tellis, 1997). In this paper, a mix out of qualitative and quantitative content analysis is carried out to answer the research question. Thereby the three basic methods of summarization, explication and structuring are used (Mayring, 2010).

Further this paper is based on a deductive approach. A theoretical model of key influences on early and rapid internationalization is applied on the case of easyJet. It is investigated if the key influences in the conceptual model can be found at easyJet.

5. Analysis of the market-related key influences on easyJet’s early and rapid internationalization

Finally, this chapter will attempt to answer the research question underlying this dissertation: “What market-related key influences favoured the rapid and early internationalization of the low-cost airline easyJet?” To answer this question, we begin by taking a closer look at the presented key influences on early and rapid internationalization described in the conceptual model in chapter 3. In the following is investigated whether the market-related key influences can be observed in the case of easyJet. In total a number of ten market-related key influences are assessed. The period under consideration is limited to the company’s start-up phase, from 1995 – 2000. In this time the firms first internationalization steps were taking place and rapid growth was present, which are main characteristics of BGFs.

With regard to the market conditions of the home country market, the host country market and the relevant industry is examined. For the British airline easyJet the United Kingdom was considered as the relevant home market. The host country under investigation was the Netherlands since Amsterdam is the first location outside form the UK that easyJet expanded to. Lastly, the aviation industry is evaluated, because easyJet is a low-cost civilian airline.
Market conditions in the United Kingdom

The first key influence that should be evaluated is the market size of the home country. In the literature, evidence can be found that a small market size can promote the emergence of BGFs (Johnson, 2004; Lindqvist, 1991; McNaughton, 2001; Oviatt & McDougall, 1999).

Stelios originally wanted to launch his low-cost airline in Athens. But his father pointed out that Athens’ small and highly seasonal market located at the end of Europe could make it difficult for the airline. Thereupon, Stelios looked at the population numbers of other European countries. He identified France, Germany, Italy and the UK as suitable locations for his new airline. In the end Stelios decided to choose the UK because only there could he speak the local language. Within the UK quickly the choice fell on London, as there where located the highest number of potential customers. However, easyJet was not based at one of the major airports like Heathrow or Gatwick as they are either too expensive or there were no aircraft slots available. The decision has to be made between Stansted and Luton. Due to the lower airport fees Stelios chooses Luton. For people from central London Luton is in general not so easy to reach, as it involves a thirty-minute train ride and fifteen-minutes by bus (Calder, 2006; L. Jones, 2005).

The aviation market in the United Kingdom (UK) was already huge when the civilian low-cost passenger airline easyJet was founded in 1995. The total population of the UK was more than 58 million and airport statistics show that there are close to 129 million passengers transported in 1995. The figure grew to nearly 180 million in the year 2000, even though the population growth was only minor (from 58.02 million in 1995 to 58.89 million in 2000). This indicates a very aggressive growth in the UK aviation market (Rutherford, 2011; “World Bank - World Development Indicators,” 2016).

When Stelios selected his first two routes for easyJet he was, in the first instance, trying to minimize the risk (Calder, 2006). Therefore Stelios selected the two largest domestic air markets from London with the Scottish cities Glasgow and Edinburgh. After the first day of operation 80 per cent of the seats were booked on the two routes. Naturally, the third largest Scottish city Aberdeen was included in the route plan of easyJet in January 1996.

As Morrison et al. (1995) states, the countries that take the lead in establishing low-cost airlines are Britain and the Netherlands. Thus it is not surprising that the first push towards internationalization from easyJet is into Amsterdam in April 1996, where customers are familiar with the business model. Later in the same year, easyJet expanded to France and Spain. EasyJet’s rapid growth in Europe after just one year indicates that considerable expansion is possible before any evidence of market saturation in the UK can be recognized.

However, there are many major cities in the UK. One is tempted to wonder why easyJet did not just stay in the UK and exploit that market further. The answer is probably largely due to their customers, many of which want to fly to and from Europe. Thus, traffic at UK airports is considerable higher for international as opposed for domestic passengers; and not all of the international passengers fly to Europe. Looking at the growth rate of passengers transported domestically and internationally, indicates that the international markets probably offered great incentives. According to the UK airport statistics cited by Rutherford (2011) the following development presented in figure 3 can be recognized.
The above figure shows that for the time between 1995 and 2000 the international passenger numbers experienced aggressive growth with an average growth rate of 6.8%. In 1995 101.4 million international passengers were transported. This number increased to 142.7 million in the year 2000. The domestic passenger numbers also had a high average growth rate with 6.3% for the time from 1995 to 2000 and is also evident. In 1995 there are 14 million domestic passengers and this figure grew to 18.6 million in 2000. Thus, clearly more international passengers than domestic passengers can be found in absolute numbers, which can increase the attractiveness for airlines to offer international flights. A significant difference between the two growth rates, however, could not be recognized. Nevertheless, the authors are certain that it was not the insufficient size of the home market that was responsible for easyJet’s early and rapid internationalization, rather it was foreign market opportunities.

Previous studies recommend that BGFs often emerge in countries with a small domestic market. In contrast, in the case of easyJet, a huge domestic market existed noticed within the UK that certainly had not reached saturation in 1996. Nevertheless, easyJet expanded extensively into foreign countries shortly after foundation. For this reason, the statement that early and rapidly internationalizing firms come from smaller domestic markets cannot be supported in the case of easyJet.

The second key influence under consideration is the competition in the home market. Certain research has shown that BGFs often have only little competition in their home markets (McNaughton, 2001).

The European deregulation of aviation led to a substantial increase in competition by the mid-nineties. Geller et. al. (2013) report that competition was so fierce that Europe’s top five airlines have grasped a combined market share of only 31 per cent, while the five largest airlines in the USA have a lion’s share of 67 per cent. Deregulation also signalled a change in the airline landscape, with old companies bowing out and new companies jumping on the low-cost bandwagon. In 1995 alone 65 airlines launched their operations (Sull, 1999). Seventeen of these airlines declared bankruptcy in their first year of operation.

In the first two years of operation easyJet had three major competitors in the UK market. The biggest competitor was Ryanair and the two others were the UK airline Debonair and the Belgian Virgin Express. Notably, Sull (1999) states and illustrates in table 1 that they often did not compete with each
other on the same routes. Thus, most destinations were only served by one low-cost airline. There were some routes that were served by more than one low-cost provider, but these routes normally had a sufficiently large passenger volume. For example, the route between London Luton and Barcelona being served by easyJet and as well Debonair.

Tab.1: Sequence of low-cost airlines’ entry into new destinations

<table>
<thead>
<tr>
<th>Destination</th>
<th>Daily flights from base</th>
<th>easyJet</th>
<th>Debonair</th>
<th>Ryanair</th>
<th>Virgin Express</th>
</tr>
</thead>
<tbody>
<tr>
<td>London Luton</td>
<td>2 - 4</td>
<td></td>
<td></td>
<td>Jan-86</td>
<td></td>
</tr>
<tr>
<td>Liverpool</td>
<td>1 - 3</td>
<td></td>
<td></td>
<td>May-88</td>
<td></td>
</tr>
<tr>
<td>London Stansted</td>
<td>9 - 11</td>
<td></td>
<td></td>
<td>Nov-88</td>
<td></td>
</tr>
<tr>
<td>Knock (Ireland)</td>
<td>1</td>
<td></td>
<td></td>
<td>May-91</td>
<td></td>
</tr>
<tr>
<td>Cork (Ireland)</td>
<td>3</td>
<td></td>
<td></td>
<td>Oct-91</td>
<td></td>
</tr>
<tr>
<td>Birmingham</td>
<td>3 - 6</td>
<td></td>
<td></td>
<td>Nov-93</td>
<td></td>
</tr>
<tr>
<td>Manchester</td>
<td>4 - 5</td>
<td></td>
<td></td>
<td>May-94</td>
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<tr>
<td>Glasgow</td>
<td>8 - 12</td>
<td></td>
<td></td>
<td>Nov-94</td>
<td>May-94</td>
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<tr>
<td>London Gatwick</td>
<td>6</td>
<td></td>
<td></td>
<td>Nov-94</td>
<td>Mar-97</td>
</tr>
<tr>
<td>Barcelona</td>
<td>7 - 10</td>
<td>Jun-96</td>
<td>Jun-96</td>
<td>Nov-94</td>
<td></td>
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<tr>
<td>Madrid</td>
<td>4</td>
<td></td>
<td></td>
<td>Jul-96</td>
<td>May-95</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>4 - 5</td>
<td>Nov-95</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Milan</td>
<td>1</td>
<td></td>
<td></td>
<td>Dec-95</td>
<td></td>
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<tr>
<td>Aberdeen</td>
<td>1</td>
<td>Jan-96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amsterdam</td>
<td>3 - 4</td>
<td>Apr-96</td>
<td></td>
<td></td>
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<tr>
<td>Nice</td>
<td>5 - 7</td>
<td>Jun-96</td>
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<td>Apr-96</td>
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<td>Leeds</td>
<td>1 - 2</td>
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<td></td>
<td>May-96</td>
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<tr>
<td>Bournemouth</td>
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<tr>
<td>Cardiff</td>
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<td>Dusseldorf</td>
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<td>Munich</td>
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<td>Jul-96</td>
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<td>Copenhagen</td>
<td>3</td>
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<td>Oct-96</td>
<td>Sep-96</td>
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<tr>
<td>Rome</td>
<td>10 - 12</td>
<td>Nov-96</td>
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<td>Sep-96</td>
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<tr>
<td>London Heathrow</td>
<td>8</td>
<td></td>
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<td>Oct-96</td>
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<tr>
<td>Inverness</td>
<td>1</td>
<td>Nov-96</td>
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<td></td>
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<tr>
<td>Paris Beauvais</td>
<td>3</td>
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<td></td>
<td>May-97</td>
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<tr>
<td>Brussels Charle-roi</td>
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<td>May-97</td>
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<td>Bristol</td>
<td>2</td>
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<td>May-97</td>
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<tr>
<td>Stockholm</td>
<td>2</td>
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<td>Jun-97</td>
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<tr>
<td>Kerry (Ireland)</td>
<td>1</td>
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<td></td>
<td>Jun-97</td>
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<tr>
<td>Geneva</td>
<td>1 - 2</td>
<td>Dec-97</td>
<td></td>
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<tr>
<td>Palma (Spain)</td>
<td>1 - 2</td>
<td>Dec-97</td>
<td></td>
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</tbody>
</table>

Dates in bold indicate first move into the specific destination.

Note: Adapted from (Sull, 1999)
Ryanair was already an established airline when the industry is deregulated. By late 1997, Ryanair offers more than 100 schedule flights every day. The firm was well established in the UK and Ireland, serving four Irish locations, nine in England, as well as Glasgow (Scotland) and Cardiff (Wales) (Geller et al., 2013; Sull, 1999).

Debonair, founded in 1995, located its base similarly to easyJet at London Luton airport, offering low-fares without any compromise on comfort. The company expanded rapidly to major airports, targeting business travellers. Unlike easyJet, the airline attracted customers with some frills (L. Jones, 2005; Sull, 1999).

Virgin Express was founded in 1991 with the headquarters in Brussels under the name Eurobelgian Airlines (EBA) and initially established itself as a charter airline (Calder, 2006). After five years, Richard Branson, the founder of the Virgin Group, took over the airline. The airline renamed and rebranded in 1997 as Virgin Express and from then on tried to operate as a low-cost airline. Within a year Virgin Express managed to establish daily scheduled services to London Gatwick and Heathrow and six other major cities in Europe (Sull, 1999).

The little direct competition among the low-cost carriers changed briefly in 1997, when British Airways announced launch of their own low-cost airline Go Fly (Sull, 1999). The London Stansted located airline had, according to British Airways, the purpose of penetrating the growing market for low-cost flights and to help stay competitive. However, other low-cost carriers like easyJet and Debonair see in Go Fly a scam that is introduced to squeeze other low-cost airlines out of the market with the financial backing of British Airways (Calder, 2006). The pricing strategy of Go Fly was set to match the fares of easyJet, Ryanair, Debonair and Virgin Express on the routes they were serving and to introduce slight cut-rate fares on the routes these low-cost carriers were not flying to. In August 1998 Go was for the first time in direct competition with easyJet on the London – Edinburgh route. Go set its price only two pounds higher than easyJet. Two months later Go reduced its ticket prices to a starting price from 15 pounds for a one-way flight. EasyJet’s lowest price at that time was 29 pounds from Luton. Stelios states: “I am sure BA/Go is losing a fortune with such prices” (L. Jones, 2005). Stelios further argued that these cheap prices of Go increased drastically again as soon as the competition is outset on a route. Nevertheless, easyJet was able to maintain its strong market position and expand its routes. British Airways operated Go from 1998 until 2000 and then sold the airline in what was described as a private equity backed management buy-out. Ironically, the following year Go was purchased by easyJet and merged with their operations (Calder, 2006).

Scholars argue that the lower the competition in the home market, the likelier the emergence of a BGFs. EasyJet faced massive competition with three big competitors and BA’s Go airline that tried to run low-cost airlines out of business in general. Despite the high competition and threats to business, easyJet managed to expand abroad exponentially. For this reason, the findings of previous scholars cannot be supported in the case of easyJet.

The last key influence that should be examined with regard to the home market is state protection. Previous studies deliver evidence that low state protection can favour the emergence of BGFs (Oviatt & McDougall, 1999).

Historically air transportation is highly regulated by most of the world’s governments to protect their local airlines. Additionally, in most countries the so-called flag carriers are traditionally state owned – including BA in the UK. Generally speaking, because these carriers are subsidized by the state, even when profits are insignificant or even zero, management could rest assured that their operations would continue. This is still the case in many countries following international liberalization programs that have deregulated the industry worldwide. However, in the UK, BA has been fully privately owned after having been operated by the Department of Transport for decades (Yarrow et al., 1995).

The UK government sold the airline in 1987, but it continues to dominate the market. According to the Civil Aviation Authority BA’s “scheduled capacity” in the UK is 84.4 per cent. Virgin Atlantic’s is
10.8 per cent and British Midlands’s 2 per cent. Following privatization of BA in 1987, deregulation accelerated. Yarrow (1995) argues that privatization is in itself a form of deregulation. Nevertheless, the process of deregulation in Europe as a whole was quite gradual, with different aviation “packages” coming into play progressively. The third and final package became effective on 1 January 1993, though a transition period until April 1997 was allowed. These packages contained aspects with regard to licensing of carriers, market access and fares (Scharpenseel, 2001). Through the packages it was ensured that:

1. All airlines in the EU have the same licensing conditions.

2. No more entry barriers.

3. No restrictions in terms of setting fares and rates.

By the time easyJet launched in 1995, liberalization of the air transportation industry in the UK and Europe was already almost fully in place. Thus, it was relatively easy for the airline to expand in 1996 to Amsterdam, Nice and Barcelona. State protection of the market could no longer stop them. Tim Jeans, the former sales and marketing director of Ryanair goes so far as to states: “There would be no low-cost airlines were it not for deregulation” (L. Jones, 2005). For such reasons it can be argued that, in accordance with current literature, low state protection is a vital key influence for the early and rapid internationalization of easyJet.

Host country conditions in the Netherlands

The first host country variable to be evaluated is the market size and growth. A big market size and attractive market growth of the host country is to be considered to favour the early and rapid internationalization of BGFs (Bell et al., 2003; Benjamin Oviatt & McDougall, 1994; Gaba et al., 2002; Holtbrügge & Enßlinger, 2004; G. Knight et al., 2004).

EasyJet’s first international expansion took place to the Schiphol airport in Amsterdam, Netherlands in 1996. As figure 3 shows, the total population of the country Netherlands with 15.5 million people at the time can be considered as rather low compared with other European countries. The population growth over the considered period is 0.58 % and is also very low. It is striking that in the year of easyJet’s expansion to the Netherlands even the lowest growth rate with 0.46% can be noted. The highest growth occurred in 2000 with 0.72 %.
Nevertheless, the Netherlands being a relatively small country, Amsterdam’s major airport Schiphol is of great importance in Europe. As Table 2 clearly shows this airport is in 1996 the fourth largest airport in Europe due to passenger numbers and air transport movements. The air transport movements at Schiphol from 1995 – 1997 increase by an average of 9.65%. Over the same period, the passenger numbers increased on average by 9.65%. Thus, the Schiphol in the Netherlands is among the largest airports in Europe with very attractive growth figures. In combination with London Luton, easyJet managed to connect two of the biggest markets in the whole of Europe. Stelios describes the advantages of the new route with the sentence: “It meets our criteria as a busy route with an overpriced fares structure” (L. Jones, 2005).

Tab. 2: European airports traffic statistics

<table>
<thead>
<tr>
<th>Rank by Movements in 1996</th>
<th>Rank by Passengers in 1996</th>
<th>Country</th>
<th>City</th>
<th>Airport</th>
<th>Airport Code</th>
<th>Total Air Transport Movements in thousands</th>
<th>Total Passengers in thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>UK</td>
<td>LON</td>
<td>HEATHROW</td>
<td>LHR</td>
<td>418.8</td>
<td>426.9</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>GERMANY</td>
<td>FRANKFURT/MAIN</td>
<td>RHEIM/MAIN</td>
<td>FRA</td>
<td>372.6</td>
<td>380</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>FRANCE</td>
<td>PARIS</td>
<td>CHARLES DE GAULLE</td>
<td>CDG</td>
<td>325.3</td>
<td>360.6</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>NETH.</td>
<td>AMSTERDAM</td>
<td>SCHIPHOL</td>
<td>AMS</td>
<td>290.7</td>
<td>321.8</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>FRANCE</td>
<td>ORLY</td>
<td>ORLY</td>
<td>ORY</td>
<td>232.7</td>
<td>245.4</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>UK</td>
<td>LONDON</td>
<td>GATWICK</td>
<td>LGW</td>
<td>192</td>
<td>211</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>ITALY</td>
<td>ROME</td>
<td>FIUMICINO</td>
<td>FCO</td>
<td>209.2</td>
<td>236.5</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>SPAIN</td>
<td>MADRID</td>
<td>BARAJAS</td>
<td>MAD</td>
<td>219</td>
<td>242.8</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>SWITZ.</td>
<td>ZURICH</td>
<td>ZURICH</td>
<td>ZRH</td>
<td>209</td>
<td>224.4</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>GERMANY</td>
<td>MUNICH</td>
<td>MUNICH</td>
<td>MUC</td>
<td>201.9</td>
<td>211.7</td>
</tr>
</tbody>
</table>

**Note:** Adapted from (Morrell, 1998; Reynolds-Feighan & Button, 1999)

**Figure 3:** Total population Netherlands 1995 – 2000. Adapted from (“World Bank - World Development Indicators,” 2016), 26/01/16, retrieved from http://databank.worldbank.org
In summary, a very big market with high market growth motivated easyJet’s first expansion target. Clearly this is a great incentive for easyJet to foster expansion to this location. Consequently, the findings in this case are in accordance with the results of former scholars who argue that the big market growth and size of the host country drives the emergence of BGFs.

The second variable that is about to be evaluated with respect to the host country is the **important customers**. It is argued in studies that the presence of important customers in the host country can promote the early and rapid internationalization of a firm and thus contributes to the emergence of a BGF (Johnson, 2004).

Customer demographics have changed quite dramatically over the past few decades. As Taneja (2012) warns, if airlines cannot understand and respond quickly to customer needs they are not going to survive.

When easyJet first launched, there was a clear vision of who their target customers were. Sull (1999) explains that at first the airline generally ignored business travellers to a large extent and focused simply on customers who are cost-conscious. Discussing the easyJet customer base in more detail, Stelios first defined the target market: “people who pay for travel from their own pockets”. He described the companies’ three customer segments ranked due to their importance as:

1. Leisure travellers making brief trips
2. Travellers visiting relatives like family or friends
3. Entrepreneurs and managers of small businesses

Later on the business travellers also started to realise the big cost advantage that easyJet was offering. Thus, easyJet for example provided special options for several large companies based in Luton, including ICL, Tesco and Vauxhall. In addition, easyJet targeted certain “route specific” travellers in 1996, including expats living in the south of France and British with teaching jobs in Spain.

For easyJet the first step towards internationalization was to the Amsterdam, Schiphol airport. The route between London and Amsterdam provided a good tourist option and offered business travellers easy proximity to the city centre (EasyJet PLC, 2000). Additionally, a third type of customer developed unexpectedly on this route (L. Jones, 2005). The affordable fares of easyJet made it possible for the first time for a large number of drug tourists come from the UK to Amsterdam at low rates. The Netherlands and especially Amsterdam is known for its liberal drug policy (Walden, 2007).

Aderton and Nandan (2011) argue that the low costs are easyJet’s key to success. Everything about the easyJet operation works towards lowering costs and providing cheap flight tickets to a large and very diverse customer group. Thus, the airline’s target market is from the beginning anybody that wants to save some money when flying. Stelios explains the low price strategy quite simply: “The cheaper you can make something, the more people there are who can afford it” (L. Jones, 2005).

On the route between London and Amsterdam some important customer segments could be detected, such as holidaymakers or business travellers. Nevertheless, customers are very diverse on this route and one cannot argue that specific important customers are responsible for the expansion of easyJet to Amsterdam. Therefore no agreement with the theories about important customers in the host country and the emergence of BGFs could be found in the case of easyJet.

The last variable with regard to the host country is the **market risk**. Previous studies recommend that low market risk in the host country can support the early and rapid internationalization to this country (Gaba et al., 2002).
In April 1996 easyJet introduced the first route into Europe from London to Amsterdam. On this highly profitable route 50 flights were already offered daily and major airlines like British Airways, British Midland and the Dutch airline KLM operate on it (Calder, 2006; Sull, 1999). Officials from the airport at Amsterdam Schiphol recommend easyJet to choose a different destination (Sull, 1999).

EasyJet promoted their new route by selling one-way flight tickets for just 39 pence on the first day of operation (Calder, 2006). After that the easyJet undercut the one-way ticket price for London to Amsterdam by British Airways of 150 pounds by more than half. For the one-way flight from Amsterdam to London easyJet charges 99 pounds, unlike KLM which had a fare of 296 pounds. In particular KLM is highly alerted by easyJet’s actions. KLM has a 40 per cent share in the route that they do not want to lose. In retaliation to easyJet’s perceived threat to their market, they matched the low-cost fares with what Sull (1999) describes as a permanent price promotion called “EasyChoice”.

Thereafter easyJet took serious losses on that route since partially almost no passengers could be transported. EasyJet founder, Stelios Haji-Ioannou argued that they could not survive another six months on that route if conditions stayed the same. He then took legal action against the anti-competitive practices of KLM and uses thousands of complain letters on KLM’s behaviour from his angry customers to get extensive press coverage (L. Jones, 2005). This increased brand awareness and it did not take long for easyJet to become a key player on the London-Amsterdam route (Sull, 1999).

In conclusion, easyJet faced high market risks when expanding to Amsterdam. Although a very large number of passengers are transported between London and Amsterdam, there is also huge competition present with three of the largest airlines in Europe, all willing to defend their market shares. For this reason, the argumentation in former theories that the low market risk in the host country facilitates the emergence of BGFs cannot be supported in the case of easyJet.

**Industry-specific conditions**

The first key influence that should be examined with respect to the industry is the **technology intensity**. Former research describes that the emergence of BGFs can be favoured when they operate in technology intensive industries (Andersson & Wictor, 2003; Oliver Burgel & Murray, 2000; N. E. Coviello & Munro, 1995; Harveston et al., 2000; Lindqvist, 1991; Zahra & Garvis, 2000).

The airline industry relies heavily on the use of modern technologies. Thus, technologies are used in a wide range of different areas. Probably the most significant use of technology is to be found with the aircraft and with information and communication systems.

Airlines are often very quick to integrate new technologies with respect to their aircraft. On the one hand the prevailing competition makes the constant adaptation of new technologies necessary in order to stay competitive. In the case of easyJet possible objectives with regard to their aircrafts are to keep unit costs as low as possible and to transport as many passengers as possible on one aircraft (EasyJet PLC, 2000). On the other hand aircraft manufacturers often make use of contractual hedging. Thus, aircraft manufacturers try to minimize the risk when developing a new aircraft type by agreeing with airlines on a certain sales volume forehand. The airlines have the advantage that they get a better price and an earlier delivery. This leads to close cooperation between aircraft manufactures and airlines and ultimately airlines often rapidly integrate new technologies in their airplanes (Conrady et al., 2013).

The use of modern information technology to automate, coordinate and support decisions by airlines since the 90s has replaced manual planning. Airlines use automatic planning, reservation and revenue management systems (Barlow, 2000). However, probably the biggest influence on the airline industry has been the direct sales of tickets on the Internet (Wiedemann, 2011). This sales channel makes it possible for airlines to make huge cost savings. Furthermore, the sale of tickets becomes available worldwide and can be sold independent from the location. Stelios even points out: “The Internet has probably had a bigger effect on people’s ability to fly than the jet engine” (L. Jones, 2005). He further describes the jet engine simply as an improvement on the propeller, but the Internet has made air
travelling to a mass market. EasyJet has used the Internet for direct sales since 1998 and replaced the phone as a major distribution channel within a short period of time.

To sum up, high technology intensity can be observed in the airline industry. In particular, the Internet can be referred to as it has for many airlines including easyJet contributed massively to the early and rapid internationalization. Thus, the findings are in accordance with former studies, which argued that BGFs often emerge in technology intensive industries.

Next the key influence knowledge-intensity shall now be examined. Former studies recommend that BGFs preferably emerge in knowledge-intensive industries (Bell et al., 2003; Benjamin Oviatt & McDougall, 1994; G. A. Knight & Cavusgil, 2004).

In terms of the product, however, no high knowledge intensity could be assessed in the case of easyJet. The distributed product is here primarily a service where the knowledge proportion is estimated to be rather minor as in other industries. This is in accordance with Verbeke and Merchant (2012) who also do not account air transportation to the knowledge intensive services rather than to the capital intensive services.

In strategic decisions, knowledge is used most in the airline industry. For example a variety of different data (e.g. population and passenger numbers) is used to decide which route will be flown next or where a new base should be established. However, one can assume that these data are available for all airlines at an equivalent level, which in turn does not lead to a big knowledge advantage.

Finally, high knowledge intensity could not be examined in the airline industry and thus there is no evidence on the higher probability for the emergence of BGFs.

The third key influence to be studied in the industry area is the product life cycle. Scholars state that short product life cycle can lead to an increased emergence of BGFs (N. E. Coviello & Munro, 1995; Saarenketo, 2004; Schmidt-Buchholz, 2001; Shrader et al., 2000).

Especially in saturated markets the product life cycles can be very short and firms are under constant pressure to drive sales through improvements and innovations (Alvermann, 2008). Airlines can for example adjust the on-board service, enhance comfort or increase the technical equipment of the aircraft to extend the product life cycle.

In the case of the low-cost carriers market saturation is not evident in the mid-nineties as described in section earlier. With the innovative service of low-cost flights a completely new niche market in Europe could be tapped into, which stands at the beginning of the product life cycle. Since 1996, easyJet expands extensively to Europe and achieves increasingly higher revenue and market shares. Representative for the low-cost carriers easyJet’s revenue development between 1996 and 2000 should be illustrated in figure 4. As one can easily notice the revenue growth is extremely high in this period. The average growth rate per year is 81% and the highest growth can be observed from 1996 to 1997 where the revenue number doubles.
Hence the massive growth it can be argued that the service offered by easyJet is after the period of five years still in the second of five phases of the product lifecycle, the so called growth phase. The growth phase is characterized by high revenue growth and high advertising expenditures.

In turn, considering other industries it can be examined that a much shorter product life cycle is present. For example, in the automotive industry, an average product life cycle of 5 to 8 years is commonly mentioned (Dorn, 2013; G. R. Jones & Bouncken, 2008). Accordingly, one can argue that the airline industry has very long product life cycles. In conclusion the argument that short product life cycles in an industry facilitate the emergence of BGFs cannot be supported in the case of the airline industry and easyJet.

The last key influence with respect to the industry is the internationality. Accordingly, when a high internationality can be found in an industry, also an increased appearance of BGFs could be recognized (Gabrielsson & Kirpalani, 2004; Johnson, 2004; Moen, 2002; Rennie, 1993).

The airline industry has always had a high degree of internationality since flying to other countries belongs to the airlines main business. The internationalization is further increased by the deregulation of the worldwide airspace and the associated privatization of airlines. The high internationality can be particularly recognized when looking at the passenger numbers in the EU. As figure 2 has already shown earlier in the UK the proportion of international passengers transported is significantly higher than the proportion of domestic passengers carried. Similar results can be found in many other European countries like for example Germany. Figure 6 shows that the percentage of domestic passengers is consistently around 20%. Consequently around 80% of the passengers are traveling to or is coming from another country.

Figure 4: EasyJet’s revenue 1996 – 2000. Adapted from several annual reports of easyJet, Adapted from (Barlow, 2000), 18/01/16
Thus, it can be argued that the majority of flights in Europe go across national borders and suggests a very high level of internationality in the industry. For this reason the view of other scholars on the frequent emergence of BGFs in highly international industries can be supported.

**Summing up** the results of the study so far one can recognize in table 3 that the home market conditions can have relatively little influence on the emergence of BGFs as in the case of easyJet. Thus only a minority out of the investigated variables have a positive effect on the early and rapid internationalization.

**Tab.3:** Market key influences on the early and rapid internationalization of easyJet

<table>
<thead>
<tr>
<th>Variable</th>
<th>Manifestation</th>
<th>Facilitates early and rapid internationalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market size</td>
<td>Big</td>
<td>✗</td>
</tr>
<tr>
<td>Competition</td>
<td>High</td>
<td>✗</td>
</tr>
<tr>
<td>State protection</td>
<td>Low</td>
<td>✓</td>
</tr>
<tr>
<td>Host country conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market size and growth</td>
<td>Big</td>
<td>✓</td>
</tr>
<tr>
<td>Important Customers</td>
<td>No</td>
<td>✗</td>
</tr>
<tr>
<td>Market risk</td>
<td>High</td>
<td>✗</td>
</tr>
<tr>
<td>Industry-specific conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology-intensive</td>
<td>Yes</td>
<td>✓</td>
</tr>
<tr>
<td>Knowledge-intensive</td>
<td>No</td>
<td>✗</td>
</tr>
<tr>
<td>Product life cycle</td>
<td>Long</td>
<td>✗</td>
</tr>
<tr>
<td>Internationality</td>
<td>High</td>
<td>✓</td>
</tr>
</tbody>
</table>

Note: Own illustration
6. Conclusion

By the end of the 1980’s an increasing number of firms engaged in sophisticated international expansion from their first day of operation or shortly thereafter. A new label emerged in business literature entitled “Born Global Firms” to define this phenomenon. Researchers, scholars and publishers have increasingly dedicated resources to attempt to explain how this all happened.

Although BGFs are certainly mushrooming in every sector of business, most former studies deal with BGFs in the high-technology industry, more specifically, the IT industry. For this reason the analysis of BGFs in other sectors is of particular interest to the author. Therefore, it is the objective of this work to investigate on the emergence of BGFs in the airline industry. At the centre of attention is the question what market-related key influences favoured the early and rapid internationalization in the case of the low cost airline easyJet. The following results could be found.

With regard to the market conditions the investigated variables only partially favour easyJet’s internationalization. Thus, four out of the ten investigated variables have a positive effect on the early and rapid internationalization. Firstly, it became clear that the low state protection in the home country was crucial for easyJet and enabled the company to expand into foreign countries in the first place. Secondly, when selecting the host country a strong opportunistic behaviour could be observed. Thus, easyJet primarily uses the selection criteria revenue potential and growth opportunities. Consequently a host country with an attractive market can trigger easyJet’s expansion to this location. Thirdly, easyJet’s international expansion is promoted by the high internationality and extensive use of technology in the airline industry.

Management implications that can be derived from this study and the analysis of relevant literature show that nowadays internationalization strategies are not only appropriate for big multinational companies with extensive resources but also for start-ups. Young companies with fewer resources should strongly consider expansion in international and global markets. This is especially true for technology intensive firms and firms operating in highly international industries.

For further studies it is recommended that the key influences of various industries and countries be investigated. In this way one can find more comprehensive models that can give credence to the BGFs.

References


