Report
DYNAMO 108
4/4 2020

Contours of Growth

As growth is a natural phenomenon, within a strategy to incorporate mental paradigms from other disciplines that can provide insights to enhance our analysis, we took a sideways peek into physics, biology and psychology. Growth in living organisms faces physical limitations that we have been aware of for quite some time. When a physical body grows extensively in height and width, let's say "x", its volume expands at 3^x. Within this geometric logic, excessive growth is not tolerable, because a growth expansion determines a natural physical limitation for living organisms. Limiting the perspective solely to physics, the vast literary and cinematographic tradition of stories with large beings or monstrous intruders that populate our collective imaginary will never be removed from the fiction section. As an example, for a scorpion measuring 10 cm and weighing 25 g to grow proportionally to reach the frightening size of, let's say, 50 meters, its volume would need to expand to the tune of 500^3 times. That is, to maintain the same body density, our invertebrate arachnid would weigh over 3,000 tons (equivalent to 500 African elephants piled one on top of the other), which makes it impossible. To make this growth pattern physically feasible, a transformation in the structure of genetic matter would be necessary. Something different has to happen. That is the cue for fictional literature which, when introducing oversized characters with special powers, relies invariably on creative resources whether they are chemical properties or a mutation. This is typical in scenes with "kryptonian" abilities or "gamma ray" effects.

Besides the organisms, the physical limitations also establish restrictions on the artefacts constructed by man. Regardless of the advances in engineering techniques, today we understand the safety limits for aircraft, transatlantic ocean liners or civil construction, such as bridges and buildings. Companies can be understood both as collections of physical assets and living organisms, comprising a network of individuals that interact and adapt. And, similarly, exceptional growth is only feasible if something different happens within the company. And this "something different" is the ability to innovate. Innovation is, then, the "kryptonian" ingredient in the corporate world, that renews and potentializes the organization's capacities. Didactic evidence is found in the experiment of the large conglomerates in the United States at the end of the 1960s, which emerged as indestructible but shortly after fell apart. One of the main reasons for the failure of these gigantic "organizations" lies in the fact that they start posting levels of innovation and productivity below those of niche companies. Without permanent innovation, prolonged sustainable growth is not possible. We will return to this aspect later.

Growth is a typical phenomenon of living beings, insomuch that biology probably has much to say. George Land in his book *Grow or Die,* first published in 1973, introduces his "theory of transformation," a systemic analysis of growth based on biological elements, which, however, also applies to other dimensions, both human and social. Land affirms that the physiological impulse of living beings is to assimilate external matter and reformulate it as an extension of their own beings. "Growth cannot happen independently; it requires interaction and inter-relations between what actually grows and its environment." Nothing grows from within, something external must be interacted with. To grow, the organism responds to the basic conditions of the environment: the availability of nutritional matter and the environment's reaction to attempts at using this matter. The organism and the environment interact and the ensuing behavior is

modified by the feedback from the environment. If the conditions for nutrition and feedback are favorable, the result will be healthy growth. If not, the lack of alternatives will result in "falling back on the most basic growth patterns".

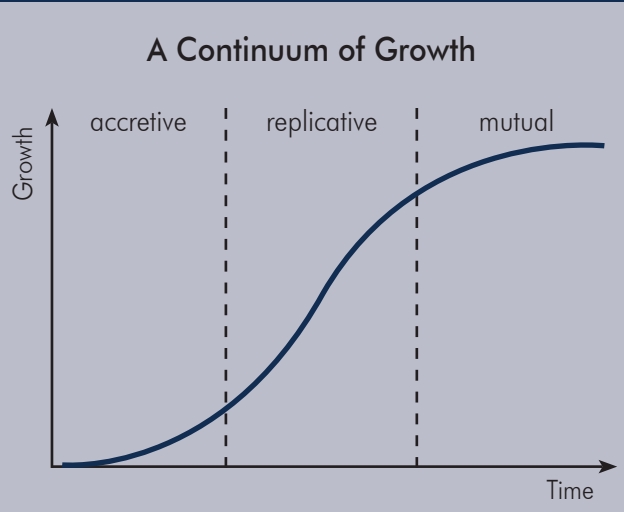
Land observes that there are three distinct types of growth. The first, a purely addictive stage, a mere extension of the existing limits. Referred to as *accretionary* or *incremental*, this is characterized by the accumulation of identical things. The second kind is *replication*, when growth influences other things to take on aspects of what initiated the process. If, in the first phase, growth happens through resemblance, in this stage it takes place via similarity. An example of the former would be a cell that grows, while the latter would be a cell that splits into two. According to Land, the third phase is a reciprocal interaction, a genuine exchange between the two sides, which reveals a higher level of sharing and "which is continuously expressed at higher levels of the organization." This is so-called *mutual* growth, a culmination of a successful process involving the two previous phases, which exhibits a form of cooperation found in multicellular organisms. Figure 1 below has a graph showing the classifications of growth proposed by Land.

We saw in the previous letter that the Penrose theory gave rise to vast literature on the administration discipline, focusing on the basis of internal resources and capacities of companies. In the book cited above, the pendulum has, in a way, swung to the other side. The environment plays a more central role, both taking responsibility for offering opportunities (nutritional) for growth to happen, and as a compelling adaptation driver for organisms to continue growing healthily.

Psychology also offers insights in interpreting the role of growth. American psychologist Carol Dweck, with more than thirty years of research, classified individuals in psychological categories, which she called a "fixed mindset" or a "growth mindset". In the former, individuals believe that their personality, intelligence character and talents are innate. The behavioral corollary of this understanding of themselves means these individuals try to prove themselves all the time and do not handle deception or opposition very well. If the abilities are innate and fixed, failures can only be interpreted as permanent. Different to this psychological rigidity, in the other group are those that understand their basic characteristics as merely initial references and, as such, can be developed through effort, strategies and help from others. Individuals are different, each one in their own way, whether it is through talents, skills, interests or temperaments, but all of them can change and grow through dedication and experience.

In the book *Mindset: the new psychology of success* (2007), Dweck reveals how her classification appropriately describes behaviors in several dimensions of human relations and interests, whether they are affective, family-based, in education, the arts, sport and business. In the corporate environment, the author found vast evidence that supports the division of personalities, with important repercussions in the performance of companies. Executives with a fixed mindset establish a style of leadership that invariably leads to a working environment in which each one tries to outdo the other, and the focus on collective results becomes secondary. A typical example was the case of Enron which created a culture of adoration for talent, in which each collaborator should appear and act in an extraordinarily wise fashion. When things began to go wrong, the company became a collective denial. Failure was not acceptable to that group of individuals that exclusively sought acknowledgement for their personal ostentation.

Figure 1 – Growth in its stages, according to George Land



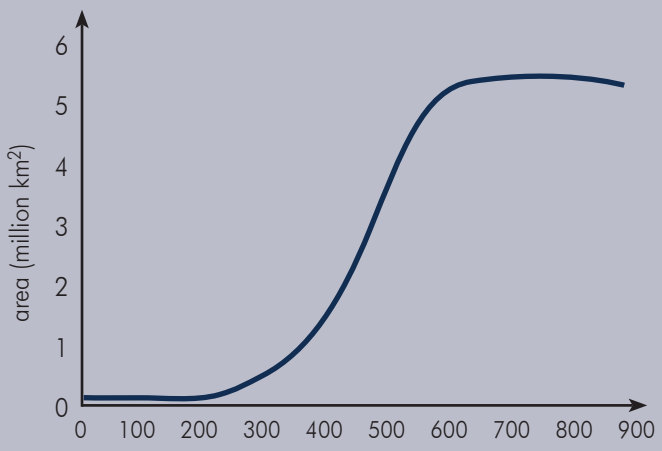
Source: Land (1973)

Meanwhile, the executives with the so-called psychological disposition for growth establish a working environment that is completely different. They are leaders that do not try to show themselves as being superior; quite the opposite, they recognize their limitations and prefer to surround themselves with competent people. They usually believe in self-transformation and human development. They are frank, transparent, direct but cordial, they know how to listen, believe, nurture, inspire and boost enthusiasm, they frequently ask questions, they are always open to reviewing their ideas and admit their mistakes. In an empirical study, Dweck observes that companies in which there is a prevalence of "growth mindset", collaborators feel more empowered, committed and like owners. They believe more in the company and, reciprocally, the executives believe in the potential of the subordinates more. Besides this, the experience revealed that they are companies that become richer (more competitive), they are more innovative and resourceful. That is, everything indicates that a "growth mindset" seems to provide an individual and collective psychological foundation on which healthy corporate growth bases itself.

Growth is a pervasive reality of the universe. From bacteria to the galaxies, everything seems to be a target of this expansionist imperative. In the book *Growth: from microorganisms to megacities* (2019), Vaclav Smil describes the growth patterns of innumerous natural and human realities. Bacteria and virus, trees and forests, animals, plantations, energy productions, tools and machinery, infrastructure, transport, electronics, populations, cities, economies, empires and civilizations make up the vast list of circumstances illuminated by the prism of growth. This is an encyclopedic collection of narratives told through numbers and statistics, bringing together knowledge supported by no less than 100 pages of bibliographical references.

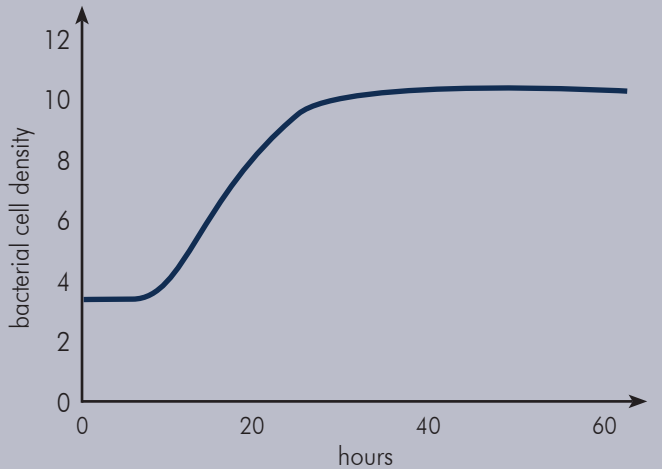
Smil recognizes a common pattern in the paths of growth over time between completely different phenomena, such as: the body mass of rats, the height of sunflowers, the American population, the speed of planes in commercial aviation, the number of Mozart's compositions, the density of energy in batteries, the speed certain bacteria reproduce, the productivity of wheat and corn harvests, the areas for farming and raising cattle in the United States, the production of fertilizers, the height and weight of individuals in specific populations, the nominal capacity of hydro-electric and steam turbines, the autonomy of commercial transatlantic shipping, the average size of American houses, paved highways in several countries, passenger transport on Japanese trains, the maximum capacity of passengers on commercial planes, sales of cell phones and semi-conductors, the world's populations, the urban population in several cities, the areas influenced by the Roman empire and republic, global crude oil production and natural gas

Figure 2 - Territorial growth of the Roman empire and republic



Source: Smil (2019)

Figure 3 – Growth in E.coli bacteria cultures

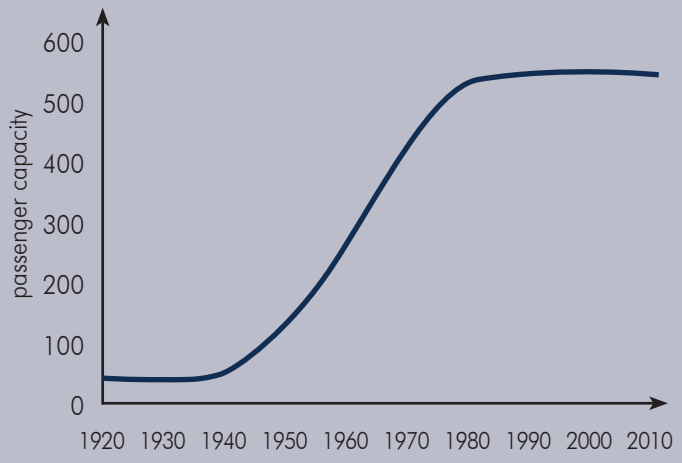


Source: Smil (2019)

extraction, generation of electric and nuclear energy, the GDP and income per capita in several countries, the share of international trade in the global GDP, among others.

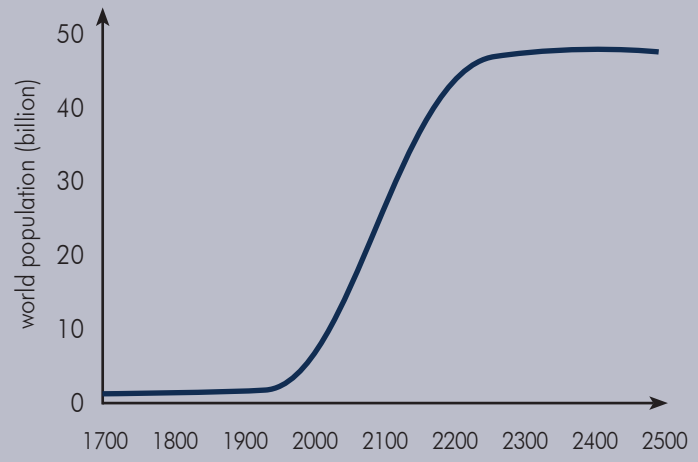
All of these realities, when plotted on graphs over time, follow the path in an "S" shaped curve, also known as the Sigmoid curve or the logistic curve, much like the description of the growth stages presented earlier in George Land's book. They show an initial moment of slow expansion, followed by a period of accelerated growth, and shortly after a deceleration then onto stagnation, or saturation (see Figures 2 to 5). Smil did not attempt to present a theory that aligned a unified explanation for this omnipresent pattern of behavior. Neither did he attempt to investigate the reality of companies, which is of special interest to us. If he had done so, he would surely find more examples for his collection. This is because the S-curve has been present in our environment for some time, also known as the "business curve", since it describes the reality of the business life cycles, in which firms are born, grow, decelerate, mature and eventually decline.

Figure 4 – Max. capacity of passengers on commercial planes



Source: Smil (2019)

Figure 5 – Growth of world population



Source: Smil (2019)

Another reference on the theme of growth is *Scale: the universal laws of growth, innovation, sustainability, and the pace of life in organisms, cities, economies and companies,* from the physicist Geoffrey West. West also studied innumerous natural and social phenomena seeking answers to the simple and thought-provoking question: what happens when things expand? The book is a fascinating journey and the author has the gift of an engrossing story teller, taking the reader through concepts of physics, mathematics and statistics as if they were simple arguments. The title of the book announces the sheer magnitude of his ambition. As a well-educated theoretic physicist, West seeks universal laws that can explain the common patterns of behavior that he has observed in such distinct realities.

Several natural and social phenomena – such as, for example, the level of metabolism in mammals, the number of patents in a specific population, or the strategy of a specific group of companies – when they expand and are measured under specific variables, they do so at a constant rate. These underlying "systemic regularities" in circumstances that are so distinct suggest the presence of some conceptual common scheme. All these realities – animal metabolism-ecosystem, patents-cities, companies-collaborators – are complex phenomena, comprising innumerous independent and connected agents. West proposes that an explanation unifying this growth consistency lies precisely in its network structures.

When cities grow, highways, energy transmission lines and gas stations expand at a lower rate than the population growth. That is, cities across the whole world grow in a *sublinear* fashion, with less physical

infrastructure per capita. On the other hand, socio-economic realities such as wages, wealth, patents, crime, cultural centers and teaching establishments grow in a *super-linear* manner, that is, faster than the population growth rate. Despite the enormous geophysical diversity and urban complexity, no matter what the spatial coordinates are, cities expand in accordance with the regularities described above. West suggests that physical infrastructure in cities describes a pattern of economy of scale comparable with biological configurations, such as the cardiovascular system, where energy is saved depending on how the blood flows throughout the system. On the other hand, social-human realities reflect a stronger power in the connections at the extremities (between individuals), leading to a dynamic of increasing returns, and to a systematic surge in the *pace of city life,* including the speed of walking, which curiously accelerates depending on the size of the city.

Following that, West moves from cities to companies, despite highlighting that his research on the corporate world is not as dense as it was on cities, where data is more robust. And here, he also finds a consistent pattern in growth that transcends the enormous individual variety of companies. Observing the combined behavior of companies, using the example of organisms and the physical infrastructure of cities, companies also grow in a *sublinear* fashion, pressured "by the mechanisms of continuous feedback inherent to natural selection and to survival of the fittest", typical in competitive environments. Under the imperative of efficiency and competitiveness, as companies grow, they need to become more focused, becoming more rigid and monolithic, losing diversity and the capacity for innovation. They become more bureaucratic and costs begin to increase disproportionately, like an organism that ages and loses its homeostatic balance, allocating growing energy to maintenance and less to the metabolism.

With this, when observed as a group, companies show behavior closer to that of organisms than to cities, dominated by a version of economies of scale and less by increasing returns and innovation. Naturally, this has profound repercussions in the cycle of life, where growth beyond a particular moment will be taken over by deceleration, saturation and a later eventual posterior mortality, as seen in the popular Sigmoid curve.

The parallels from physics and biology suggest a natural limitation for company growth. In fact, the S-curve, establishing the phases of slow expansion, acceleration, deceleration and stagnation, describe what seems to be standard route for the life of businesses and companies. Are companies condemned to this path that will inevitably lead them to stagnation and to the precipice?

Since the last Report, when we began a deeper investigation into the determining factors for company growth starting with the contributions made by Edith Penrose, we have maintained the traditional company model as a basis for our analysis. Notwithstanding, in several more recent Reports, we have shared with our readers some reflections on transformations of new business models, based on the digital reality.

It is a known fact that some companies, such as Alphabet (Google), Amazon and Apple, for example, unaffected by the S-curve, continue to present patterns of growth with no slowdown. What is behind this notable phenomenon? In our view, there are two fundamental elements.

First, the digital business model, based on connections within a network environment, organized under a configuration of platforms. We recall that the logic of a traditional economy follows the order of efficiency and productivity. In the network environment, concerns are different; they are on connectivity. Within this context, the entrepreneurial impetus consists of establishing connections, as many and as dense as is possible, creating network effects. These, in their turn, generate a positive feedback, producing an environment of increasing returns that tend to amplify the differences between competitors. This is a dynamic that is quite different to the traditional "physical" environment in which growth beyond a specific level will usually lead to a loss of efficiency and decreasing returns. In an environment of increasing returns, there is more value in capturing the enormous growth potential than in optimizing costs. Where there are positive network effects, growth leads to market expansion.

In the digital space, the more significant the advantage of a given company, the more it will tend to amplify, mainly through network effects and the dependency on using technology, which presents a learning costs that is relatively high, inhibiting switching decisions. Thus, the aim of several companies is to try to establish an early advantage, in an effort to reap the benefits of winner-takes-all or almost-all.

As we stated in Dynamo Report 96, with platforms, the dynamic is no longer that of scarcity and exclusiveness, but rather one of abundance and attraction. Value no longer lies in controlling the internal asset base, but rather in bringing together interactions that come from outside. Growth and market expansion are the result of the ability to reduce barriers for users. If attracting users is the name of the game, the main challenge in managing platforms lies in offering the best experience possible to the consumer. The logic is no longer about controlling supply chains, logistics infrastructure, distribution channels, nor marketing communication. Now, the idea is to try to reach a leadership position by dominating demand, offering the best value proposition to the consumer.

Entwined, these elements mean that the possibilities for expanding businesses are astonishingly amplified. Free from the physical ties, propelled by the winds of increasing returns and having an ocean of clients' needs stretched out ahead, digital platforms will continue to advance, ignoring the curbs that establish physical limits of company growth in a traditional economy.

Another way to escape the curse of the S-curve would be to jump to another S-curve, hypothetically further ahead. That is, upon realizing the approaching of the stall region in the growth curve, the company could launch into a new business project that would boost it to a higher level, revealing the next segment of promising growth. This is much easier said than done. As we noted before, the *modus operandi* of established companies is to latch on to the *status quo*. The recipe is to repeat what has worked before. The evolutionary filter discards what went wrong in the past and selects from the same base of things that worked well. Conventional "wisdom" prevails, and propositions that are distant from what has already been tested are quickly cast aside. Companies start to work like operational franchises dedicated to protecting the parts of their business that have been successful. Stuck in this "fixed mindset," they are unable to take the necessary leap to explore new opportunities. They put all their chips on the instruments that have brought them this far. Clinging to their current swinging vines, they will lose momentum very shortly.

The digital environment establishes another logic and drives a different pattern of behavior. In the world of network effects, one cannot simply be born small and grow slowly. When the focus of the business model is to grow quickly, there are more chances of incorporating network effects. Thus, the emphasis on speed is fundamental. Key attributes for growth as network effects and distribution tend to reap disproportionate rewards for a company that first reaches a critical mass in a specific business segment. With speed being a relative aspect, aimed at taking the market opportunity, it is vital to advance more swiftly than competitors. In this context, decisions need to be made in the name of adaptation and not so much in terms of efficiency. For this, it is necessary to maintain the capacity for innovation at all times. And innovating depends not only on the desire to advance into unpaved terrain, but also on the drive to explore the unknown, and on leaping onto more promising vines.

Embracing accelerated growth is a risky strategy and should only be entertained if there is a credible and competitive threat. Business segments governed by increasing returns and network effects in which the winner takes all or almost all are similar to the race to conquer the South Pole: only those that survive can have the glory (Shackleton, Facebook, Airbnb, Twitter). The story, even for those that made it to the top, but remained on the trail (Scott, Friendster, Wimdu, Tumblr), will probably be remembered more for the reasons that resulted in delays rather than for the merit of their undertaking. Winning companies in the digital ecosystem/platform (such as Alphabet, Amazon, Apple, Microsoft, Netflix) cannot have the luxury of forgetting their disruptive DNA for fear of falling into the same trap of those companies struggling in the traditional environment. This explains why Jeff Bezos insists, in his internal communications,

that Amazon cannot lose the high-spiritedness of its "Day 1".

This is an enormous challenge since companies that grow quickly undergo profound changes in a short period of time. When a company climbs high, all the ingredients, functionalities and properties change: the role of the founder, the board, the decision-making process, strategy, product market fit, hiring, controls, competitors, people, product, go-to-market, technology, operations, capital structure etc. The company quickly passes through specific phases, each one requiring different competencies. It is quite difficult for people to adapt their skills and specific knowledge at a speed that is compatible with the needs of the company. This results in a high staff turnover, thus shortening the time of employment. This has important repercussions, mainly for those collaborators that are unable to develop with the necessary elasticity. Here, we recall the insight borrowed from psychology related to the importance of a "growth mindset". The Penrose theory on the traditional economy also loses its value. In that theory, a company would advance inasmuch as the base of its administrative talents were able to free up cognitive resources by making tasks routine. Administrative competencies would establish the rhythm for the orchestra's growth. In the digital world, they try to keep up with the beat of the new soloists: the demanding consumer and the imminent competitor.

Facing the difficulties and risks involved in the pursuit of growth – the more accelerated, the riskier –, one can see how important it is for established companies to be ready to jump to the next S-curve. In start-ups, growth is, before and above anything else, a survival strategy. It is a need, "grow or die." As a company matures, establishing a business model that guarantees recurring revenue, the driver for growth is naturally diluted by the imperative to control and protect what has been achieved. Attack strategies gradually move over to make room for defensive concerns.

Established tech companies that continue to grow and to challenge the limits of the S-curve are those that maintain the spirit they had at the beginning. They continue scanning for opportunities in business segments that are often miles from their main source of revenue and profit. A classic example is Amazon Web Services (AWS), a new business segment, launched as a company that started as a marketplace for book sales, that transformed, in less than two decades, into the largest platform in the cloud, offering a portfolio of 175 services and solutions for customized computers, generating more than US$ 40 billion in revenue in the last year. How did this improbable metamorphosis come about?

Thankfully, we do not need to risk making extensive considerations to answer such a tricky question, since Amazon itself has offered up some clues, succinctly summarized in an unexpected recommendation: it is necessary to *wander*. Below is an excerpt from the 2018 annual report:

Sometimes (often actually) in business, you do know where you're going, and when you do, you can be efficient. Put in place a plan and execute. In contrast, wandering in business is not efficient … but it's also not random. It's guided – by hunch, gut, intuition, curiosity, and powered by a deep conviction that the prize for customers is big enough that it's worth being a little messy and tangential to find our way there. Wandering is an essential counter-balance to efficiency. You need to employ both. The outsized discoveries – the "non-linear" ones – are highly likely to require wandering.

Leaning once again on the AWS example, the same report goes on, taking into account valuable experiences, illustrating what we have just contemplated concerning the fundamental skills in the digital world: prioritizing clients and the importance of speed in company initiatives:

Much of what we build at AWS is based on listening to customers. It's critical to ask customers what they want, listen carefully to their answers, and figure out a plan to provide it thoughtfully and quickly (speed matters in business!). No business could thrive without that kind of customer obsession. But it's also not enough. The biggest needle movers will be things that customers don't know to ask for. We must invent on their behalf. We have to tap into our own inner imagination about what's possible.

AWS itself – as a whole – is an example. No one asked for AWS. No one. Turns out the world was in fact ready and hungry for an offering like AWS but didn't know it. We had a hunch, followed our curiosity, took the necessary financial risks, and began building – reworking, experimenting, and iterating countless times as we proceeded.

Lastly, a final excerpt from the same report which is rich in its revealing insights. This time about the little appreciation shown for a dimension of growth:

As a company grows, everything needs to scale, including the size of your failed experiments. If the size of your failures isn't growing, you're not going to be inventing at a size that can actually move the needle. Amazon will be experimenting at the right scale for a company of our size if we occasionally have multibillion-dollar failures. Of course, we won't undertake such experiments cavalierly. We will work hard to make them good bets, but not all good bets will ultimately pay out. This kind of large-scale risk taking is part of the service we as a large company can provide to our customers and to society. The good news for shareowners is that a single big winning bet can more than cover the cost of many losers.

The lengthy quotes are justified by the depth and the opportunity of the acute remarks within the context of our argument. They summarize fundamental elements for those seeking (and those able) to, like Amazon, rebel against the fate of the S-curve: it is necessary to (i) detach from the gravitational pull of efficiency and freely scan the topology of the landscape, including rummaging through, in a less obvious manner, what lies beyond the business segments you currently operate in; (ii) maintain a relentless focus on clients' needs: not just understanding what is revealed by them, but eventually revealing what they themselves do not understand; (iii) remember the vital importance of speed in the environment of increasing returns which disproportionately rewards those who arrive first and those who establish themselves as competent; (iv) learn from mistakes transforming them into main power for future wins. In a space that remunerates so well, locking down access to avenues with no exits using the padlock of experience from past mistakes, shortening the spectrum of valid options, configures a substantial advantage.

Culture, incentives and the structure of decision-making processes must be duly prepared to accept elements that are quite foreign to the organizational structure that we find in the traditional incumbent companies. Without such predisposition, the apparently fragile ingredients that lead to disproportionate gains and which are less obvious cannot prosper.

There are innumerous examples of doubtful initial propositions, appearing as somewhat eccentric arguments, often challenging the dominant logic of business or opposing the history of proven experiences, which have resulted in amazing corporate successes. In the same vein, remote and potentially promising ideas, born within incumbent companies, are often unable to surpass the monocratic filter of efficiency/minimal return, and further on end up being taken and used by the competition.

Hoping that consumers would provide credit card information for online payments was not a trivial issue when Amazon began. Google launched its search engine when everyone was sure the market was enough mature. Famous investors did not believe that people would rent their own houses and turned their backs on Airbnb. Similarly, the founder of Mercado Livre, prior to start its entrepreneurship, asked a dozen Latin-American friends at Stanford University and all of them replied that a platform for electronic trade like eBay would never take off in Latin America. And even, who would not have doubted the sanity of the idea of Netflix when a company that began its activities distributing DVDs using the regular mail system decided to produce relevant content taking on the Hollywood studios? (see Hoffmann, 2018).

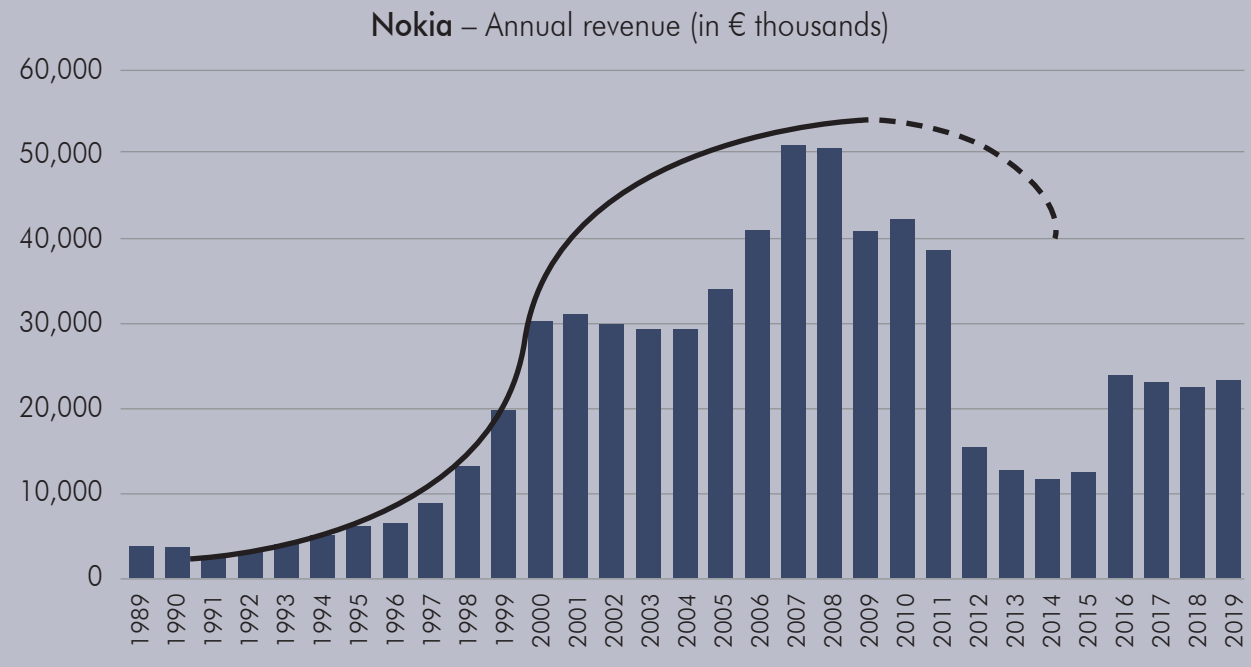
For sure, the cases above are not selected randomly, containing typically the sample problem known as survivorship bias. Acknowledging the disclaimer, perhaps very few examples show, in such an unpleasant manner, the destructive power of conservative structures in companies as the Nokia episode. It is not by chance that it is so well documented. In 1996, Nokia launched what would be the first smartphone. In 1998, innovation initiatives

were concentrated on a new structure, Nokia Ventures Organizations (NVO), precisely to seek out opportunities for growth beyond the scope of existing business. In fact, NVO developed innumerous critical projects that were taken up by Nokia and which showed the company as being ahead of its time, identifying, for example, opportunities for the "internet of things" in the area of health management. In 2001, when it launched the first smartphone with a camera, Nokia already held half of the global market. The company has become "synonymous with success" and took pride in being the "least hierarchical big company in the world" (see Bachall, 2019).

In 2004, Nokia's engineers developed a new device, designed for the internet, with a touchscreen, a high-resolution camera and they even put forward a strange idea: an online app store. The prototype was shelved by the company's top management, fearful of the possible impact on the *status quo* in the business. The company became a hostage of its own operational system, Symbian, which had given them the advantage at the first moment. But the system was centered in the device, and Nokia could not see (or did not want to see) that the world was migrating to platforms and applications. To make things worse, Symbian delayed launches when the entire set of codes had to be developed and tested for each new model. Nokia ended up using 57 different and incompatible versions of its operational system (see Doz, 2017), blatant evidence of the problem with legacy structures which we mentioned in Dynamo Report 106. In 2007, Nokia's engineers saw their ideas being materialized in the launch of Apple's iPhone. Five years later, Nokia became irrelevant in the market.

The Nokia case is especially interesting because the company had created a pioneering and reasonably sophisticated design structure at the time to deal with the challenges of innovation and, in theory, had the elements that could keep them at the cutting edge of technology, possibly ensuring successful pathways to robust future growth. Even so, powerful conservative forces won out and the company became a hostage of its own destiny in the S-curve (see Figure 6). Clinging to the *status quo*, a fixed mindset, mistaken aversion to risk and shortsightedness helped build up a crust of internal resistance and ended up sabotaging promising projects.

Figure 6 – Nokia – hostage to the S-curve



Source: Bloomberg / Elaboration: Dynamo

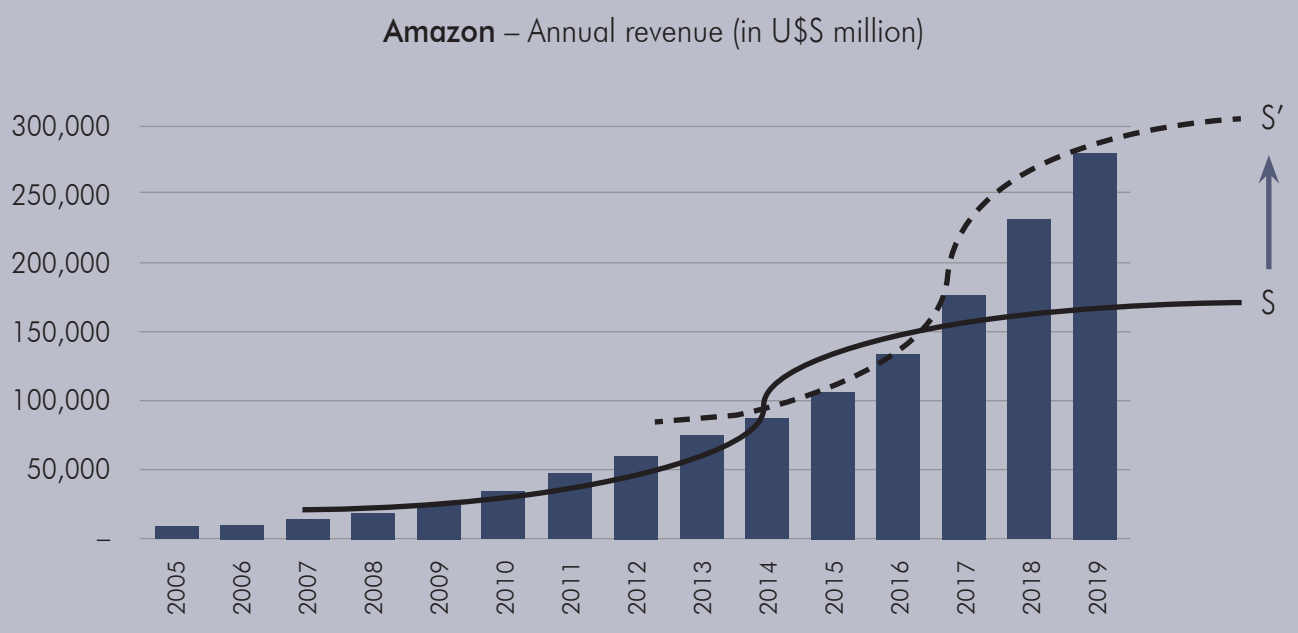
Curiously, the word "nokia" in modern Finnish refers to "soot", which is a lesson to all companies: it is not enough to design open, horizontal diverse corporate environments. It is necessary to take care to maintain them "spotless", free from the filth that accumulates with the wear and tear on the structures over time.

Innovation is the hyperlink that transports the company to other dimensions of growth (see Figure 7). Traditionally, we understand innovation in terms of products. But innovation is polychromatic and presents several angles. As we have seen in the examples above, besides products and markets, innovation can happen in business models, strategies or even in management. Nokia had a great innovation strategy, however hesitated when faced with the challenge of having to reformulate its business model and failed, becoming a hostage to the out-of-date management model.

Identifying the elements that often contribute to taking companies towards a path of sustainable growth is a fundamental task for long-term investors. Searching for clues in less obvious places, we began the previous Report investigating the theoretic literature, where we revisited Edith Penrose's main work. As we have seen, TFG also offers, in specific excerpts, relevant reading to understand the current corporate reality. Still, our journey sorting through the literature on empirical tests was not able to reveal valid help. The econometric technique reveals its weaknesses when faced with the difficulty of explaining causality in complex environments. We continue forward and begin to consider the determining factors, the circumstances and the challenges that simultaneously drive and stifle the phenomenon of growth. We finalize the text describing the strategic alternatives that companies face so as to make their expansion plans feasible within the scope of the classic Ansoff matrix.

The entire script in the previous Report ran within the scope of a traditional economy model of scarcity and declining returns, analyzed using the classic tools. Both TFG and the Ansoff matrix date back to the 1950s. In this letter, we sought inspiration from other disciplines – psychology, biology and physics –, exploring varying realities such as populations, societies and cities, always analyzing how these orders

Figure 7 – Amazon – jumping the S-curve



Source: Bloomberg / Elaboration: Dynamo

behave when submitted to the forces of growth. From there, we observed that the growth pattern for companies over time resembled that of several other natural, human and social phenomena, equally described in terms of an S-shaped curve, translating an initial period of gradual advance, followed by accelerated expansion, a slowdown and finally decline.

On the other hand, we know of a small group of companies that have stood up to this universal law and continue to present growth patterns with no apparent slowdown. From what we are able to see, there are two possible explanations for these exceptions: (i) they are companies on the forefront of the digital environment, under a regime of network effects and increasing returns; and/or (ii) they are companies that are able to jump successively to other S-curves. The main ingredient, common throughout all aspects, is the capacity to innovate. Innovation is the secret and the fuel for persistent growth.

There are multiple challenges for investors. We need to access the incentives and determining factors for growth in each company, factor in pros and cons, besides mapping out a matrix of strategic options that are valid on a case-to-case basis. That is, we have to identify not only the S-curve region that each investment is located, but also the real chances of reaching the new promising paths. All this, as we have seen, without the support of reasonable theories, reliable analysis instruments or robust empirical evidence. It is up to us to create our own tools on a case-to-case basis, adapting experiences and learning from our past mistakes. This is what we have been doing repeatedly at Dynamo.

Our analysis of the relevant themes for investment are based on the perspective of a value investor that actively selects the companies building a portfolio from the bottom up. This has been our focus since Dynamo began. From a social standpoint, the underlying hypothesis is that, by choosing the most efficient, competent and ethical companies, providing them with resources to expand their operations, we are contributing to an increase in the well-being of society, mainly in a country where there is still a lot of inefficiency, informality and illegality within the corporate environment. Choosing the winners in this competitive process of corporate Darwinism is part of the capitalist logic behind creative destruction which has brought about notable benefits in improving standards of living for a large part of humanity. As one of the undisputable protagonists of the virtuous dynamic, innovation is sovereign.

Nevertheless, non-intentional consequences of extraordinary technological, economic and social progress arise and accumulate. More acute repercussions are visible in the environment, through global warming, pollution, and the loss of biodiversity, and in society, with increasing inequality and exclusion. To the extent that humanity finds itself in an existential dilemma still with no answers. Is it possible to continue reaping undeniable benefits from human resourcefulness, while at the same time correcting the legacy of wrongdoing from the past and building the bases for progress with no negative externalities, which is more balanced and inclusive? The nature of this idea poses an enormous challenge: this is a problem of collective global action that manifests in different dimensions of timescales. That is, the incentives to act are diverse, the geographic distribution of cost-benefits is dispersed, and the perception of urgency is different.

Naturally, we too have no answer. Our intuition is that a concerted solution will undergo a mandatory change of individual attitude and move to a more

Dynamo Cougar x IBX x Ibovespa
Performance up to November 2020 (in R$)

Period	Dynamo Cougar	IBX	Ibovespa
60 months	207.4%	144.9%	141.3%
36 months	112.4%	55.3%	51.3%
24 months	87.6%	24.9%	21.7%
12 months	30.9%	1.7%	-0.6%
Year to date	19.9%	-5.2%	-5.8%

NAV/Share on November 30 = **R$ 1,595.0572862**

DYNAMO COUGAR x IBOVESPA
(Performance – Percentage Change in US$ dollars)

Period	DYNAMO COUGAR* Year	DYNAMO COUGAR* Since Sep 1, 1993	IBOVESPA** Year	IBOVESPA** Since Sep 1, 1993
1993	38.8%	38.8%	7.7%	7.7%
1994	245.6%	379.5%	62.6%	75.1%
1995	-3.6%	362.2%	-14.0%	50.5%
1996	53.6%	609.8%	53.2%	130.6%
1997	-6.2%	565.5%	34.7%	210.6%
1998	-19.1%	438.1%	-38.5%	91.0%
1999	104.6%	1,001.2%	70.2%	224.9%
2000	3.0%	1,034.5%	-18.3%	165.4%
2001	-6.4%	962.4%	-25.0%	99.0%
2002	-7.9%	878.9%	-45.5%	8.5%
2003	93.9%	1,798.5%	141.3%	161.8%
2004	64.4%	3,020.2%	28.2%	235.7%
2005	41.2%	4,305.5%	44.8%	386.1%
2006	49.8%	6,498.3%	45.5%	607.5%
2007	59.7%	10,436.6%	73.4%	1,126.8%
2008	-47.1%	5,470.1%	-55.4%	446.5%
2009	143.7%	13,472.6%	145.2%	1,239.9%
2010	28.1%	17,282.0%	5.6%	1,331.8%
2011	-4.4%	16,514.5%	-27.3%	929.1%
2012	14.0%	18,844.6%	-1.4%	914.5%
2013	-7.3%	17,456.8%	-26.3%	647.9%
2014	-6.0%	16,401.5%	-14.4%	540.4%
2015	-23.3%	12,560.8%	-41.0%	277.6%
2016	42.4%	17,926.4%	66.5%	528.6%
2017	25.8%	22,574.0%	25.0%	685.6%
2018	-8.9%	20,567.8%	-1.8%	671.5%
2019	53.2%	31,570.4%	26.5%	875.9%

2020	DYNAMO COUGAR* Month	DYNAMO COUGAR* Year	IBOVESPA** Month	IBOVESPA** Year
JAN	-0.1%	-0.1%	-7.1%	-7.1%
FEB	-13.0%	-13.0%	-13.1%	-19.3%
MAR	-41.2%	-48.9%	-39.3%	-51.0%
APR	10.6%	-43.5%	5.6%	-48.3%
MAI	9.9%	-37.9%	8.6%	-43.9%
JUN	12.1%	-30.3%	7.8%	-39.5%
JUL	18.0%	-17.8%	13.9%	-31.1%
AUG	-3.5%	-20.7%	-8.2%	-36.7%
SEP	-5.4%	-25.1%	-7.0%	-41.1%
OCT	-1.3%	-26.1%	-3.6%	-43.2%
NOV	22.9%	-9.3%	25.5%	-28.8%

Average Net Asset Value for Dynamo Cougar
(Last 12 months): R$ 5,361.5 million

(*) The Dynamo Cougar Fund figures are audited by Price Waterhouse and Coopers and returns net of all costs and fees, except for Adjustment of Performance Fee, if due.

(**) Ibovespa closing.

widespread collective awareness. We need to build mechanisms that foment an approximation of these different and distinct dimensions. Individual action with a collective purpose, local decisions illuminated by global perspectives, short-term initiatives aimed at long-term results.

It is precisely in this context that we take on the issues of sustainability at Dynamo. ESG is organically integrated into our long-term investor approach, becoming an aspect that helps coherently align these diverse dimensions in our investment activities. While we do not have a definitive solution for the questions raised above, for trade-offs involving growth x negative externalities, we push on with our objectives stemming from our fiduciary obligations, selecting profitable, winning companies; at the same time, we contribute with our share as an investor to promote corporate initiatives aligned with the efforts of social cooperation and collective arrangements.

It is within this scope that we also envisage the growth of companies. Growth is not an asset in and of itself. Nonetheless, as we said in our previous Report, whether it is a determining element in defining the performance of an investment, for us, growth only makes sense if it is integrated and submitted to the highest standards of business sustainability.

Rio de Janeiro, December 29, 2020.

Please visit our website if you would like to compare the performance of Dynamo funds to other indices:

www.dynamo.com.br

DYNAMO

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