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Growth Through Metamorphosing*

Loris Gaio[**], *Alessandro Rossi*[***], *Enrico Zaninotto*[****]

Abstract

One of the central concerns of the literature studying firms' growth is the need for understanding the rationale underlying the growth process from the company perspective. The appearance of novel patterns of firms' growth is linked to the emergence of new paradigms for the organization of industrial and manufacturing processes (that is, industrial revolution). The paper discusses evidence from a sample of fast-growing large companies taken from the Fortune 500 ranking. Results show patterns of firms' growth more in line with traditional sectors which are fuelled by scale and scope economies, and other patterns, observed more often in the case of high-tech "new economy" companies, which are instead mostly driven by network effects and platformization strategies. We label the latter phenomenon "metamorphosing", a pattern of growth characterized by a constant reshaping of horizontal and vertical boundaries by the firm which aims at taking advantage of market opportunities by exploiting its keystone position in platform-based business.

Keyword: Firms' Growth; Fourth Industrial Revolution; Dynamic Transaction Costs; Mergers and Acquisitions; Network; Vertical Integration; Diversification; Metamorphosing; Global Markets

1. Platformization

The literature on the patterns of firms' growth has highlighted different ways through which firms can extend their size, each having a rationale in the different nature of the expected advantages for the company (Coad 2009). Growth by replication, or extension of the same business on a larger scale, in the same or in a new market, can be justified both by efficiency reasons (economies of scale) or the search for monopolistic power. Growth through vertical integration (Lafontaine, Slade 2007) is generally justified either by moral hazard or transaction cost arguments: it can be expected when the cost of the use of the market is high, as when there is risk of opportunism and contracts are incomplete. Diversified growth (Montgomery 1994), which taps into the concept of economies of scope, can be traced back to various motives, such as the search for market power; executives' interests in status and power; and resource-based view motives, where firms' growth is driven by the chance to invest internal, non-transferable managerial

* The Authors: L. Gaio §§ 2, 3, A. Rossi §§ 4, 5, E. Zaninotto § 1.
** Associate Professor of Management, University of Trento (loris.gaio@unitn.it)
*** Associate Professor of Management, University of Trento (alessandro.rossi@unitn.it)
**** Full Professor of Management, University of Trento (enrico.zaninotto@unitn.it)

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competences in new businesses (Penrose 1959). More recently, newer patterns of growth have emerged. On the one side, studies on network effects (Katz, Shapiro 1994) have shown how market performance might tend to winner-takes-all outcomes where the leader tends to grow larger and larger. On the other side, the recent trends towards the platformization of markets and business are connected to novel patterns of growth where firms controlling the platform show aggressive patterns of growth fuelled, in turns, by the growth in the number of providers of products and services in the platform ecosystem (Aversa et al. 2015; Brondoni, Pironti 2015; Pironti et al. 2015; Rieple at al. 2012; Pisano et al. 2015; Rieple, Pisano 2015).

In this paper, we suggest that these different patterns of growth can be linked to major regime changes in the organization of industrial and manufacturing processes. Indeed, if one takes such a route, the issue of firm growth dates back to at least to the Second Industrial Revolution and the need to manage large-scale plants. The link between large-scale plants and vertical, "silo type" growth was highlighted by Chandler (1962) and vividly represented by Brands (2010). Historical reconstructions show firms' growth as driven by achieving large scale production benefits while at the same time minimizing coordination costs connected to the large size of the organization.

Later on, theoretical advancements brought on by transaction costs theory (Coase 1937) helped explain vertical integration as a means to growth via reshaping the boundaries of the firm, in order to reap the advantages of a hierarchical organization with respect to the market when dealing with issues such as uncertainty, high frequency of transactions, asset specificity, and opportunism. Later on, newly adopted organizational and management techniques, needed to run large-scale, vertically integrated firms, moved the attention from scale to scope. It was again Chandler (1990, 1992) who accounted for this enlargement of perspective, rooted in the Penrosian 'Theory of the growth of the firm' (Penrose 1959).

The Third Industrial Revolution, characterized by big advancements in information and communication technologies, opened the way to a different pattern of growth based on network effects. The size of the customer base appeared as a powerful source of growth: the more clients are captured, the faster the growth. Network competition was put at the centre of industrial dynamics. Again, historical accounts joined theoretical advancements (David 1992; Arthur 1994) in helping clarify new patterns of growth.

More recently, the idea of network effects has been extended to two-sided markets. A growing network of a service provider at one side of the market (e.g., customers) increases the provider's attractiveness to suppliers that can add services to the platform. This process makes it more attractive for clients to adhere to the platform, and so on. A wide debate issued on "platformization" as an impressively powerful driver of growth (Evans, Schmalensee 2007; Evans et al. 2006).

In this paper, we discuss these patterns of growth in light of the so called "Fourth Industrial Revolution". Two questions are at the centre of the paper. The first regards whether different patterns of growth replace each other, or instead survive, by complementing each other or by grafting. The second is related to whether it is possible to envisage new patterns of growth characterizing the Fourth Industrial Revolution. Under this respect, we gathered hints of a phenomenon that we dubbed "growth through metamorphosing", by which platform-based firms move their

boundaries upstream or downstream in the supply chain in order to capture from outside and inbreed complementary technologies with the aim of fostering (or sometimes hindering) their development. The idea that this paper sketches is rooted in an old, but barely exploited, concept of *dynamic transaction cost*, first presented by Langlois and Roberson (1995).

The aim of this article is to present some evidence on recent patterns of growth among large American companies. To assess the nature of growth, we look at US Fortune 500 companies and collect data on mergers and acquisitions (M&As) and divestitures for a group of fast-growing firms (the construction of the database is described in the next section). Leaving aside the issue of internal growth, we concentrate on external growth by analysing detailed documentation that helps characterize more precisely the nature of firms' changing boundaries and the directions and reasons for them. We then present some empirical evidence on the survival and overlapping of the "three generations" of growth—scale, scope, and network economies—and we gather hints of a fourth generation of growth through M&A, which we dubbed "metamorphosing". After a quantitative assessment of a Fortune 500 sample of some large-scale, high-growth-rate companies, we describe in detail three vignettes each representing an example of a different pattern of growth. The final section presents a summary of the findings along with an outlook into future research.

2. Data Set and Methodology

In order to highlight different patterns of firms' growth, we firstly chose a sample of high-growth firms as a way to characterize quantitatively the phenomenon. Then we selected three case studies from the sample so to characterise qualitatively three different patterns of corporate growth.

We chose as a sample a subset of US Fortune 500 companies. Data on such companies has been collected on the whole timespan ranging from 1995 to 2015, through a total time interval of 21 years. Fortune 500 data has been consolidated by company, tracking relevant corporation variations such as name changes, transformations such as split and bankruptcy, and major mergers. Our sample, made by 331 firms, is represented by all 2015 Fortune 500 companies which have been continuously on the list since their entry and whose median yearly growth rate is higher than 10%.

There is a well-developed debate in the literature on firm growth dynamics on how to operationalize growth measures (Weinzimmer 1998; Coad 2009). Our choice was to use the yearly growth ratio of revenues, which then have been computed for every company, and corporations have been ranked by total positive variation.

In the second part of the analysis, we focus on growth dynamics by means of mergers, acquisitions, and divestitures. Mergers and acquisitions constitute an established approach in company growth literature and have been extensively applied to explain and account for non-organic growth (Faulkner et al. 2012). In particular, recent streams of investigation relate M&A dynamics to the exploitation of strategic agility in building and maintaining technological platforms (Brueller et al. 2014). In order to operationalize this, we made use of the Lexis-Nexis M&A Mergerstat database from 1995 to 2014 to collect data on our set of firms.

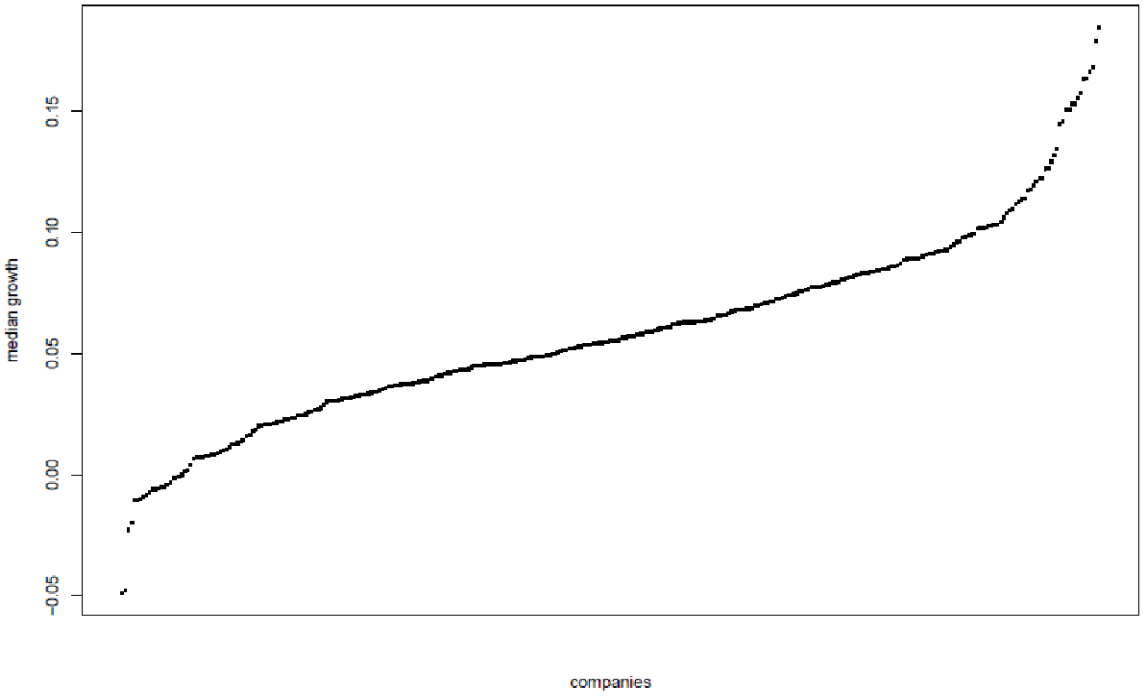
Operations were filtered out according to closing date, taking into account completed operations only.

Conventional research mostly uses SIC codes in categorizing the targets according to their relationships with the acquiring firm's main business. Unfortunately, this approach poses a series of shortcomings and flaws (Yang et al. 2018). Therefore, instead of using SIC codes in this study, a qualitative approach was embodied, and we investigated all M&A and divestitures for three case studies, analysing all the instances by coding the descriptions of targets and deals from the Lexis-Nexis Mergerstat database.

3. Patterns of Growth Among the US Fortune 500

A broad view of growth rates of firms in the US Fortune 500 during the period 1995–2005 is shown in Figure 1. We consider companies at the top right of the figure, which collects the fastest growth companies that made the *Fortune* list for at least 10 years.[1]

Figure 1: *Annual median growth rate of US-Fortune 500 firms (1995–2015)*



Source: elaboration from Fortune 500 data

Table 1, collect some descriptive statistics on those fastest growing firms. Notably, Microsoft with 221 operations, Cisco with 209, and Amazon with 181 used mostly M&As as a growth strategy; on the other side, four firms relied uniquely on internal growth.

[1] Banking, insurance, and finance companies were disregarded from the sample.

Table 1: *Fastest Growing Firms (annual growth rate > 10%)*

Name	Ticker	Industry	Growth	Years	Deals	SIC
Alphabet	GOOG	Information Retrieval Services	0.1846	10	62	7375
Amazon.Com	AMZN	Catalogue and Mail−Order House	0.179	14	181	5961
World Fuel Serv.	INT	Petroleum Products Wholesale	0.1682	11	18	5172
Energy Transfer	ETP	Natural Gas Transmission	0.1662	10	22	4922
Anadarko	APC	Crude Petroleum and Natural Gas	0.1635	15	35	1311
D.R. Horton	DHI	Operative Builders	0.1634	13	0	1531
Western Digital	WDC	Computer Storage Devices	0.1576	12	19	3572
Valero Energy	VLO	Petroleum Refining	0.1554	19	27	2911
Tesoro	TSO	Petroleum Refining	0.1532	16	13	2911
Plains GP	PAGP	Offices of Holding Companies, NEC	0.1531	14	0	6719
Chesapeake En.	CHK	Crude Petroleum and Natural Gas	0.1509	10	52	1311
Lennar	LEN	General Contractors−−Single Houses	0.1506	11	25	1521
National Oilwell	NOV	Oil and Gas Field Machinery	0.1458	10	41	3533
Apache	APA	Crude Petroleum and Natural Gas	0.1448	12	27	1311
Qualcomm	QCOM	Radio and Television Equipment	0.1317	16	66	3663
Kinder Morgan	KMI	Natural Gas Transmission	0.1294	15	11	4922
ConocoPhillips	COP	Petroleum Refining	0.1265	21	58	2911
Devon Energy	DVN	Crude Petroleum and Natural Gas	0.1263	14	33	1311
Lowe's	LOW	Lumber and Other Building Materials	0.1224	21	7	5211
Apple	AAPL	Electronic Computers	0.1224	21	34	3571
PulteGroup	PHM	Operative Builders	0.1209	13	0	1531
Danaher	DHR	Industrial Instruments for Measurement	0.1195	17	84	3823
EMC	EMC	Computer Storage Devices	0.1179	18	3	3572
Oracle	ORCL	Pre-packaged Software	0.1174	20	137	7372
Jabil Circuit	JBL	Printed Circuit Boards	0.114	14	22	3672
Nucor	NUE	Steel Works, Blast Furnaces, and Mills	0.1128	21	0	3312
CarMax	KMX	Motor Vehicle Dealers	0.1119	12	2	5521
eBay	EBAY	Business Services, NEC	0.1096	10	77	7389
Whole Foods	WFM	Grocery Stores	0.109	11	21	5411
Comcast	CMCSA	Telephone Communications	0.1081	20	55	4813
US Steel	X	Steel Works, Blast Furnaces, and Mills	0.1042	13	17	3312
Penske	PAG	Motor Vehicle Dealers	0.1032	17	20	5511
Terex	TEX	Industrial Trucks, Tractors, and Trailers	0.103	12	59	3537
Walgreens	WAG	Drug Stores and Proprietary Stores	0.1027	21	49	5912
Cisco Systems	CSCO	Telephone and Telegraph Apparatus	0.1023	19	209	3661
Starbucks	SBUX	Eating Places	0.102	13	29	5812
Microsoft	MSFT	Pre-packaged Software	0.1019	21	221	7372
Kohl's	KSS	Department Stores	0.1015	18	1	5311

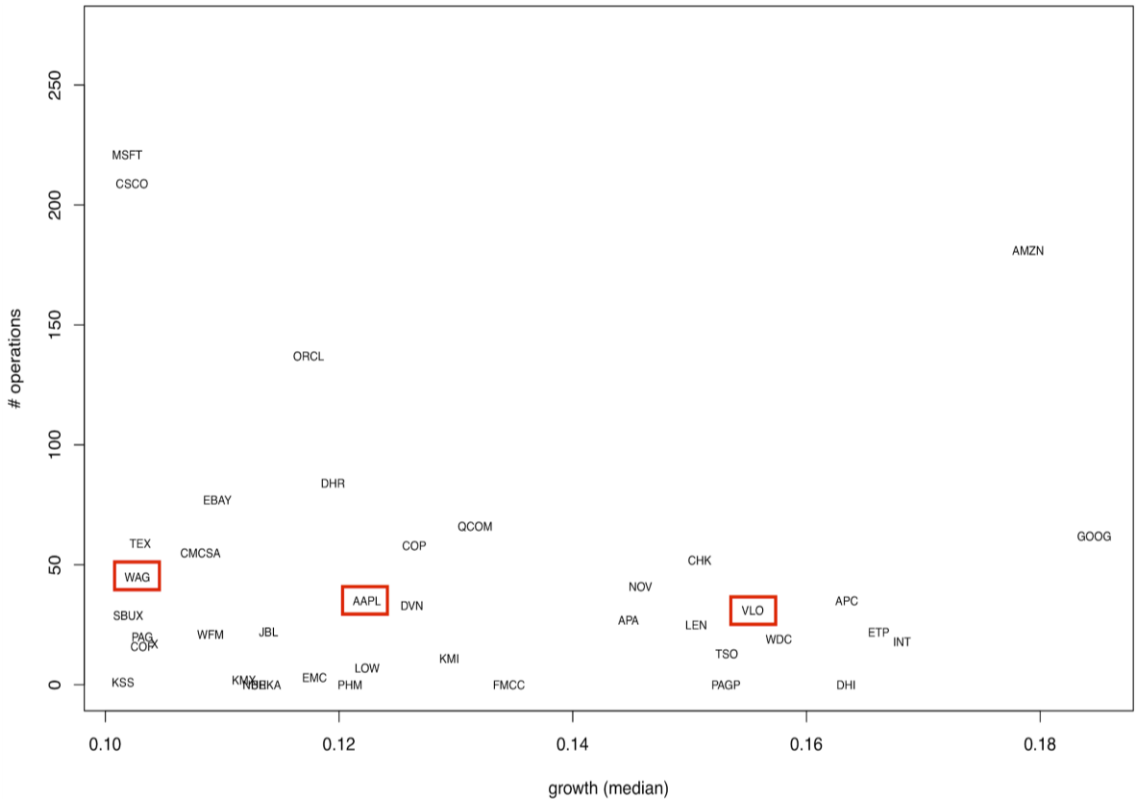
Source: elaboration from Fortune 500 data (1995-2015)

Also, there is no clear evidence of an association between growth and M&A (Figure 2); external growth seems to be more of a strategic choice than a common rule for the companies in the sample. Contrary to the naïve belief that hi-tech and software companies should be the easy winners in the race to persistent fast growth the Table shows a much more sectorial heterogeneity. For instance, in the top 20 ranks, the broad New Economy category (mail orders, information services, electronic, communication, and broadcasting) seems to be dwarfed by the Energy sector (oil and gas extraction, refining, transmission, wholesale, energy machinery, and energy infrastructures and logistic services).

Table 2 groups SIC codes in four broad categories. The first one groups all the codes in some ways related to the new economy. M&A is widely used by firms in this group, and there are on average 90 M&A operations per firm. In the energy sector, the average number of M&As is 31, and in Commerce and Restaurant the average number of M&As is 18. The residual sector has 23 M&As per firm, but the variability is very high. Among Operative Builders M&A are absent, and 84 M&A operations are due to a single firm (Danaher) operating in the Industrial Instruments for Measurement, Display and Control, a category that has much in common with the New Economy group. It must be noted that traditional manufacture is present

with only three firms, two (Nucor and United State Steel) operating in steel and related products, while the third (Terex) is a manufacturer of lifting and material handling solutions.

Figure 2: *Firms by Annual Growth and Acquisitions (in frame, firms considered in qualitative analysis)*



Source: elaboration from Fortune 500 data (1995-2015)

Traditional manufacturers were invested by the "great (second) unbundling": the value chain was dismantled and production stages were offshored to a small group of developing countries. A precise account of this phenomenon, which reversed the silos pattern of growth described by Chandler (1962), was given by Baldwin (2016). Baldwin stressed the role of information technology and knowledge in reversing the clustered (in firms and countries) manufacture of the golden age of capitalism, and triggering the geographic (and, under certain conditions, ownership) separation of G7 factories. What does not enter into Baldwin's narrative is why, at the same time, a new group of firms—either in IT-related industries, or in industries (like energy) always at the top of large firms, or in traditional industries (commerce and restaurants)—grew so fast. Our position is that the two phenomena can be related, and the Fourth Industrial Revolution is at the root of both the "great unbundling" and the "new bundling".

High growth is not a matter of the industries that led the Second Industrial Revolution anymore—the ones depicted by Chandler and Penrose, whose increase in size via M&A, fuelled by economies of scale and scope, was achieved though vertical integration and diversification. But, at the same time, neither is it just a matter of the so called new economy sectors, where firms exploit network

economies and platforms as means for growth. Some firms of the "old economy" not only are unaffected by unbundling, but keep the pace of growth of the Fourth Industrial Revolutioners.

Table 2: *Firms and Mergers Grouped by Main Categories*

Industry	Group	Firms	M&A
Information Retrieval Services Catalogue and Mail-Order Houses Computer Storage Devices Radio and Television Equipment Electronic Computer Computer Storage Devices Pre-packaged Software Printed Circuit Boards Telephone Communications Telephone and Telegraph Apparatus Business Services, NEC Petroleum and Petroleum Products Wholesalers	ICT Industries	12	1087
Natural Gas Transmission Crude Petroleum and Natural Gas Petroleum Refining Oil and Gas Field Machinery and Equipment Lumber and Other Building Materials Dealers	Energy	11	341
Motor Vehicle Dealers Grocery Stores Drug Stores and Proprietary Stores Eating Places Department Stores Operative Builders	Commerce and Restaurants	7	125
Offices of Holding Companies—NEC General Contractors—Single Houses Industrial Instruments for Measurement Steel Work, Blast Furnaces, and Mills Industrial Trucks, Tractors, Trailers, and Stackers	Others	8	185

Source: elaboration from Fortune 500 (1995-2015) and Mergerstat M&A data

To understand better what lies in between the old and the new, it is worth describing three short case studies that we use as insightful vignettes detailing different patterns of firms' growth. Among the high-growth companies in US Fortune 500 rankings, we chose three firms (Valero Energy, Walgreens and Apple – see also Figure 2). From our sample, we took three prominent companies which clearly adopted different strategies for growth (respectively: scale-based, scope-based, and platform & metamorphosing-based growth), at the same time controlling for the number of M&As and divestiture operations occurred in the period 1995–2005.

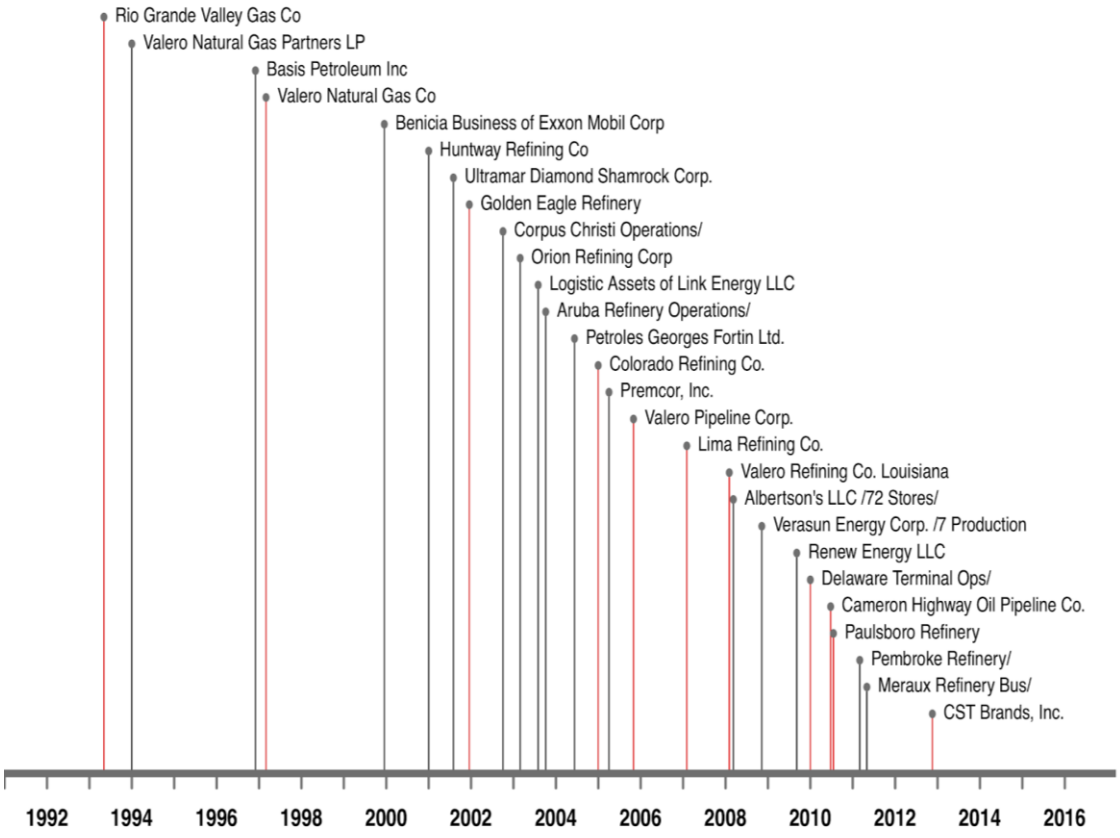
3.1. Valero Energy (VLO)

Valero Energy Corporation is an international manufacturer and marketer of transportation fuels and related petrochemical products. It is headquartered in San Antonio, Texas, United States. Valero operates in two reportable segments: refining and ethanol. The refining segment includes refining operations, wholesale marketing, product supply and distribution, and transportation operations in the U.S., Canada, the U.K., Aruba, and Ireland. The ethanol segment primarily includes

sales of internally produced ethanol and distillers' grains (Valero Energy, 2014). During the period 1997–2014, Valero's median annual growth in revenues equalled 15.54%.

In 2014, the company operated 16 refineries throughout the United States, Canada, and the United Kingdom, with a total capacity of approximately 480,000 cubic meters per day; 11 ethanol plants with a combined production capacity of 4.5 million cubic meters per year; and a 50-megawatt wind farm. Before 2013, Valero was one of the United States' largest retail operators with approximately 6,800 retail and branded wholesale outlets in North America, under a wide umbrella of brands (Valero Energy, 2014).

Figure 3: *Acquisitions (black lines) and Divestitures (red lines) - Valero (1993–2014)*



Source: elaboration from Mergerstat M&A

According to the Mergerstat database, deals by Valero Energy during the time interval 1993–2014 accounted for a total of 27 operations, with 17 acquisitions and 10 divestitures. Acquisition deals are mainstream in the oil business (Hsu et al. 2017; Riboldazzi 2010; Brondoni 2014) and show a conventional growth path addressed towards scale exploitation through horizontal mergers, with a threefold orientation: (1) optimization of refining size and pipeline capacity, (2) concentration of plants and operations in geographical areas near the sources of oil and with easy access to shipping routes, and (3) focalization on midstream activities such as refining and pipelining, mainly withdrawing from both upstream (exploration and extraction) and downstream (distribution) activities.

Moreover, some acquisitions benefited from specific financial or operating circumstances (bankruptcy or favourable value/book ratios of the targeted firm) that made the deals particularly profitable; among these were Premcor and Orion Refining. The major deals in the surveyed period (Figure 3) gradually led to a withdrawal from gas distribution (Rio Grande Valley, 1993; Cameron pipeline, 2010), exploration activities (Golden Eagle, 2002), and logistics services (Delaware terminal, 2010), concentrating operations on refining and related intertwined phases, such as oil pipelines.

Strategic acquisitions (especially Premcor, 2005) focused on purchasing production and pipeline capacity and were accompanied by divestiture of refineries and other assets exhibiting low strategic complementarities (Lima Refining, 2007; Valero Refining Louisiana, 2008; Paulsboro Refining, 2010). In this path, other acquisition deals fuelled the concentration of refineries and pipelines on distinct areas, mainly Texas (summing up to around 50% of total refining capacity), Louisiana (15%), and California (10%) in the USA, with minor presences in Aruba, Canada (Quebec), and the United Kingdom (Wales).

The main process of expansion and divestiture from less attractive segments in the oil business has been accompanied by more recent acquisitions of ethanol plants (Verasun, 2009; Renew Energy, 2010) located in the Midwest, mainly Indiana and Iowa. The entry in the ethanol business has been justified by increasing complementarities between oil and ethanol in the production of vehicle fuels, as a major consequence of environmental laws. Finally, to complement the focusing process on oil-refining activities and ethanol production, Valero spun off its retail operations into a new company (CST Brands, 2013). Under long-term supply agreements, Valero Energy continues to supply fuel to over 7,400 retail locations, many of which use brand names formerly owned by the oil refiner.

3.2. Walgreens (WAG)

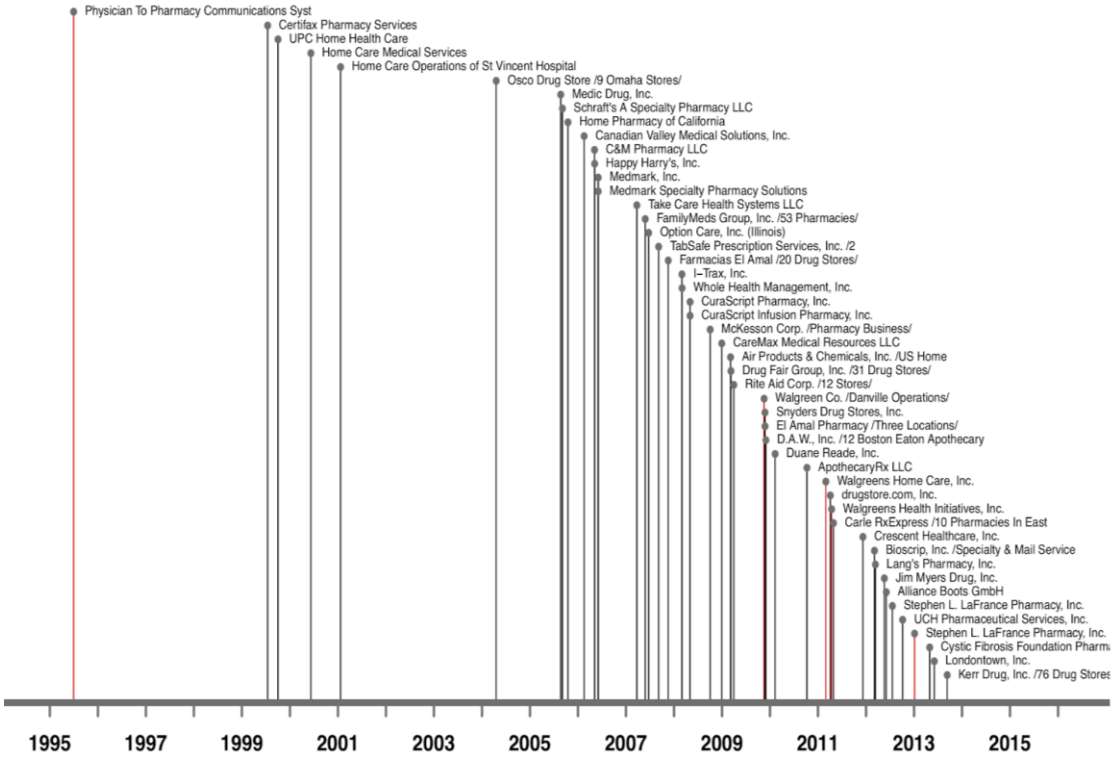
Walgreens provides its customers with multichannel access to pharmacy, health, and wellness services across America, offered through drugstores as well as mail, telephone, online, and mobile applications. In 2014, the company was the largest drugstore chain in the United States with net sales of $76.4 billion. Walgreens sells prescription and non-prescription drugs as well as general merchandise, including convenience and fresh foods, household items, personal care, and beauty care. Walgreens is present in Fortune 500 rankings over the whole 1995–2015 interval, moving up from 120th to 35th position, with a 10.27% median annual growth in revenues. After 2010, prescription drugs, general merchandise, and non-prescription drugs represented around 65%, 25%, and 10% of total sales respectively (Walgreens, 2014).

As of 2014, Walgreens operated 8,309 locations in 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. Locations include 8,207 drugstores, 91 infusion pharmacies, 9 specialty pharmacies, and two mail service facilities. As of 2014, total locations do not include 437 healthcare clinics and 48 worksite pharmacies operated through unconsolidated partially-owned companies.

Drugstores make up a distribution channel which provides generic pharmaceutical goods and services; a typical drugstore is located in the commercial area of a community, hence the name “community pharmacy”. “Specialty pharmacy” refers to distribution channels designed to handle specialty drugs or treatments, such as

pharmaceutical therapies that are either high-cost, high-complexity, or high-touch; "high-touch" refers to a higher degree of complexity in terms of distribution, administration, or patient management needing customized treatments, which drives up the cost of the drugs. Similarly, infusion pharmacies provide patients with therapy services including the administration of intravenous (IV) medications for acute and chronic disorders which must be treated by IV.

Figure 4: *Acquisitions (black lines) and divestitures (red lines) - Walgreens (1993–2014)*



Source: elaboration from Mergerstat M&A

Walgreens provides specialty and infusion services at home, at the workplace, in a physician's office, or at a company's alternate treatment site. Other clinical services include laboratory monitoring, medication profile review, nutritional assessments, and patient and caregiver education. In addition to store traffic, websites (including Walgreens.com and drugstore.com) received an average of approximately 59.7 million visits per month in 2014.Integrated with the e-commerce platform, the mobile application allows shoppers to refill prescriptions through scan technology, receive text messages alerting when a refill is due, and other front-end functionalities.

In the first instance, Walgreens's pattern of acquisitions (Figure 4) is marked by both the overall growth of its distribution channels in terms of the size of the network (total number of locations) and, later, vividly characterized by the expansion into specialized channels (mostly infusion pharmacy and specialty pharmacy). The company concluded around 50 M&A deals in the period 1995–2014; the huge majority (45 operations) were acquisitions, with a remaining tiny quote of divestitures related to support activities, such as information systems and

business process services (Pharmacy to Pharmacy Communication Syst, 1995; Danville Operations, 2010; Walgreens Health Initiatives, 2011).

The path of acquisitions showed no significant pattern in terms of geographical location, as Walgreens's main goal was to reach the largest population share; in this respect, population density seemed the sole driver in location decisions (Walgreens 2014). This generic intent unites the strategy of major firms in the pharmaceutical services industry (Walgreens, CVS), whereas other companies prefer a more focused approach: Rite Aid, for example, concentrates its distribution network mainly on the West and East Coasts of the USA.

Some deals were paramount in terms of number of customers served and growth of the drugstore distribution channel (size). In particular, acquisitions of companies which already provided health management centres and pharmacies at large-company worksites (I-trax, 2008; Whole Health Management, 2008) allowed Walgreens to quickly expand its global base of customers.

Before 2005, all M&A deals were targeted at networks of drugstores or support services. The process of horizontal diversification toward specialized channels (scope) began in 2005 and was particularly intense in the time interval 2006–2009. The succession of acquisitions was first aimed at specialty pharmacies, with at least six operations in this period (among these: Schraft's, 2005; C&M, 2006; Medmark, 2006) and later focused on the more specialized segment of infusion pharmacies (Canadian Valley Medical Solutions, 2006; Coscript, 2008; Air Products & Chemicals, 2009). Acquisitions concerned with specialized channels summed up more than 15 operations until 2014 and were frequently aimed at target firms managing pharmacies with multiple specializations (both infusion and other specialties). This stream of operations allowed Walgreens to enter novel specialized segments, obtaining new assets, situated knowledge, and specific capabilities to trigger and fuel the corporation's growth path into horizontal integration.

3.3. Apple (AAPL)

Apple Inc. is a California corporation established in 1977; it designs, manufactures, and markets mobile communication and media devices, personal computers, and portable digital music players, and sells a variety of related software, services, accessories, networking solutions, and third-party digital content and applications. Apple's products and services include electronic devices, a portfolio of consumer and professional software applications, operating systems, processing and storage cloud services, and a variety of accessories, service, and support offerings. Apple also sells and delivers digital content and applications through music and web store platforms. In addition, Apple sells a variety of third-party products, including application software, through both online and retail stores.

As part of its business strategy, Apple continues to expand its platform for the discovery and delivery of third-party digital content and applications through proprietary web stores. Apple's App Store and iBooks Store allow customers to discover and utilize media such as books and music, and install applications. Apple also supports a community for the development of third-party software and hardware products and digital content that complement Apple's offerings. Moreover, Apple's strategy also includes building and expanding its own retail and online stores and its third-party distribution network. More than 84% of the total sales came from the sales of hardware products like Mac, iPhone, and iPad. In

hardware products, Apple implements its proprietary OS and App Store (Apple Inc. 2014).

Apple's growth path is far from uniform in the time interval we considered (1995–2015); in 1995 it ranked in position 123 in the Fortune 500, with a total revenue of $9.18 billions USD. Over a seven-year period the company suffered a deep crisis that dropped its rank to 325th place, with a huge fall in revenues ($5.3 billion USD) and a loss equal to $25 million USD. During the last decade the corporation made its way back to one of the highest positions in the Fortune 500 ranking, gaining the fifth position in 2015 with total revenues of $182 billions USD. In the period 2002–2015, the average annual growth rate was equal to an astonishing 33.28%. Our analysis of Apple's line of conduct in acquisitions and divestitures will focus on this time interval.

Apple has not been very active, in comparison with other platform keystones like Google, in acquiring firms, with only 29 acquisitions from 1988 to 2009 (Yang et al. 2018). However, in recent years, Apple has used M&As as a core part of its business strategy: the Mergerstat M&A database records 34 deals in eight years (Figure 5), most of which were acquisitions. In effect, the only two divestitures shown here both refer to security applications (Autentec, 2012; Abaca Technology, 2012).

Before 2006, Apple acquired mostly firms that developed software applications, with some relevant cases like Claris (1998), which operated in the segment of productivity tools (related to iWork and FileMaker applications), and NeXT (1997), which developed operating systems (associated with Apple's OS X and iOS).

Since 2006, acquisitions target growth and control of four strategic portions of Apple's ecosystem: (1) specific equipment components (microprocessors, sensors, displays) and distinctive software interfaces, in order to drive the strategic launch of new hardware devices; (2) expansion and development of mapping services and applications; (3) search and analytics services for web stores; and (4) development of functionalities and applications for digital content (mostly music listening services).

In detail, major acquisition related to hardware devices (Intransitive, 2010; Anobit, 2011; Passif Semi, 2013; PrimeSense, 2013; LuxVue, 2013) were aimed at the development of Apple's System-On-a-Chip (SOC) platform and other hardware components that are paramount elements in the company's proprietary mobile architecture; these deals are further improved by human-machine-interface (HMI) solutions, especially aimed at face and voice recognition (Siri, 2009; Polar Rose, 2010). This stream of acquisitions is rather erratic in time, although it seems related to the introduction of new generations of mobile devices.

Figure 5: *Acquisitions (black lines) and Divestitures (red lines) – Apple Inc. (2007–2014)*

Source: elaboration from Mergerstat M&A

The second relevant segment developed in Apple's ecosystem is connected with mapping and geo-localization services, and is easily detectable in time: in the period 2009–2014 at least 10 major M&A operations were aimed at developing this strategic portion of the platform, with a burst between 2011 and 2013; among them, Placebase (2009), Poly9 (2010), C3 Techs (2011), WiFiSlam (2013), Locationary (2013), and others. A third major component of the platform is represented by specialized search and analysis tools targeted at facilitating the seeking and identification of specific information, such as applications, music, and databases, in the Apple Store (Chomp, 2011; Topsy, 2013; Novel Prj, 2013; Matcha, 2013). Finally, a further strategic portion of the platform aimed to enhance digital content services, in particular music streaming (Lala.com, 2009; Beats Electronics, 2014).

4. Discussion

The three case studies on high-growth Fortune 500 companies reflect three ideal typical strategies for growth: we treat Valero Energy as the poster child for scale-based, Walgreens for scope-based, and Apple for platform-metamorphosing-based growth.

Valero Energy operates in a traditional industrial sector where patterns of growth are largely informed by focusing on scale-relevant stages. As a specialist in the petrochemical products market, many of Valero's acquisitions are related to

optimizing size and capacity of production, at the same time extending its operations in different geographical sourcing markets. Divestitures occurring over time reflect a tendency to concentrate on the stages of the supply chain (refining and pipelining) that mostly gain from scale, withdrawing from upstream and downstream activities (such as extraction or distribution). Moreover, even when investing in complementary technologies (e.g., ethanol-based production), the main motivation is not scope-related, but it is, on the contrary, related to market opportunities emerging from changes in the regulations of the fuel industry.

In the case of Walgreens, many instances of growth through acquisitions are, again, related to scale-based motives. There are, apparently, similarities with the case of Valero Energy: both exploit scale in some stages of the value chain. But while Valero exploits scale by focusing, Walgreens reaches scale by replicating a business format in a growing network of outlets. Many acquisitions reflect a strategy of entry in different geographical areas in the drugstore market. On top of that, more so than in the case of Valero Energy, many acquisitions are related to strategies of diversifications from the traditional business of distribution of prescription and non-prescription drugs, with the acquisition of adjacent business lines such as specialty pharmacies and infusion centres. As a result, efficiency motives become over time intertwined with a rationale for growth related to the expansion in different market niches which are compatible with the core competence of the company, where moves occur to take advantage of novel market opportunities. The move from scale to scope seems common to the recent developments of retailers (Riboldazzi 2015), and can be a prelude to a platform-driven pattern of growth.

Even more complicated to disentangle are the various motivations at play in the case of Apple's growth strategy. Until 2006, growth apparently followed a pure platformization pattern: a strong proprietary and unbundled hardware-software platform, enacting families of complementary products, created a network of users tied to the platform by high switching costs. This growing network fuelled the supply of platform-specific contents and applications. In the more recent decade, instead, the bulk of the acquisitions have been related to technological and platform extensions which increase the value of the whole company ecosystem (e.g., analytical tools, digital contents, georeferencing etc.). The set of functions performed by the platform has not been defined since the beginning. New tools appear, with the potential of increasing the value of the original mediating function in a two-sided market; such is the case of georeferencing services and recommendation tools. Moreover, new and highly attractive content must be quickly developed in order to attract new users or tie the existing ones to the platform. Competition among ecosystems needs a rapid exploration and quick adaptation to this protean nature of platforms, which give advantages to the internalization of search and development of new functions, applications, and contents. This process calls to mind the rationale of growth based on *dynamic transaction costs*, used to explain vertical integration: "When the existing arrangement of decentralized capabilities is very different from that required by a major systemic innovation, (vertical) integration—which permits a quicker and cheaper creation of new capabilities—may prove superior" (Langlois, Robertson 1995, p. 43).

Summing up, we posit that high growth companies in turbulent markets, such as Apple, exhibit a strong tendency of growing through a pattern of metamorphosis of

their vertical boundaries and horizontal scope as a way to better exploit their position in platform markets. According to our view, the discovery of novel business opportunities opens new ecological niches; existing firms and incumbents compete in occupying the new ecological niches, using different resources. Entrants can attack, or create through innovation, new, small niches; as niches increase in size, incumbents swallow the new niches. This process can bring the firm away from its original core: periodic redesign of the set of activities gives coherence to the set of activities in which the firm is involved, and metamorphoses the firm identity around the platform. According to this view, the firm's growth becomes part of a process of discovery in which markets are not given, and firms expand by taking advantage of the use of some source of competitive advantage in new markets and business by adding features to their platform as a way to improve their market stance.

5. Conclusions

This paper has shown first that, in the Fourth Industrial Revolution, different patterns of growth survive, overlap, and graft, and the voracious growth of firms of the new economy represent only a fraction of changes that affect both the old and the new economy. A full understanding of the big chances faced by firms cannot lose sight of what happens "outside the new". We have presented just a few business cases but, together with information and communication, industries like health, food, or energy are in different ways affected by global changes (Brondoni 2014), with important consequences for the strategic patterns of integration, disintegration, and growth.

Secondly, it has presented a short characterization of growth patterns, showing that the same archetypal pattern of growth through platformization of the Fourth Industrial Revolution must be refined and better understood. To this aim, a model of platform metamorphosing has been outlined which refreshes in the new context the concept of dynamic transaction cost used by Langlois and Robertson (1995) to explain vertical integration. It must be emphasized that growth models and industrial sectors are not mutually homologous. In effect, different companies located in the same sector can choose multiple growth strategies: in the oil sector, for instance, many firms pursue vertical integration, whereas other corporations, such as Valero Energy, focus on horizontal integration on narrower phases of the global value chain. Moreover, the same platformization path could exploit different strategic intents; for instance, the path of acquisitions of mapping and localization service firms, pursued by both Google and Apple, is actually complementary to different mixes of strategic goals, such as advanced search services, rather than support for self-driving vehicles.

Obviously, this investigation has to be considered still at its early stages and further refinements are needed in order to gather a more grounded understanding of the empirical phenomenon addressed in this article. One promising area of research is represented by studying the impact of digital transformation of traditional industries as a major driver for firms' growth. The emergence of innovative ways for reaching new markets, optimizing internal processes and collecting data is becoming key aspect in value creation strategies. Moreover, from the methodological standpoint, we believe it is essential for the future agenda to move from vignette cases to more detailed business analysis, and to pair qualitative

analysis with quantitative assessment of growth patterns. From the authors' point of view, however, this is a first tentative step to go beyond the fads and the fashionable tags that fill the literature on the Fourth Industrial Revolution.

Bibliography

Apple Inc. (2014). Form 10-K 2014. Retrieved from http://www.sec.gov/edgar.shtml.

Arthur W. Brian (1994). *Increasing Returns and Path Dependence in the Economy*. Ann Arbor, MI: Michigan University Press.

https://doi.org/10.3998/mpub.10029

Aversa Paolo, Haefliger Stefan, Rossi Alessandro, Baden-Fuller Charles (2015). From Business Model to Business Modelling: Modularity and Manipulation. *Advances in Strategic Management*, 33, 135-185.

https://doi.org/10.1108/S0742-332220150000033022

Baldwin Richard (2016). *The Great Convergence. Information Technology and the New Globalization*. Cambridge, MA: Belknap.

Brands Henry W. (2010). *American Colossus. The Triumph of Capitalism, 1865–1900*. New York, NY: Anchor Books.

Brondoni Silvio M. (2014). Ouverture de 'Global Networks and Sustainable Development – 1'. *Symphonya: Emerging Issues in Management (www.unimib.it/symphonya)*, 1, 1-9.

https://doi.org/10.4468/2014.1.01ouverture

Brondoni Silvio M., Pironti Marco (2015). Ouverture de'Design Management, Product Engineering and Global Competition'. Symphonya. Emerging Issues in Management, 2, 1-12.

http://dx.doi.org/10.4468/2015.2.01ouverture

Brueller Nir N., Carmeli Abraham, Drori Israel (2014). How Do Different Types of Mergers and Acquisitions Facilitate Strategic Agility? *California Management Review*, 56, 39-57.

https://doi.org/10.1525/cmr.2014.56.3.39

Cartwright Susan, Schoenberg Richard (2006). Thirty Years of Mergers and Acquisitions Research: Recent Advances and Future Opportunities. *British Journal of Management*, 17, S1-S5.

https://doi.org/10.1111/j.1467-8551.2006.00475.x

Chandler Alfred D. Jr. (1962). *Strategy and Structure: Chapters in the History of the American Industrial Enterprise*. Cambridge, MA: MIT Press.

Chandler Alfred D. Jr. (1990). *Scale and Scope: the Dynamics of Industrial Capitalism*. Cambridge, MA: Belknap Press.

Chandler Alfred D. Jr. (1992). Organizational Capabilities and the Economic History of the Industrial Enterprise. *Journal of Economic Perspectives*, 6 (3), 79-100.

https://doi.org/10.1257/jep.6.3.79

Coad Alex (2009). *The Growth of Firms: A Survey of Theories and Empirical Evidence*. Cheltenham, UK: Edward Elgar.

https://doi.org/10.4337/9781848449107

David Paul A. (1992). Path-dependence and Predictability in Dynamic Systems with Local Network Externalities: A Paradigm for Historical Economics. In D. Foray and C. Freeman (Eds.), *Technology and the Wealth of Nations. The Dynamics of Constructed Advantage*. London, England: Unkinder.

Evans David S., Hagiu Andrei, Schmalensee Richard (2006). *Invisible Engines. How Software Platforms Drive Innovation and Transform Industries*. Cambridge, MA: MIT Press.

Evans David S., Schmalensee Richard (2007). *Catalyst Code. The Strategies Behind the World's Most Dynamic Companies*. Boston, MA: Harvard University Press.

https://doi.org/10.1111/j.1540-5885.2008.00309_3.x

Hsu Kuang-Chung, Wright Michael, Zhu Zhen (2017). What Motivates Merger and Acquisition Activities in the Upstream Oil & Gas Sectors in The U.S.? *Energy Economics*, 65, 240-250.

https://doi.org/10.1016/j.eneco.2017.04.028

Lafontaine Francine, Slade Margaret (2007). Vertical Integration and Firm Boundaries: The Evidence. *Journal of Economic Literature*, 45, 629-685.

https://doi.org/10.1257/jel.45.3.629

Langlois Richard N., Robertson, Paul L. (1995). *Firms, Markets and Economic Change. A Dynamic Theory of Business Institutions*. New York, NY: Routledge.

Montgomery Cynthia A. (1994). Corporate Diversification. *Journal of Economic Perspectives*, 8, n. 3, 163-178.

https://doi.org/10.1257/jep.8.3.163

Penrose Edith T. (1959). *The Theory of the Growth of Firms*. Oxford, UK: Basil Blackwell.

Pironti Marco, Cautela Cabirio, Christodoulou Joannis (2015). Business models innovation through new customer roles: A design-driven case study. Symphonya. Emerging Issues in Management, 2, 25-41.

http://dx.doi.org/10.4468/2015.2.03pironti.cautela.christodoulou

Pisano Paola, Pironti Marco, Rieple Alison (2015). Identify innovative business models: can innovative business models enable players to react to ongoing or unpredictable trends? Entrepreneurship Research Journal, 5, n. 3, 181-199.

https://doi.org/10.1515/erj-2014-0032

Riboldazzi Sabina (2010). Retail Policies in the Global Gasoline Market. *Symphonya: Emerging Issues in Management (www.unimib.it/symphonya)*, 1, 86-101.

https://doi.org/10.4468/2010.1.09riboldazzi

Riboldazzi Sabina (2015). Global Markets and Development Policies in Large-Scale Retailers. *Symphonya: Emerging Issues in Management (www.unimib.it/symphonya*), 5, 8-28.

http://doi.org/10.4468/2015.5.02riboldazzi

Rieple Alison, Pironti Marco, Pisano Paola (2012). Business network dynamics and diffusion of innovation. Symphonya. Emerging Issues in Management, 2, 13-25.

http://dx.doi.org/10.4468/2012.2.02rieple.pironti.pisano

Rieple Alison, Pisano Paola (2015). Business models in a new digital culture: The open long tail model. Symphonya. Emerging Issues in Management, 2, 75-88.

http://dx.doi.org/10.4468/2015.2.06rieple.pisano

Valero Energy (2014). Form 10-K 2014. Retrieved from http://www.sec.gov/edgar.shtml.

Walgreens (2014). Form 10-K 2014. Retrieved from http://www.sec.gov/edgar.shtml.

Weinzimmer Laurence G., Nystrom Paul C., Freeman Sarah J. (1998). Measuring Organizational Growth: Issues, Consequences and Guidelines. *Journal of management*, 24 (2), 235-262.

https://doi.org/10.1016/s0149-2063(99)80061-0

Yang Seung H., Nam Changi, Kim Seongcheol (2018), The Effects of M&As Within the Mobile Ecosystem on the Rival's Shareholder Value: The Case of Google and Apple. *Telecommunications Policy*, 42, 15-23.

https://doi.org/10.1016/j.telpol.2017.07.004