

# **Achieving business model innovation over time**

## **-On the basis of IAC and Travelzoo-**

### **(2006-2011)**

**Author:** Quynhtrang Le  
University of Twente  
P.O. Box 217, 7500AE Enschede  
The Netherlands

#### **Abstract:**

Digital platform industries are known for rapid changes due to the emergence of technologies and entering of new companies. Next to this, large platform companies, such as Google, Amazon and Facebook dominate the market, making it difficult for other enterprises to enter it. In order to grow and adapt to the fast and unstable environment, firms started to introduce innovations and changes to its model. Envelopment is known as one key aspect that makes innovation happen. Eisenmann proposed to recombine and bundle valuable resources from another platform with its own in order to form a supra-platform (2010). Furthermore, his envelopment typology distinguishes between three different types of envelopment: ‘Complement (I)’, ‘Weak Substitutes (II)’ and ‘Unrelated Platforms (III)’. However, long-term success and time designation has not been investigated on, making it difficult for industries to apply this typology. Hence, this study focuses on answering how business models innovate over time by examining Travelzoo and IAC and its product introduction over the time of 2006-2011. Thereby, two envelopment types were focused on, possibly leading to one company outperforming the other one in the long-term. However, during the timespan of these five years, both companies are making a steady growth in revenue, making it difficult to state, which one has a higher growth. However, due to applying Eisenmann’s typology and the Platform Envelopment Lifecycle Matrix (+ an updated version), which displays how to employ envelopment over time in order to achieve growth, a tendency can be noticed. This paper aims at providing strategic directives for envelopment and long-term growth in the digital market, in hope of contributing to the platform industry.

#### **Supervisors:**

**Björn Kijl Prof. Dr. Bart Nieuwenhuis**

#### **Keywords:**

Business model innovation, Value proposition, Envelopment, Platform market, ICT industry, IAC, Travelzoo

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

*7<sup>th</sup> IBA Bachelor Thesis Conference, July 5th, 2017, Enschede, The Netherlands.*  
Copyright 2016, University of Twente, The Faculty of Behavioural, Management and Social sciences.

## 1. Introduction

### 1.1 Digital platform Markets' and its current situation

Digital platform industries are pressured by a highly dynamic and unstable environment due to the continuous emergence of new technologies (Sriram et al., 2014; Gawer, 2010). The steadily increase of new platform companies or technologies entering the market and outperforming existing ones are typical traits in this industry.(Eocman, Jeho & Jongseok, 2006).

It becomes evident that old platforms are substituted by newer ones, as platform markets are constantly engaged in ‘winner-take-all battles’ (Eisenmann, 2011). Thus, it is suggested by Eocman (2006) to ‘get-big-fast’ in order to survive this uncertain market and secure a competitive advantage. In other terms, business models need to be changed over time. Hence, companies are forced to respond quickly to new environments. Among others, various attempted to enter other platform markets by bringing further products on the market as can be observed in companies like Google, Yahoo, Amazon and Facebook who started in separate markets before with one value proposition and gradually introducing new products, making them compete in several markets now (Visnjic & Cennamo, 2013).

Taking Amazon as an example, it started as a pure retailer. However, it enveloped in several markets such as the cloud services market and the hardware market. Due to this, Amazon became among others a leading company in media and web services (Ritala, Golnam and Wegmann, 2014).

Generally speaking, competing in other markets and bundling their resources to a supra-platform is called ‘platform envelopment’ (Eisenmann, Parker & Alstyne, 2010).

### 1.2 Problem Statement

Given the current situation, it is relevant to question how these platform market companies innovate their business model over time and maintain their success without being outdated by other organisations.

Having a look at Eisenmann’s typology (2010), which is a first step of explaining how business model innovation works in the ICT market, an identification of ‘platform pairs’ can be made and defined as ‘complements’ (I), ‘weak substitutes’ (II) or ‘unrelated platforms’ (III).

This typology provides an explanation of how business model innovation works in the ICT market. Nevertheless, it fails to take the dynamic factor of the companies operating in this market into account. Additionally, it does not provide information on what type of envelopment to use at what time. Hence, it is,

up to this point, still imprecise on how specific platform markets chose their envelopment type and to what extent envelopment is held responsible for the digital market companies’ success or failure rate (Müller, 2015; Paramsothy, 2015; Heikkilä, 2015).

### 1.3 Research Question

The goal of this study is to ascertain business model changes and the impact of platform envelopment on the success of digital platform industries over time.

*How do companies in the ICT industry innovate their value proposition over time in order to achieve success measured by revenue?*

To answer the research question adequately, this paper will analyse press releases and blog posts in a timeframe of 2006 to 2011. This period was chosen due to its high technological dynamicity in which remarkable changes can be observed, leading to a sufficient and representative sample size for a detailed analysis of this research.

### 1.4 Why IAC and Travelzoo?

The case companies for this research is decided to be IAC and Travelzoo. While the former gradually performed ‘platform envelopment’ over the course of time, the latter barely started to enter different markets and maintained its value proposition. As a matter of fact, both corporations are known for being successful companies globally. Furthermore, two different core markets and different envelopment types might achieve high internal and external validity, as the findings may not only focused on one sector. Hence, a comparison between and findings of these companies might be relevant as its outcome might be different from case companies of researchers before. Previous case companies of researches in regard to platform market innovation were always widely known and big enterprises in the digital platform market such as Google vs. Yahoo (Müller, 2015), Google vs. Amazon (Paramsothy, 2015) or Apple vs. Samsung (Heikkilä, 2015). This research however, does not focus on enterprises that are known for being big. On the one hand, it puts emphasis on Travelzoo, which until 2005 was still defined as a SME, with a turnover less than 50mio USD and an amount of approximately 200 employees (Official Journal of the European Union, 2003). Starting from 2006, it made a transition from being a small company to a big one, which makes it interesting to follow whether envelopment was part of this growth. On the other hand, IAC counts as a big company with a turnover of more than 3.23bn USD in 2015. This research intentionally looks at two companies, which are in different stages regarding its size and revenue, in order to find out the differences in the approach they took throughout the time. Although

both companies were founded at around the same time (IAC in 1995 and Travelzoo in 1998), IAC managed to outperform Travelzoo by far in regard of revenue. Hence, it could be interesting to look at which factors play an important part in this.

## 1.5 Outline of the thesis

Before delving into the paper, the outline of this thesis is organised as follow: The next section introduces the theoretical concepts and framework which is used for the case analysis. Additionally, the methodology as well as the analysis part will be described and explained. This paper finishes with a conclusion of the main findings and further research.

## 1.6 Significance

As business model innovation is often misused in the business context and envelopment appears to be an untouched topic, the findings of this research could provide a better insight into how envelopment is applied by different digital platform companies to pursue growth and remain successful on the market. Hence, this research can contribute to the platform literature.

In the next section, theoretical models and concepts are introduced and explained in detail in order to strengthen the case analysis with a significant theoretical framework.

## 2. Theoretical background

In order to get a better understanding of the paper and to be able to answer the research question, the key concepts will be defined before dipping into the next part of this research.

### 2.1 Platform Markets

According to Eisenmann (2009) platform markets, also called two-sided market or network have two or more distinct user groups where exchange of values are facilitated and beneficial effects are provided. Additionally, it can be described as a combination of elements such as an application or operating system (Müller et al., 2011). A third definition by Evans & Schmalensee (2008) states that platforms provide a meeting place for a two-sided market which makes it act as an intermediary. An example of two-sided market are video game networks that have players and developers as two distinct groups. While developers sell games to players, they also have to contract a permission to publish games with the platform's provider, such as Nintendo. Hence, platforms are defined as two-sided when they serve two separate group of users, as previous mentioned: Developers and

Video game players (Rochet & Tirole, 2003; Parker & Van Alstyne, 2005).

## 2.2 Envelopment

Companies, which can be defined as digital platforms, are governed by a number of economic effects such as the “network effect” and the problem of high “switching costs” which prevent incumbents from entering the market (Eisenman et al., 2011; Farrell & Saloner, 1985; Katz & Shapiro, 1985; Klempner, 1987). In order to overcome these entry barriers, new platform companies have to offer revolutionary functionality (Henderson & Clark, 1990; Bresnahan, 1999).

Due to these effects, different entry paths have to be explored. This is why digital platform companies employ in “platform envelopment” (Eisenmann et al., 2011), meaning that one platform enters into another platform’s market, combining its own resources with a different platform’s resources - also called bundling, where several products are put together and offered as a combined one - to form a supra-platform (Eisenmann, Parker & Alstyne, 2010). In other words, digital platforms create an ecosystem that provides the possibility of direct interactions between two or more parties.

### 2.2.1 Fransman’s ICT Layer model

As products in the ICT industry cannot only be classified as a simple product or a service, but occur at several levels, the ICT framework provided by Fransman (2010) is defined and explained in the following in order to comprehend the ecosystem of digital platform market and find out about the layers, the case companies of this paper operate in.

<i>Layer 1: Networked elements</i> (including switches, routers, servers, PCs, phones, etc.)
<i>Layer 2: Converged communication and content distribution networks</i> (including mobile, fibre, copper, cable, satellite)
<i>Layer 3: Platforms, content and applications</i> (including ICAPs)
<i>Layer 4: Final consumers</i>

Figure 1: Fransman (2010); p. 9: Four layers model

The ICT framework by Fransman (2010) is categorised in four different ‘layers’. The first layer is named ‘Networked elements’ which includes routers, servers, PCs and phones. The second layer ‘converged communication and content distribution networks’ includes mobile, fibre, copper and cable. Layer 3 is called ‘platforms, content and applications’. Having a look at the layer 1, 2 and 3, it is precise that platforms are created within the third layer which can then be delivered and provided to the fourth layer, which is the ‘Final customer’.

Whilst layer 1 and 2 refer to tangible products that are preconditioned for layer 3, the latter is the one where envelopment plays the most pivotal role.

In order to differentiate software products in platform market, the software product classification (SPC) by Zahavi & Lavie (2009) will be introduced. The SPC provides four main categories for software products, naming (1) personal application, (2) system infrastructure applications, (3) vertical applications and (4) business applications (Table of SPC in Appendix).

Again, the taxonomy of Zahavi & Lavie (2009) illustrated the importance of the third layer of Fransman's framework (2010) for envelopment, thus it is not sufficient to put platforms, content and application in one layer but separate them into layer 4a, 4b and 4c. This division is necessary in order to understand how platform companies build their ecosystem. Subdividing the layer into three categories leads to the updated layer model of Fransman.

Layer 1	Devices
Layer 2	OS (Operating System)
Layer 3	Network
Layer 4a	Platform
Layer 4b	Content
Layer 4c	Application
Layer 5	Consumer

**Table 1: Updated ICT Layer model based on Fransman (2010)**

## 2.2.2 Eisenmann's Envelopment typology

Having identified the ICT layers (Fransman, 2010) and the taxonomy of Zahavi & Lavie (2009), this section will bring a deeper understanding about the different types of envelopment, provided by Eisenmann et al. (2010), which helps to comprehend how digital platform companies can overcome entry barriers. Eisenmann introduced three types of envelopment, which are complements (type I), weak substitutes (type II) and unrelated platforms (type III).

Platforms are known to be divided in layers (Sangiovanni-Vincentelli & Martin, 2001). A firm can at the same time serve as a platform provider in one network and as a component supplier in another. Taking Paypal as an example, this company is the platform provider for its payment network via email but simultaneously serves as a component supplier to the auction platform: Ebay.

This example shows that challengers enter an adjacent layer through the envelopment of a complementary platform in many cases. In other words, the challenger tries to bundle the service that the adjacent layer provides in its own supply in order to gain a strong position in the adjacent layer. This step is called the envelopment of complements and is referred to as the envelopment type I. So, to be most likely successful, the challenger needs a high overlap of user base in adjacent layers (Eisenmann et al., 2011).

Type II of the envelopment typology, also named 'Envelopment of weak substitutes' deals with the maximum price that a customer would pay for a bundle of two perfect substitutes. However, this price should be equal to the price that a customer would pay for either one of the substitutes separately. In comparison to bundling perfect substitutes, bundling weak substitute can create value. Weak substitutes provide and offer the same broad purpose but gratify different sets of user demand because they rely on different approaches. Monster.com and LinkedIn.com serve as a good example, as they used different methods in helping users find a job: searchable listings and social network. As the user base of type II can slightly overlap, bundling will not realise significant gains. Hence, a user's valuation will only exceed the value of the preferred product if the second item provides unique functionality. Thus, it is suggested to discount the bundle deeply. In order to do so, the challenger has to realise significant economies of scope (Eisenmann et al., 2011).

Even if platforms are defined to provide fundamentally different purposes, some platforms may still share common users and components such as a mobile phone and handheld gaming device that require a display, battery and microprocessor each. By leveraging similar components and users, the envelopment of 'unrelated platforms' frequently converges which combines two previously distinct product in a single one (Greenstein & Khanna, 1997; Yoffie, 1997). As an example, Apple's iPhone bundled functions of mobile phones, media players, navigation systems and video game players. Following this, type III envelopment is most likely to succeed with platforms having a substantial user overlap and high economies of scope (Eisenmann et al., 2011).

Eisenmann's typology helps to comprehend how digital platform companies can overcome entry barriers. However, it fails to answer when to launch an envelopment attack and what type to use under which circumstances. Still, it is a first step to identify which type of envelopment Travelzoo and IAC engaged in. In this way, a comparison between both companies can be obtained and further analysed by applying the Platform Envelopment Lifecycle Matrix by Paramsothy (2015).

## 2.3 Business model innovation

### 2.3.1 Business Model

To be able to analyse the innovation of business models, the term business model itself must be clearly defined first, as the concept of business model is mostly misused in literature (Magretta, 2002, Teece, 2010, Shafer, Smith, & Linder, 2005). A reason for this is today's fast moving business environment, which makes it difficult to update business models in detail (Al-Daebei & Avison, 2010).

According to Teece (2010) and Chesbrough & Rosenbloom (2002) a business model is based on value

creation, value delivery and value capturing. Furthermore, Business Models can provide competitive advantage (Zott, Amit and Massa, 2011). The authors claim that if a business model is difficult to copy, it can be seen as an advantage towards the competitors. Nevertheless, as the ICT industry is rapidly changing, it is advised to constantly innovate the business models (Chesbrough, 2007).

Having defined the fundamentals of business models, the focus lies on business model innovation.

Business model innovation is described as an approach of developing and recombining unique products or concepts without making heavy investments in R&D (Amit & Zott, 2010). Business model innovation can be formed if new logics of the firm are searched, value can be created or captured in new ways and defining value propositions for its stakeholders (Casadesus-Masanell & Zhu, 2011). In respect to the research question, the focus of a value proposition is to realise new revenue sources by obtaining resources from the firm itself or partners and hence, improving the product value and reflect products or services which are offered to satisfy customer's need (Johnson et al., 2008).

Having defined the terms Business model innovation, it is difficult to say how it can be achieved. Researchers claim that a step-by-step guidance to achieve business model innovation does not really exist, as the environment is unstable and future directions cannot be predicted. Instead of searching for a guide, Companies should rather engage in experiments in order to get a business model innovation (Chesbrough, 2007).

### 3. Methodology

#### 3.1 Research setting

To answer the research question adequately, this paper will analyse press releases and blog posts with a focus on product introductions in a timeframe of 2006 to 2011. This period was chosen due to its high technological dynamicity in which remarkable changes can be seen, leading to a sufficient and representative sample size for a detailed analysis of this research. To ensure that comparisons can be drawn, the methodology used in Müller's (2015), Paramsothy's (2015) and Heikkilä's (2015) research paper was adapted and used as a scale.

The part will be subdivided into a brief overview of the case companies, followed by a data collection, data analysis and the testing of growth by measuring the revenue. In order to analyse the data properly, press releases should be extracted to an extent that it is possible to filter out the most relevant information in regard to the research. Furthermore, it is of relevance to ascertain whether an introduction of a product is radical or incremental. In other words, are the introduced products entirely new products or are they simply an exploitation of existing ones? After collecting and categorizing these according to the

updated layer framework of Franseman (2010), product introductions can be analysed.

In the following paragraph, IAC and Travelzoo will be shortly depicted before moving on to the data collection and analysis.

##### 3.1.1 IAC

Established in 1986 as Silver King Broadcasting Company, InterActiveCorp (also known as IAC) initially operated in the broadcast and television network. After acquiring several broadcast stations and thus, going through various name changes, it finally adopted its current name in 2003, after taking over uDate.com, RealEstate.com and LendingTree. This marked the shift of the company as besides focusing on broadcast network, it started to put importance on online assets as well. Barry Diller, founder of IAC, emphasised his ambition on making the company a leading media and internet player, which has the potential to compete with global market leaders such as Google and Yahoo, by acquiring Ask.com in 2005 (Leithold, 2013).

Today, the corporation is known as a leader in American media and Internet network, composed of some globally recognised products, such as HomeAdvisor, Vimeo, Dictionary.com, Investopedia, Tinder et cetera. With over 150 brands across 100 countries, IAC is one of the largest website of families in the world with a revenue of 3.23bn USD in 2015.

##### 3.1.2 Travelzoo

Travelzoo Inc. is known as a global publisher of travel offers of various travel organisations worldwide. The company provides advertising opportunities such as airlines, hotels and vacation packagers by offering them through the internet, which has become a consumers' preferred medium, in order to reach millions of user in a cost-effective way (Annual Report, 2008). It mainly operates in Asia Pacific, Europe and North America. Its revenue are generated mainly from advertising fees, as it is a facilitator.

#### 3.2 Data collection

In order to capture the value created by IAC and Travelzoo from the time span of 2006 and 2011, relevant data has been extracted from 69 press releases containing information on IAC and 264 press releases regarding Travlzoo. Out of these, a total of 23 and 28 new product introductions as well as new versions of existing products have been collected and analysed.

The sourcing of new value proposition was mainly collected through the official company websites of IAC and Travelzoo. These include press releases, which are shared with externals as well as news articles only published on the company's website. Next to this

source, Factiva was used as a second source of information if official website articles were not available during the period necessary for the case study. Factiva is an online research tool that aggregates content and press releases from licensed as well as free sources sent to wires (Dow Jones, 2016).

### 3.3 Data analysis

Having finished the data collection and its necessary data, the data analysis starts with categorising press releases according to a template, which can be found in the appendix. This template distinguishes new value propositions into four categories: (1) Direct extraction, (2) Product category, (3) ICT Layer and (4) Software Classification.

The first category – Direct extraction (1) – lays the foundation of the analysis and composed of basic information such as launch date, company name, product name, product version, product type and customer classification. These will be extracted from the press releases. An illustrated table can be found in the appendix.

In the second category – Product category – new value propositions will be separated either into a product launch or as a new version of an existing product. Additionally, each new value proposition will be categorised as a launch with partners, launched in a bundle or launch in a platform.

Thirdly – the ICT layer – by Fransman (2010) will be adapted and new value propositions will be investigated on in order to understand the ecosystem of IAC and Travelzoo. The layers are adjusted by Müller (2015), Paramsothy (2015) and Heikkila (2015) as the updated version of the layers fit better to the platform market, hence to the research question, too.

Lastly, this paper will categorised software products according to the previously mentioned software product classification of Zahavi & Lavie (2009) to provide further subcategories of software products.

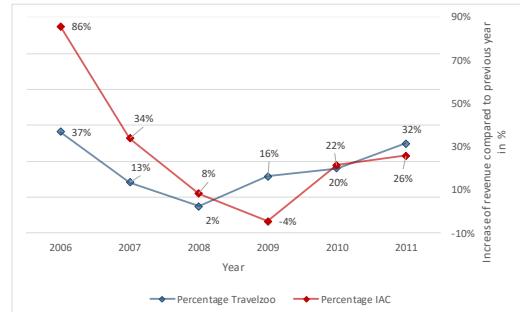
## 4. Analysis

### 4.1 Testing for Growth

Next to the analysis on press releases, the growth of both companies have been taken into account in order to ascertain in which way and how this key performance indicator affects envelopment and vice versa. In previous paper regarding platform market innovation by Müller (2015), Paramsothy (2015) and Heikkila (2015), revenue served as an indicator to determine growth. In order to compare this research to previous ones adequately, the same indicator has been taken. Graph 1 displays the development of IAC's and Travelzoo's revenue from 2006 until 2011.

Year	Revenue Travelzoo	Revenue IAC	Percentage Travelzoo	Percentage IAC
2005	50.772.000	523.493.000		
2006	69.525.000	972.961.000	37%	86%
2007	78.904.000	1.301.969.000	13%	34%
2008	80.817.000	1.410.078.000	2%	8%
2009	93.973.000	1.346.695.000	16%	-4%
2010	112.784.000	1.636.815.000	20%	22%
2011	148.342.000	2.059.444.000	32%	26%

**Graph1: Revenue collection of Travelzoo and IAC from 2005-2011**



**Graph 1.1: Increase of revenue compared to previous year in percentage in case of Travelzoo and IAC from 2006 to 2011**

Graph 1.1 illustrates IAC's and Travelzoo's growth in terms of revenue. The graph shows the increase of revenue compared to the previous year in percentage. Extracting from graph 1, which shows the absolute revenue of both companies, it is clear to see that IAC's revenue figures were always greater than of the competitor's. However, due to the fact that Travelzoo is a much smaller company, therefore, revenue are measured on a different scale than IAC's, graph 1.1 was included as it shows a relative increase of revenue in percentages. Hence, it is able to compare both companies, taking out the fact, that one is bigger than the other. Having clarified this, it is certain to say that IAC and Travelzoo have a similar growth in revenue from year 2006 to 2011. While IAC's revenue grew from year to year, it is significant that there is an 86% increase in revenue from 2005 to 2006. The reason for this is the acquirement of various companies, such as Ask Jeeves, Inc, Bloglines and Cornerstone Brands, Inc.

Within the timeframe of 2008 to 2009, IAC made a drop of -4% in revenue due to its spin-off of HSNI, Interval Leisure Group, Inc, Tree.com and Ticketmaster. These companies have been presented as discontinued operations; therefore, they were not listed in the revenue of IAC (Annual Report, 2009). Besides this, IAC's revenue increased continuously. On the other hand, Travelzoo' revenue grew slowly but steadily, overtaking IAC in 2011 with a 32% increase compared to the previous year (2010).

In summary, none of the both companies seem to have taken the lead throughout this time period as their growth were similar and exhibited positive upwards trend in its financials.

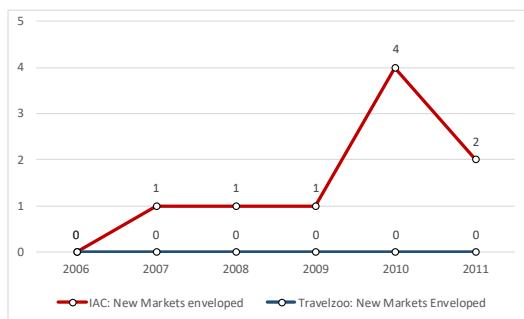
## 4.2 Market Entries

In order to determine how digital platform companies envelop their value propositions over time to pursue growth, an envelopment of the markets were analysed over the course of these years.

Again, 69 press releases for IAC and 264 press releases for Travelzoo were analysed over the same period of 2006 to 2011 whereby IAC has introduced 23 new value propositions, of which 7 were new versions, and Travelzoo has introduced 28 new value propositions, where significantly 23 were new versions. A high number of new versions in this case are expanding and opening offices in different cities around the world, therefore upgrading its user base. However, it is important to mention, that these new versions are rather seen as an expansion strategy of Travelzoo instead of a platform envelopment. The latter does hardly exist for Travelzoo, meaning that within the above-mentioned timeframe, Travelzoo did not envelop into new markets.

Whilst IAC has launched several new products with a remarkable use of bundling, acquiring and partnering over the course of time, Travelzoo has focused on bringing out new versions to the market rather than new products. This indicates that both enterprises follow different envelopment strategies. Whilst Travelzoo only focuses on developing its value proposition and core market further by expanding offices to different countries and launching local deals, IAC puts importance on acquiring and collaborating with operating businesses in order to build and widen its business into other ICT markets.

This is highlighted in Graph 2, which gives an overall view on the market entries between 2006 and 2011 after being classified according to Zahavie and Lavie's taxonomy (2009).



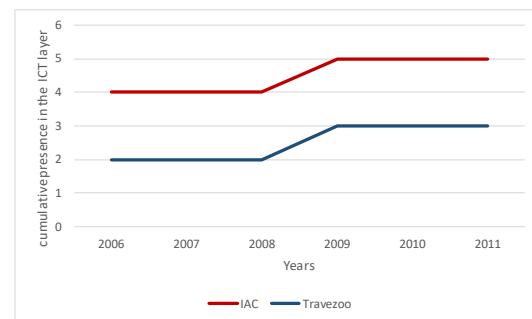
**Graph 2: Market entries between 2006 and 2011**

According to the graph, IAC started with none additional market entries in 2006 but slowly entered one new market within the time span of 2007 to 2009 before getting involved in four new markets in 2010 and two in 2011. Travelzoo however, never entered a new market over the time span.

Due to this, it can be observed that Travelzoo enveloped into significantly fewer to no markets compared to IAC. This again, indicates that Travelzoo focuses on one core market and aims to improve this by

launching new versions within the market instead of performing envelopment into different markets.

Looking at the updated ICT layer by Fransman (2010), it becomes apparent that IAC is active in more layers than Travelzoo. While IAC started with a presence of four ICT layers in 2006, Travelzoo was active in two ICT layers. As graph 3 is a cumulative depiction of the ICT layers, 2006 represents a cumulative amount of ICT layers that were entered in previous years already. In case of IAC, it was active in the network, platform, content and application layer until 2009. Examples for operating in these layers are companies that have been acquired by IAC, such as the broadcast company, pronto.com, which is a search service, daily beast, a website dedicated to news, culture and entertainment, and match.com, a website but also mobile application. In case of Travelzoo, the company operates in the content and application layer by launching the 'Top 20', and Newsflash via Email. Throughout the following three years, both enterprises differ by +/- two layers, whereas IAC added one more layer (device) in 2009 reaching a total of five ICT layers. Travelzoo as well, operated in one more layer, which is the platform layer by launching Fly.com in 2009, resulting in a total presence of three ICT layers.

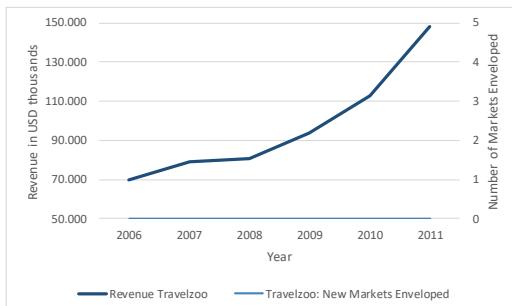


**Graph 3: cumulative presence in ICT layers of Travelzoo and IAC from 2006-2011**

Referring this to the financial aspect, it might be obvious to state that ICT layers do not significantly affect revenue because if a positive correlation exists, Travelzoo in this case would perform worse than IAC regarding its revenue as the former operates in less ICT layers than the latter (Müller, 2015). In the case of growth, it is wrong to state that IAC has a better performance than Travelzoo as a steady increase in revenue can be observed for both companies. However, if looking at the absolute revenue and recalling the fact that both companies were founded within the same time, IAC outperformed Travelzoo significantly with revenues reaching billions while Travelzoo's turnover are around millions.

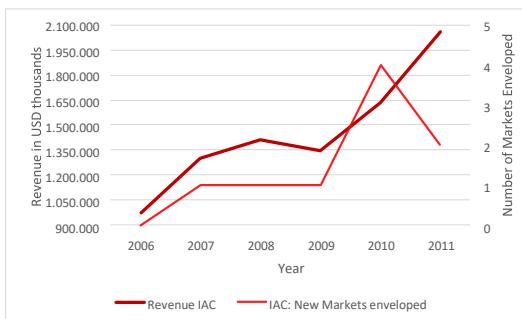
## 4.3 Development and financial KPI

In order to further find out whether envelopment contributes to the company's growth, graph 4 and 5 were created in order to show the comparison of the company's revenue to the number of markets, they have enveloped into.



**Graph 4: Comparison of Markets Presence and Revenue of Travelzoo from 2006 until 2011**

Taking the data from graph 4, it is apparent, that there is no correlation between Travelzoo's revenue and envelopment. Not having enveloped in any new markets during the timeframe did not affect Travelzoo's revenue. In general, revenue steadily increased over the course of these five years. Therefore, it is believed that market envelopment did not contribute to the company's growth. However, it can be stated that Travelzoo might have made higher revenues if the company enveloped into new markets, as again, Travelzoo's revenue is rising but comparing the absolute revenue, it is indeed far behind IAC.



**Graph 5: Comparison of Market Presence and Revenue of IAC from 2006 until 2011**

Analysing graph 5, it is evident that IAC's revenue and envelopment are positively correlated. While revenue increased from 2005 to 2008 steadily, a slight drop can be noticed in 2009, which is assumed to have a reasonable cause. 2009 to 2010 showed that there is indeed a correlation between both factors as IAC has enveloped to four new markets, which incidentally seem to cause revenue to increase continuously. Taking a look at the company's milestones, in year 2009, it acquired various companies such as Urbanspoon, Sportspickle.com, Market hardware, inc. and People media. Furthermore, the enterprise launched Electus and the production company Notional, which also results in them entering the fifth ICT layer called 'Device'. An interaction of acquiring several companies, launching new websites and entering an additional ICT layer, might be the reason for the company to increased steeper in revenue.

Coming back to the drop that started to occur in 2008 and constantly fell until it reached its lowest level in 2009. One way to explain this drop is the global

financial crisis in 2008, which according to economists has been the worst financial crisis since the 1930s (Wikipedia, 2016). However, this was not the cause of the drop.

In August 2008, IAC outsourced its business operations HSN, Interval Leisure Group, Ticketmaster and Tree.com from its business. Since then these operating businesses agitated as separate publicly businesses at the stock exchange. Hence, their revenue did not appear in IAC's revenue anymore, which led to the drop in 2008 until 2009 (Leithold, 2013).

Having a look at the typology by Eisenmann et al. (2010), it becomes clear that Travelzoo focused its strategy on type I envelopment as the company combines the service that the adjacent layer provides in its own offering. In 2009, Travelzoo launched Fly.com, a platform comparing prices and offering a search function for flights. As Fly.com was a new platform back in 2009 but still operates in the same market, the travel market, it is seen as a promotion of its core market. Further products that Travelzoo offers are the local deals, which compare prices and search for nice options to travel to locally. This as well was launched to promote its core market and strengthen the company's market position in the adjacent layer. As products are only launched in the same market throughout the years, it indicates that Travelzoo introduced an amount of extra features and further functionalities to its platform in order to maintain its value proposition and strengthen its core market presence. Type II and III envelopment attacks were not identified within this timeframe.

However, it is certain that IAC deployed in type III envelopments as the company launched products by bundling old ones with new functions of another product. As IAC has acquired many companies and is known for being a big internet and media platform, several operating businesses collaborate with the company to create new value propositions. Starting with no market envelopment in 2006 and staying focused in a few markets, the company enveloped in four markets in 2010 and two in 2011, which is twice as much as in the previous years. After acquiring several companies, experimenting and spinning them off, it focuses on four core markets:

Platform envelopment
1.The Match Group
2.Search & Applications
3.Videos
4.eCommerce

**Graph 6: Platform Envelopment of IAC**

Comparing both companies, it becomes evident that Travelzoo puts its focus on the core market whereas IAC seems to neglect its core market. The enterprise started as a broadcast and television network, which at one point merged and acquired several different companies from different markets, such as ask.com, a web search

engine and tinder, a dating app, not related to its core business of broadcast and television. This is why it rather follows an experimental strategy of acquiring as many companies as possible, ranging from Dating apps, betting websites, travel agencies and fitness pages to search, health, loan and entertainment segments, which then were subdivided into four core markets, as mentioned above. The logic of expanding into these different markets and layers might be to expunge competition or at least have a lower level of competition by acquiring and obtaining the competitor's infrastructure and value proposition (Müller, 2015). By entering more ICT layer and markets, IAC creates a supra-platform with superior functionality across the markets. They adopted the strategy of acquiring, creating, merging and growing businesses into high performance entities, spinning them off and building new ones. Adducing Match.com as an instance, this company was acquired by IAC even before 2006 making the latter enveloping into a new market. Following the years, IAC eliminated a majority of competitors by acquiring the leading Chinese matchmaking site Zhenai, OkCupid and peoplemedia. As if this is not enough, it took a step further by launching Ourtime, a dating site for singles over 50 and tinder, which is popular in nowadays generation. The last one has the requirement of only signing up via Facebook, attracting Facebook's user base and displaying network effects. This envelopment type of acquiring and bundling seems unstructured, which is why it is called a rather experimental type of envelopment. However, according to Chebrough (2007, 2010) and McGrath (2010), experimentation is a form of business model innovation. And this again means, that IAC is constantly searching for ways to create and capture value (Casadesus-Masanell & Zhu, 2011).

Additionally, the ICT layer analysis indicates the experimental strategy of IAC, as it shows presence in nearly all six layers throughout the five years. In case of Travelzoo, the company was active in a total of three ICT layers throughout the years. According to Müller (2015), being active in less ICT layers leads to less control over the market and threats of competitors and 'winner-takes-it-all' dynamics. Comparing Expedia to Travelzoo, the former one has always exceeded Travelzoo in terms of revenue. While Expedia follows the same strategy as IAC, which is to acquire various travel agencies and facilitators, such as trivago and venere.com, in order to eliminate the competition, Travelzoo does not acquire any companies but launches deals that exist in other travel agencies as well. This could be a forecast of experiencing losses in the future. Nevertheless, until 2011, it makes an ongoing increase of revenue.

#### 4.4 Platform Envelopment Lifecycle Matrix

To get a better illustration of how digital platform companies envelop over time, the platform

envelopment lifecycle matrix (PELM) by Paramsothy (2015) is taken into account.

Characteristics	Stages of platform maturity		
	Growth stage		Maturity stage
Envelopment type	Core market enhancement	Focused diversification	Experimental
Number of Market Envelopments	Low	Moderate	High
Presence in ICT layers	Moderate (2 – 4)	Moderate (2 – 4)	High (5 – 6)
Main focus	(1) get-big-fast by acquiring and expanding the base of users and by (2) searching for new logics for the firm (3) gradually locking in the user		Create real options in order to find new ways and to create and capture value

**Graph 5: Platform Envelopment Lifecycle Matrix (PELM) by Paramsothy (2015)**

This matrix adds a timely dimension to the envelopment typology of Eisenman et al. (2010), calling it the 'growth stage' and the 'maturity stage'. Furthermore, the envelopment type I-III are redefined as 'core market enhancement (I)', 'focused diversification (II)' and 'experimental (III)' envelopment. According to Paramsothy (2015), Cassadesus-Masanell & Zhu (2011), each stage uses a different envelopment strategy in order to generate revenue.

The matrix shows that within the growth stage, digital platform companies focus its activities on core market enhancement and focused diversification. In doing so, companies do not only present a low to moderate numbers of envelopment, they also have a moderate amount of ICT layers during this stage. This amplifies the focus on the core market.

A focus of the growth stage is to get-big-fast by acquiring and expanding the user base (Eocean et al., 2006). This can be done by launching new products and versions in the core market. Taking Travelzoo as an example, it introduces several local deals to enhance its core market. Launching local deals did not make the company envelop into different markets. It only manifest and develop its value proposition further. According to Paramsothy (2015), growth will follow when focusing on fewer markets in the early stage. Moreover, this matrix indicates that companies should not engage in experimental activities during the growth stage, as this can contort its core markets. Additionally, it is stated, that being active in a moderate number of ICT layer in the early stage, leads to growth in the subsequent stages. Travelzoo offered local deals and started new offices in different locations to expand its base of users. This shows that it was active in the platform, application and content layer three altogether. This anon is displayed as a moderate presence of ICT

layers in the matrix, explaining Travelzoo's steady growth of revenue for these five years.

Next to 'core market enhancement', digital platform companies engage in 'focused diversification'. In this case, companies search for new logics of the firm in order to find new options to create and capture value. Taking IAC as an example, it tried to acquire different companies and therefore operated in several markets right from the beginning. It acquired Lexico, owner of dictionary.com, thesaurus.com and reference.com in 2008 and dating site Singlesnet in 2010. Based on this example, it can be observed that IAC neglected its core market, which initially focused on broadcast and television network, and rather puts importance on acquiring well-known SMEs in order to build up its own territory, changing its core business to a broad media and internet company. By doing so, the enterprise enveloped into a high amount of markets and furthermore represented a constant number of four to five ICT layers throughout its growth and maturity stage. As the number of market entries during this envelopment type is supposed to be moderate, it is questionable whether IAC engaged in 'focused diversification' or 'experimental' type of envelopment. Nevertheless, it is certain that IAC does not engage in 'core market enhancement' during the given periods. In order to find out, which envelopment type IAC engaged in, the 'experimental' type has to be defined.

In the maturity stage, companies typically engage in an experimental envelopment type. In this phase, companies typically experience envelopments in unrelated platforms and markets, which automatically leads to a higher amount of markets entries. Furthermore, Presence in ICT layers are high as companies are experimenting in order to create real options, which then can capture value. As mentioned before, this type of envelopment is a form of business model innovation (Chesbrough, 2010).

Again, regarding IAC, it acquired and partnered with various unrelated markets, hence, its market entries were quite high. Taking the five years together, it was active in five out of six ICT layers. According to the matrix, this shows a high presence in the ICT layers. Coming to a conclusion after unveiling all the characteristics of the matrix, IAC is considered to engage in an 'experimental' envelopment type throughout the years, resulting the company to be in the maturity stage which is comprehensive as it is a listed company with over 3.14bn USD in 2016.

To highlight the engagement of both case companies, a further characteristic is added into the Matrix (Graph 6).

Characteristics	Stages of platform maturity		
	Growth stage		Maturity stage
Envelopment type	Core market enhancement	Focused diversification	Experimental
Number of Market Envelopments	Low	Moderate	High
Presence in ICT layers	Moderate (2 – 4)	Moderate (2 – 4)	High (5 – 6)
Indirect network effects	Moderate	Moderate – High	High
Main focus	(1) get-big-fast by acquiring and expanding the base of users and by (2) searching for new logics for the firm (3) gradually locking in the user	Create real options in order to find new ways and to create and capture value	

**Graph 6: Updated version of Paramsothy's Platform Envelopment Lifecycle Matrix (2015)**

As displayed in the updated matrix, 'Indirect network effects' is additionally taken into account, to strengthen and determine the envelopment type and stages of platform maturity. Furthermore, it strengthens this research's finding by making clear where to put Travelzoo and IAC. It is one further key aspect to define the stages. This characteristic was chosen, as it plays a crucial role in the digital platform market. Without positive network effects, which is definded as an increase in value of a network, platform or application by an increase in usage of that particular layer, ICT industries cannot survive. Furthermore, a coherence between this and all the presented characteristics exist.

During the growth stage and especially when engaging in 'core market enhancement', the number of market envelopment is low and the presence in ICT layers is moderate. This automatically leads to a moderate effect of network as firms that operate in fewer markets, automatically has a smaller network effect than ones that are represented in a higher number of markets. Considering Travelzoo as a firm, which focuses on its core market, it can be stated that its indirect network effects are moderate. This is due to the focus on its core business, which is to convey travel offers and deals to its customer. The indirect network effects are moderate and not low, because Travelzoo acts as a facilitator, meaning that it operates in various collaborations with travel agencies and accommodation vendors. Through its partnership with many known agencies, the indirect network effects increase.

Having a look at IAC, which is found out to engage in an 'experimental' envelopment type, indirect network effects are high. This is due to the reason that the company enveloped in a high number of markets, such as the search industry, social network, entertainment, eCommerce et cetera. By acquiring companies, IAC automatically transferred and took along the network effects of the purchased enterprises. Acting in several markets, congregate a high network effect, especially

when it comes to social network, such as Tinder and OkCupid, which are free to use and decoy a high amount of users. Moreover, these above-mentioned networks have gained a high level of awareness, which again, attracted a high base of user.

## 5. Conclusion

This research paper started with a statement concerning the dynamic factor that are not taken into account when it comes to digital platforms. Eisenmann's envelopment typology (2010) was determined as a first attempt to identify three different types of envelopment. However, there is no explanation on when to engage in what type of envelopment and how digital platforms evolve over the time.

Hence, this paper made use of the Platform Envelopment Lifecycle Matrix by Paramsothy (2015) as it added the dynamic elements to the envelopment types and clarified how digital platform can successfully enveloped over time. Furthermore, an additional dynamic factor – indirect network effects – was attached in order to complement and augment the matrix.

To test these theories, Travelzoo and IAC were chosen as case companies. Press releases and blog posts were compared and analysed between 2006 and 2011, in order to find out about the envelopment patterns. After categorising these into NVP, new versions, ICT Layers et cetera, the envelopment types based on Eisenmann's typology (2010) was applied, followed by the PELM (Paramsothy, 2015) and an updated version of PELM, taking indirect network effects into consideration.

As a result, Travelzoo is classified in the growth stage, especially in the envelopment type I – Complements – or as renamed in the PELM – Core market enhancement. This is because of its low market envelopment throughout these five years and moderate presence in the ICT layers. Looking at the indirect network effects, Travelzoo has a moderate network effects due to its partnership with several travel agencies. According to Paramsothy (2015), it is important to consolidate its core market in the early stages. In this case, Travelzoo followed the theory and focused on its core business, therefore its steady growth in revenue. However, analysing over a period of five years, Travelzoo did not move on to the maturity stage, still focusing on its core market only. As ICT industries are known for a rapid change, this could affect Travelzoo in a long-term. An indication for this might be the drop of revenue starting from 2013 with a revenue of 170 \$ million decreasing to 128 \$ million in 2016 (Annual Report, 2016).

On the contrary, IAC engaged in the envelopment type III – unrelated platforms – or 'experimental'

within the timeframe of 2006-2011. By acquiring and partnering with different, unrelated enterprises, it enveloped into a high number of markets, making indirect network effects high as well as the presence in the ICT layers. Starting as a broadcast and television network, IAC changed its core markets over time to an

internet company not only specialized in broadcast and television anymore but on broader markets as well. This indicates that IAC is more power driven than identity driven. The firm does not seem to ask the 'who we are' question (Santos & Eisenhardt, 2005) unlike Travelzoo, who seem to only focused on this question. In contrast to Travelzoo, IAC foresees the dynamic change in the digital market and experimented as much as possible in order to form a business model innovation and get a sustainable growth in the long-term. Similar to Yahoo, Travelzoo did not see or did not see the importance in the technical leaps in interactivity that would revolutionise the ICT industry in short time, hence, did not envelop in different markets, which in the long-term might have been a better option.

## 6. Limitations

As this research is a comparative case study between two companies, it does not reflect on business model innovation of other companies. Nevertheless, the chosen companies for the case study are two wellknown global players in the ICT industry, representing big as well as small-becoming-big companies, meaning that an universalisation is possible. Additionally, this paper focused on the press releases and research conducted from 2006 to 2011. As business models, especially in the ICT industry are known for rapid changes and updates (Al-Debei & Avison, 2010), business model innovation in a different time period might result into significantly different and diverse findings.

## 7. Further research

Based on this case, it is difficult to answer the research question of how digital platform evolves over time. Therefore it is recommended to do further researches on different, maybe more up to date, timeframes in order to follow the lifecycle of both companies. Furthermore, researches on SMEs in the ICT industry would be recommendable as they represent the majority of the economy in this world. As the research aims at answering the question of whether envelopment contributes to a success of a company over time, it is of higher validity to research on smaller to medium enterprises (SME).

## 8. Acknowledgement

I would like to thank my advisor Ir. B. Kijl for his continuous support and patience. He always gave expert advice, encouragement and understanding throughout this difficult but interesting project and topic which is up to now still untouched.

Besides, I would like to thank my second supervisor: Prof. Dr. Bart Nieuwenhuis for his flexibility of joining this circle as a second supervisor. Lastly, I would like to express my gratitude for the University of Twente

that has guided me through the last years and taught me many things about my faculty.

## References

- Al-Debei, M. M., & Avison, D. (2010). Developing a unified framework of the business model concept. *European Journal of Information Systems*, 19(3), 359-376.
- Amit, R. H., & Zott, C. (2010). Business model innovation: Creating value in times of change.
- Armstrong, M. (2006). Competition in two-sided markets. *The RAND Journal of Economics*, 37(3), 668-691.
- Bresnahan, T. (1999). New modes of competition: Implications for the future structure of the computer industry. In *Competition, Innovation and the Microsoft Monopoly: Antitrust in the Digital Marketplace*. Eisenach J, Lenard T (eds.). Kluwer: Boston.
- Casadesus-Masanell, R., & Ricart, J. E. (2007). Competing through business models.
- Casadesus-Masanell, R., & Ricart, J. E. (2010). From strategy to business models and onto tactics. *Long range planning*, 43(2), 195-215
- Chesbrough, H., & Rosenbloom, R. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and corporate change*, 11(3), pp. 529-555.
- Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Planning*, 43,354-363. doi:10.1016/j.lrp.2009.07.010
- Official Journal of the European Union. (2003). Commission Recommendation concerning the definition of micro, small and medium-sized enterprises.
- Dow, J. (2016). Factiva. *Your trusted Source for Premium News, Data and Analysis*.
- Eisenmann, T. R., Parker, G., & Van Alstyne, M. W. (2010). Platform Envelopment. *SSRN Working Paper Series*.
- Eisenmann, T. T., Parker, G., & Van Alstyne, M. W. (2011). Platform envelopment. *Strategic Management Journal*, 32(12), 1270-1285.
- Eoaman, L., Jeho, L., Jongseok, L.. (2006). Reconsideration of the Winner-Take-All Hypothesis: Complex Networks and Local Bias. *Management Science* 52 (12): 1838-1848.
- Evans, D. & Schmalensee, R. (2002). Some Economic Aspects of Antitrust Analysis in Dynamically Competitive Industries. NBER Chapters, in: Innovation Policy and the Economy, National Bureau of Economic Research, Inc, 2: 1-50.
- Farrell, J., Saloner, G. (1985). Standardization, compatibility, and innovation. *Rand Journal of Economics* 16: 70-83.
- Forbes.com Names Travelzoo(R) One of Best Web Sites for Travel.. (n.d.) >*The Free Library*. (2014). Retrieved Jun 16 2016 from [http://www.thefreelibrary.com/Forbes.com+Names+Travelzoo\(R\)+One+of+Best+Web+Sites+for+Travel-a0143917172](http://www.thefreelibrary.com/Forbes.com+Names+Travelzoo(R)+One+of+Best+Web+Sites+for+Travel-a0143917172)
- Fransman, M. (2010). The new ICT ecosystem: implications for policy and regulation.
- Greenstein, S., & Khanna, T. (1997). What does industry convergence mean? In *Competing in the Age of Digital Convergence*. Yoffie D (ed.). Harvard Business School Press: Boston.
- Heikkilä, L. I. (2015). Taxonomy of platform envelopment: A case-study of Apple and Samsung. University of Twente.
- Henderson, R., Clark, K. (1990). Architectural innovation: the reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly* 35: 9-30.
- IAC. (2009). *Annual Report 2008*.
- Johnson, M. W., Christensen, C. M. & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*, 86(12), 57-68
- Katz, M., Shapiro, C. (1985). Network externalities, competition, and compatibility. *American Economic Review* 75: 424-440.
- Klemperer, P. (1987). Markets with consumer switching costs. *Quarterly Journal of Economics* 102: 375-394.
- Leithold, L. J. (2013). IAC/InterActiveCorp. *Mediendatenbank/mediadb.eu*
- Magretta, J. (2002). Why business models matter.
- Müller, C. N. (2015). A Tale of Contend and Conquest: Leveraging Market Presence to Grow the ICT-Ecosystem – Lessons Learned from Google and Yahoo. University of Twente.
- Müller, R., Kijl, B., & Martens, J. K. (2011). A comparison of Inter-Organizational Business Models of Mobile App Stores: There is more than Open vs.

- Closed. *Journal of Theoretical and Applied Electronic Commerce Research*, 6(2), 63-76.
- Paramsothy, A. (2015). Configuring envelopment over time in order to achieve business model innovation in digital platform companies – A comparison of Amazon and Yahoo. *University of Twente*.
- Parker, G. G., & Van Alstyne, M. W. (2005). Two sided network effects: A theory of information product design. *Management Science*, 51(10), 1496-1505.
- Ritala, Golnam, & Wegmann (2014). Coopetition-based business models: The case of Amazon.com. *Management Science*.
- Rochet, J. C., & Tirole, J. (2006). Two-sided markets: a progress report. *The RAND Journal of Economics*, 37(3), 645-667.
- Sangiovanni-Vincentelli, A., & Martin, G. (2001). Platform-based design and software design methodology for embedded systems. *IEE Design & Test of Computers*, 6, pp. 23-33.
- Shafer, S. M., Smith, H., & Linder, J. C. (2005). The power of business models. *Business Horizons*, 48, pp. 199-207.
- Siriam, S., Manchanda, P., Bravo, M., Chu, J., Subramanian, U. (2014). Platforms: A multiplicity of research opportunities. pp. 141-152.
- Travelzoo. (2008). *Annual Report 2007*.
- Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, 43, pp. 172-194.
- Visnjic, I., & Cennamo, C. (2013). The gang of four: acquaintances, friends or foes? Towards an integrated perspective on platform competition. *Towards an Integrated Perspective on Platform Competition* (2013). *ESADE Business School Research Paper*, (245).
- Yoffie, D. (1997). Introduction: CHESS and competing in the age of digital convergence. In Competing in the Age of Digital Convergence. *Yoffie D (ed.). Harvard Business School Press: Boston*.
- Zahavi, T., Lavie, D. (2009). Software product classification.
- Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*, 29(1), 1-26.

## Appendix

	IAC	Travelzoo
Founders	Jas Dhillon, Barry Diller	Ralph Bartel
Year founded	1995	1998
Company HQ	New York City, New York	New York City, New York
Employees ()	5.000	448
Revenue (2006 in USD thousands)		
Revenue (2011 in USD thousands)		
Competitors	AOL Inc., CBS Interactive Inc., Hearst Interactive Media	Expedia Inc., Tripadvisor

Appendix A: Comparison of IAC and Travelzoo

Direct Extraction				
Launch Date	Company	Product Name	Product Type	Customer Classification

Appendix B: Analysing Scheme for Press Releases and Blog Posts for IAC and Travelzoo

Category Choice				
Product Launch	New Version	Launch with Partners	Bundling	Platform

Appendix C: Analysing Scheme for Press Releases and Blog Posts for IAC and Travelzoo

### Software Product Classification by Zahvie & Lavie (2009)

\*Level of Detail used in Paper: x.x (Original x.x.x)

#### 1 Personal applications

- 1.1 Educational/training 110
- 1.2 Reference 120
- 1.3 Games 130
- 1.4 Entertainment 140
- 1.5 Life style 150
- 1.6 Personal productivity 160
- 1.7 Personal multimedia productivity 170
- 1.8 Personal productivity utilities 180
- 1.9 Business productivity 190
- 1.10 Utility systems 200
- 1.11 Operating system enhancements 210
- 1.12 Internet communications 220

#### 2 System infrastructure

- 2.1 Network management (logical) 230
- 2.2 Network management (physical) 240
- 2.3 Data structuring, acc. & manipulation 250
- 2.4 Integrated development environment 275
- 2.5 Software application design 270
- 2.6 Software application development 280
- 2.7 System-level application 290
- 2.8 Storage 300
- 2.9 Security 310
- 2.10 Distributed computing 320
- 2.11 Middleware 340
- 2.12 IT system management software 350

#### 3 Vertical applications

- 3.1 Banking 360
- 3.2 Government 370
- 3.3 Healthcare services and medicine 380
- 3.4 Insurance 390
- 3.5 Legal 400
- 3.6 Entertainment and media communications 410
- 3.7 Real estate 420
- 3.8 Aerospace and aviation 430
- 3.9 Agriculture and farming 440
- 3.10 Apparel and fashion 450
- 3.11 Automotive 460
- 3.12 E-learning/education 470
- 3.13 Food service and beverage 480
- 3.14 Hospitality/travel 490
- 3.15 Mapping 500
- 3.16 Not-for-profit 510
- 3.17 Telecommunications 520
- 3.18 Energy/utilities 530
- 3.19 Retail & wholesale 540
- 3.20 Science & engineering 550

#### 4 Business applications

- 4.1 Enterprise resource planning 555
- 4.2 Accounting 560
- 4.3 Factory/facility management 580
- 4.4 Financial analysis & management 590
- 4.5 Manufacturing 600
- 4.6 Sales & marketing 610
- 4.7 Product design & development 620
- 4.8 Logistics 630
- 4.9 Collaborative applications 640
- 4.10 Human resource management 650
- 4.11 Data analysis 660
- 4.12 Decision support systems(DSS) 670

#### 5 Packages

- 5.1 Integrated development environment 275
- 5.2 Enterprise resource planning 555
- 5.3 Office Suite 1700
- 5.4 Integrated accounting 7900
- 5.5 Manufacturing resource planning 8600
- 5.6 Customer relationship management 8900
- 5.7 Supply chain management 9380
- 5.8 Human resource management 9700

Appendix D: Software Product classification by Zahvie & Lavie (2009)