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Growth hacking: A critical review to clarify its meaning and guide its practical application

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ABSTRACT

There is an increasing recognition among academics and practitioners that growth hacking provides a means to bridge the gap between strategy definition and strategy implementation. Significant tensions tend to arise across this gap. However, the data-driven experimentation, and the organizational capabilities developed within the firm, increase the ability of the company to foster technological forecasting and business model innovation. It is argued within this paper, that growth hacking actually mitigates these tensions. This paper is a critical review complemented with insights from practitioners and an illustrative case, the purpose of which is to: a) shed light on what growth hacking is; b) give practical tips on how to implement growth hacking. In achieving the first goal, the paper unravels the following myths. First, growth hacking is not a framework for platforms and high-tech companies only. Second, it is not only a marketing strategy and third, that growth hacking is a predefined process. These issues are traced back to two flawed assumptions underlying growth hacking; namely that (a) it is a framework designed for start-ups only and (b) that a "one size fits all" approach to growth hacking is appropriate. By unravelling those issues and combining these observations we shall provide ground for a fundamentally different approach to growth hacking, designed for business model scalability, enabled for adaptability in a changing business environment and focused throughout on the effective management of a firm's resources and capabilities. These insights shall guide scholars towards a better understanding of the phenomenon and of the two waves that characterize its evolution, providing also promising future research avenues. Moreover, the implications drawn from the discussion shall help managers in guiding their journey from strategy definition to strategy implementation.

1. Introduction

This special issue of Technological Forecasting & Social Change speaks to a long-running and increasingly important debate about the problematic nature of how companies shall continuously find sources of competitive advantage and adapt to digital changes. In this scenario, there is a need to shed light on new data-driven innovation methodologies, rooted in experimentation. In a context where speed and effectiveness in decision-making have become crucial for success in the business landscape, academics are called upon to provide knowledge on tools and models that can interact with new data sources and available technologies, supporting decision-making with a more scientific, data-based approach. The increased digitalization of companies has led to the exponential proliferation of business opportunities, namely through product enhancement capabilities, customer acquisition tools, organizational and operational efficiency (Kraus et al., 2021; Li, 2020). While many opportunities derive from this digital transformation, several challenges arise when firms are confronted to data usage in the strategy definition and strategy execution processes (Assar and Hafsi, 2019; Yang et al., 2010).

In the past, the quest for effective tools to address strategy formulation has led to the development of numerous top-down and linear approaches, stressing the importance to predetermine strategic goals or to involve "the chairman of the board, the president, and a select group

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of the more important vice presidents" (Cohen and Cyert, 1973, p. 350) to delineate the strategy of the firm. This approach has led to the understanding that strategies frequently fail not because of inadequate strategy formulation, but because of insufficient implementation (Yang et al., 2010). In addition, organisations of all types, sectors and sizes need new innovation models that are agile, lean and quick to implement in order to rapidly enter new markets (Paluch et al., 2020).

In 2010, Sean Ellis, entrepreneur and tech investor, addressed the need to find new ways to engrave big-data analysis and continuous learning in the strategy definition process, to foster resilience and to face the ever-shifting competitive arenas. He developed the concept of Growth Hacking (GH), that he defined in an interview with Ryan Holiday (2017) as "a process of rapid experimentation across the full customer journey to accelerate customer and revenue growth". In the words of Ellis, growth hacking helps companies to develop the dynamic skills that are needed for growth (Ellis and Brown, 2017). Since then, growth hacking has been leveraged by several born-digital companies (e.g., Dropbox, Google, Airbnb, Meta, LinkedIn, Pinterest, PayPal and many others) to improve business scalability and to boost growth.

However, while the academic discussion focused mainly on the performance outcomes of the application of growth hacking to born-digital companies, start-ups or early stage companies (Rizvanović et al., 2023) and its ability to foster business model scalability; still only a handful of studies have tried to unravel the role of growth hacking in bridging the gap between strategy formulation and execution (Bohnsack and Liesner, 2019; Feiz et al., 2021; Troisi et al., 2020). Furthermore, the steep increase in the spread of growth hacking and the need to provide managers with effective tools for strategy execution, represent a call to action for academics to challenge the validity and effectiveness of traditional linear processes used until now to bridge the strategy-execution gap (Coll and Micó, 2019; Li, 2020; Narayanan et al., 2020).

Moreover, extant literature has approached growth hacking from a jeopardized perspective, failing in providing the academic and managerial community with a holistic and shared vision of the matter. In fact, Bohnsack and Liesner (2019) present a taxonomy of growth hacking patterns along the customer lifecycle of acquisition, activation, revenue, retention, and referral and provide a categorization along two dimensions (i.e. resource intensity and time lag), focusing their analysis on a specific business (i.e., a fitness application). Instead, Troisi et al. (2020) have focused their research on assessing how a data-driven orientation to the use of big data analytics and cognitive computing can reframe marketing decisions in the B2B segment. Specifically, the authors explore whether the adoption Growth Hacking can be helpful in exploiting those opportunities in B2B marketing. The work of Feiz et al. (2021), through a multiple-case study approach investigate the growth strategies of 13 Iranian start-ups, developing five clusters of growth hacking strategies along the customer lifecycle stage (i.e., acquisition, activation, revenue, retention, and referral).

It appears evident that existing studies are divergent with regard to key concepts and their interrelationship, and there is a need to integrate those different perspectives. In addition, there are currently several false myths concerning growth hacking, which do not allow for an understanding of the topic from a theoretical and practical point of view.

The primary goal of this paper is to shed light on and provide clarity regarding the concept of growth hacking, with the aim of facilitating its theoretical understanding and practical implementation. By delving into the intricacies of growth hacking strategies, techniques, and best practices, this study seeks to offer comprehensive insights that can guide future research and empower businesses and professionals to leverage growth hacking effectively.

Our research methodology entails a multi-faceted approach to thoroughly investigate the concept of growth hacking. First, we implemented a critical literature review, in line with previous studies (Bereznoy et al., 2021; Caputo et al., 2023; Prochatzki et al., 2023; Sapsed et al., 2002) to analyse existing scholarly works, research papers, and industry reports related to growth hacking. In addition to the literature review, we adopted an inductive approach (Abatecola et al., 2022; Ardito et al., 2019; Bargoni et al., 2023a; Bohnsack and Liesner, 2019; Caputo et al., 2023; Troisi et al., 2020), which begins with a set of empirical observations, seeking patterns in those observations, and then theorizing about those patterns. Specifically, we conducted 10 semi-structured interviews with experienced growth hackers and professionals who have employed growth hacking methodologies in their respective domains. These interviews allowed to understand what growth hacking is nowadays, and will provide valuable insights into the real-world application of growth hacking, highlighting best practices, challenges faced, and success stories. Furthermore, to exemplify the relevance of growth hacking beyond digital start-ups and tech-driven ventures, we will discuss an illustrative case study (Mancuso et al., 2023) featuring a traditional business that effectively adopted growth hacking strategies to enhance its market presence and overall growth. This case study will serve as a practical demonstration of how growth hacking principles can be adapted and leveraged by more traditional industries and established enterprises.

By combining these three key components, our research endeavours to offer a comprehensive and in-depth understanding of growth hacking, empowering businesses and professionals to harness its potential and drive sustainable growth in today's competitive market landscape.

In essence, this paper makes several significant contributions to the existing literature on growth hacking, enhancing the understanding and practical application of this dynamic concept. Firstly, through a rigorous and critical review of the literature, we consolidate and synthesize the current body of knowledge surrounding growth hacking, thereby contributing to a comprehensive and up-to-date understanding of the matter. Secondly, the incorporation of semi-structured interviews with growth hackers and professionals who have implemented growth hacking methodologies offers unique and valuable insights into real-world experiences, challenges, and successful strategies. These first-hand accounts enrich the existing knowledge base, providing practitioners with actionable insights and potential pitfalls to consider when implementing growth hacking techniques. Third, the illustrative case study presented in this paper serves as a practical demonstration of growth hacking's adaptability and efficacy for traditional businesses. By showcasing how a non-tech-centric company successfully leveraged growth hacking principles to achieve tangible growth outcomes, we illustrate the versatility and applicability of growth hacking methodologies beyond its traditional associations with digital start-ups. All in all, the multi-faceted approach allows us to clarify the growth hacking concept, unravel its false myths and help scholars and practitioners in understating its underlying mechanisms.

2. Defining growth hacking

The ability of technology to permeate every aspect of today's life has brought unprecedented disruption in our societies (Millar et al., 2018). Not only from a practical perspective, facilitating the completion of tasks or by substituting human labour, but foremost as a resource for companies to fuel growth and sustain competitive advantages (Saura et al., 2022).

Empirical evidence from the markets has shown that some companies have leveraged resources and managed capabilities in a way that has led to unprecedented growth (e.g., Dropbox, LinkedIn, Pinterest, PayPal, etc.) compared to other companies in their respective industries. Especially the so-called digital firms, which compared to industrial firms, deploy business models that are based on non-integration of resources and activities thus relying of outsourcing (Giustiziero et al., 2022). More specifically, from a resource-based view (RBV) perspective, they employ digital resources that are essentially scale free, leading to higher "scalability", amplified by the network effects (Cusumano et al., 2019; Giustiziero et al., 2022).

For example, in the digital payment industry, PayPal experienced a 10 % daily growth reaching in a small amount of time a userbase of over

100 million people. In the hospitality industry, Airbnb revolutionized the way people travel and accommodate. In 2016, the annual guest arrivals grew from 40 million in 2015 to almost 80 million, bringing the cumulative figure close to 160 million since the company's founding in 2008. The question rises easily, how did those companies manage resources and activities to experience such growth and how did they make their business model so scalable?

The common pattern that ties those companies together is that they all used growth hacking to scale up. For example, PayPal's revolutionary hack consisted in paying individuals to sign up. In fact, the company understood that the customer lifetime value of the newly acquired customers was higher than the cost of giving $10 every time a friend you referred created an account. Airbnb found out another simple solution to drastically increase the number of bookings: improving the photos listing on their site. To improve the image quality, they first started traveling to photograph hosts' apartments themselves. Later on, they were able to hire a horde of photographers all over the world to do the job on demand. Then they leveraged the Craigslist API reverse engineering hack. In other words, this solution allowed Airbnb users to cross-post their listings on Craigslist, giving them access to the huge user base already existing.

Growth hacking has been defined by Sean Ellis, entrepreneur and tech investor as well as of author of Hacking Growth (a Random House international bestseller), as "a process of rapid experimentation across the full customer journey to accelerate customer and revenue growth". The peculiarity of growth hacking resides in the use of (big) data to engrave a data-driven decision making within the company and the iterative approach to tackle innovation or rapid prototype design to intercept customer needs throughout the customer journey (Bohnsack and Liesner, 2019; Sultana et al., 2022). These elements of growth hacking combine the strengths of big-data analysis to continuous learning from iterative experimentation, which allows companies to adapt their capabilities to the ever-shifting competitive arenas (Škare and Soriano, 2021). Big data analytics refer to the complex set of instruments and analytical techniques employed to store, manage, analyse and visualize large and complex amounts of data (Troisi et al., 2020). These tools and techniques increasingly support decision-making processes within firms (Saura et al., 2021).

In this context, growth hacking posits that companies should turn data into information that can be transformed into knowledge to develop learning and creativity in a circular process of continuous improvement (Santoro et al., 2018; Troisi et al., 2020). From a practical perspective, Growth hacking is the process of rapid experimentation and implementation of resource-light and cost-effective tactics to help acquire and retain an active user base, sell products and scale the business efficiently and effectively (Cavallo et al., 2023; Sanasi et al., 2023). It uses traceable marketing tools, so that data from individual and specific stages of the customer journey or funnel can be analysed to make decisions.

According to extant literature, growth hacking is an established process that encompasses four phases. First, firms must ensure a fit between the product they are trying to sell and the addressed market. Hence, product innovation (even whole businesses and business models) does not derive just from internal R&D but rather from the necessity to fulfil a compelling need for a defined group of people. In the first phase of growth hacking, companies need to develop routines to integrate big data in the analysis of customer needs leveraging existing knowledge and rules of thumb (e.g., heuristics), followed by an iterative phase of adjustment to ensure product-market fit (Eisenhardt and Martin, 2022). These effective product development routines typically involve the participation of cross-functional teams that bring together different sources of expertise.

Second, firms that want to deploy a growth hacking process need to find the so called hack. In fact, the second phase of the growth hacking process consists in targeting the right customers in the most efficient (less costly) way for the company. In other words, the Hack phase regards targeting the right customers, at the right time, at the right place. Uber, for example, in its early days distributed coupons for free rides in front of conference venues. This hack strategy led to a high conversion rate, growing the business quickly and effectively.

The third building block of growth hacking resides in the exploitation of virality through digital channels and foremost social media. Virality is a digitally native concept, born from the spread of social media in everyday life (Argyris and Monu, 2015; Wagner et al., 2014). Digital technologies have boosted the responsive uptake activities from social media (Varis and Blommaert, 2018). For example, liking a post is as form of self-interpellation, in the sense that people express a judgment that they themselves belong to the intended audiences of a message or sign. While sharing recontextualizes and directly reorients this statement towards one's own community, triggering another phase in a process of viral circulation.

Fourth, growth hacking consists in fostering consumer retention, through the implementation of data-driven customer relationship management tools and the optimization of the marketing activities of the firm related to implementing incentives and loyalty programs. Customer relationship management (CRM) is certainly not a new concept (Maklan and Knox, 2009). However, Growth Hacking introduces a novel approach to CRM, proposing the iterative approach to customer retention and to product optimization and a data-driven decision making of the marketing function (Holiday, 2014).

From what has been discussed so far, it is evident that the literature has treated growth hacking as a process based on marketing strategies, effective only in the context of digital firms. The following sections aim to unravel these false myths.

3. Unravelling myth 1. GH is not only for platforms and high-tech companies

Growth hacking has increasingly and remarkably gained space in the debate among practitioners, following the rise of some famous tech companies. These, have been able to accelerate growth by establishing innovative data-driven tactics on different stages of growth hacking, like hack, viral and retention (Holiday, 2014). Dropbox, Uber, AirBnB are just some of the companies that have exploited growth hacking strategies to grow exponentially in a short frame. Some have focused on the hack strategy, e.g. by offering targeted discounts to a specific segment of customers. Others have exploited virality, through referral programs (e.g. Dropbox offers free space to those who bring friends, relatives, or colleagues onto the platform). For these reasons, the false myth has grown that growth hacking is only for platforms and high-tech companies. As suggested by Cusumano et al. (2019), "Platforms, in general, connect individuals and organisations for a common purpose or to share a common resource" and that "…they bring together individuals and organisations, so they can innovate or interact in ways not otherwise possible, with the potential for nonlinear increases in utility and value". These companies, thus, are based on a digital business model (Gawer and Cusumano, 2014), and need data-driven processes to be economically and financially sustainable. Therefore, it is reasonable to infer that they need a growth hacking approach to grow and maintain competitive advantages. Platforms business are continuously supported by data-driven decision making and experiments on different levels. These have been also called digital firms, which compared to industrial firms, are highly digitalized along the resources and markets dimensions and thus have more scalable resources bundles (Giustiziero et al., 2022).

As anticipated, the literature on growth hacking is still at an early stage. Books on this topic provide numerous practical examples, but always regarding platform companies, which are well known to many readers. However, as recently stressed by the emerging literature (e.g. Troisi et al., 2020) and practitioners' insights, growth hacking is not only a strategy to accelerate growth. Rather, it is a process of continuous experimentation to improve activities, products, services, and so forth. Therefore, it is an approach that can be applied by all types of

companies. In line with this, the study by Troisi et al. (2020) focuses on three companies operating in the agrifood, building and transport sectors, with a B2B focus. The authors show strategies and tactics employed to exploit the opportunities offered by cognitive computing and big data analytics according to a data-driven marketing approach. Therefore, traditional companies, if supported by big data analytics capabilities and a data-driven approach (Rialti et al., 2019), can implement continuous experimentation and growth hacking processes. As suggested by one interviewee: *"For me there is not much doubt about what growth hacking is. It is a methodology that allows companies to experiment methodically. All the stuff that is told about the big US case studies is growth hacking pop culture, used by bloggers who want to get likes on social media by giving the usual examples like Dropbox. In methodological terms, growth hacking is a very specific thing, a way for companies to experiment with a process. In order to innovate, companies have to experiment: you get innovation through experimentation and when faced with the need to experiment, you can proceed in two ways: one way is more unstructured, crude, homemade, random; the other way is more organised, i.e. you experiment methodically. The latter is growth hacking. It means working with data, with the right frameworks, with an established process, with certain roles within the company, with certain steps."*

Hence, it is reasonable to infer that traditional companies, or industrial companies as called by Giustiziero et al. (2022), can adopt growth hacking as an approach of continuous experimentation to improve products, services, processes, and activities. For example, many food and beverage companies launched their own ecommerce site to sell products online during the lockdown driven by the COvid-19 Pandemic. Growth hacking is a very efficient and effective approach to generate leads and retain customers in this context. For example, these companies use social media to generate leads (hack strategy) and subsequently make retention on their e-commerce platform. Moreover, again in a traditional context, growth hacking can be useful to support an omnichannel strategy efficiently and effectively (Taylor et al., 2019).

Similarly, growth hacking can be used to optimize pricing strategies, through consumer testing, to improve current products and services by analysing data on consumption, preferences and criticalities. However, it is vital for traditional companies to build data-analytics skills (Bresciani et al., 2021a). As one interviewee pointed out, there are two factors that are crucial for sustaining continuous experimentation processes in the context of more traditional businesses. *"The first concerns the continuous acquisition of data. Companies that today do not have a data culture, or that have not done data gathering activity cannot implement growth hacking, so before worrying about how to do growth hacking, they must first understand how to start doing a structured data gathering plan. Then there is a second issue that has to do with company structure and organisation. Companies that have a rigid hierarchical structure fail to foster experimentation. Hierarchy puts the brakes on projects or stops them in their tracks. This is not growth hacking. Experimentation needs speed and agility."*

From an RBV perspective, thus, growth hacking is fuelled by data acquisition, which becomes the main source of the process implementation (Dubey et al., 2019). However, data acquisition is not sufficient. As shown by Akter et al. (2016), organisations must be able to build big data analytics capabilities, which are fostered by big data management capability, big data technology capability and big data talent capability. Among the three variables, the latter is the one impacting most of big data analytics capabilities, proving that big data management needs talent, creativity, and knowledge before technology.

More recently, Troisi et al. (2020) showed that growth hacking provides benefits to traditional companies, if properly implemented. Based on the findings concerning three companies, the authors propose a framework for adopting growth hacking, which starts from the adoption of a data-oriented mind-set (strategy), which leads to the implementation of an integrated architecture based on a combined set of analytics (technology adoption), managed thanks to specialized competencies (management and technical skills) in order to realize marketing aims and to pursue co-innovation over time (continuous improvement and innovation).

As such, traditional companies may embark on a digital transformation journey, starting to collect data through various tools. For example, Customer Relationship Management (CRM) (Guerola-Navarro et al., 2022; Karakostas et al., 2005) can help B2B companies better understand customer needs. Due to the complex nature of the customer relationship, understanding is essential in the B2B sector. Sales in the B2B sector are more complex than in the B2C world. The average buying cycle takes longer and the target audience may be a small niche market. To optimize their activities, B2B companies need a targeted plan and the right tools, like the CRM to implement it (Itani et al., 2022).

In both B2B and B2C sales cycles, the idea is to guide potential customers through a series of (customised) messages and content that begin with generating brand awareness, potentially leading to a sale. If this sale is supported with comprehensive customer service, it can also lead to customer loyalty and induce them to promote the brand, as for the growth hacking cycle.

4. Unravelling myth 2. GH is not just a marketing strategy

From a practical perspective, growth hacking has been defined as a process of rapid experimentation and implementation of resource-light and cost-effective digital marketing tactics to help acquire and retain an active user base, sell products and scale the business efficiently and effectively. It uses traceable marketing tools, so that data from individual and specific stages of the customer journey or funnel can be analysed to make decisions. Hence, although much of the non-scientific literature has dealt with growth hacking by reporting cases and examples of digital companies that have scaled thanks to marketing tricks and tactics boosting hype and virality, in reality growth hacking is much more than that.

As one interviewee pointed out, *"Growth hacking is a methodology that allows companies to experiment methodically."* This means that growth hacking is not just about marketing strategies, as many practitioners suggest, to sell more and scale the business. On the contrary, it is a methodology for improving the business through a mindset that includes experiments. These improvements can cover different areas of the business or value chain: business model, customer service, pricing strategies, web marketing, distribution channels (online and offline), human resource management.

In short, growth hacking can be applied to all activities in the value chain or to all building blocks of the business model (Ferasso et al., 2020; Jabeen et al., 2023; Massa et al., 2017).

Therefore, growth hacking involves different areas of the company and should be interpreted as a methodology that impacts the whole organisation. Marketing has often been interpreted as an activity aimed at selling products and services. In fact, according to the American Marketing Association (AMA), along with the international literature (e.g. Wichmann et al., 2022), the marketing mix (MM) "refers to the combination of controllable marketing variables that the company uses to pursue the desired level of sales in the target market". By contrast, growth hacking does not merely have the objective of selling more, but rather the objective of solving problems, improving processes and activities, achieving precise goals through a data-driven approaches supported by flexibility and creativity. Furthermore, the goal of growth hacking might be to sell more, also through digital marketing tools such as SEO, SEM, and referral programs (Aswani et al., 2018), but not necessarily.

From this point of view, therefore, it is a process that is closer to a methodology for innovation rather than a marketing strategy. In fact, recent literature counts growth hacking among the flexible methodologies capable of supporting the new product/service development process (Gaito, 2017). These methodologies include lean start-up, agile and design thinking, which can replace (Magistretti et al., 2019) or support (Cooper and Sommer, 2016) the traditional stage gate model. These can be defined as (complementary) methodologies to foster business

opportunities, stimulate innovation and accelerate time-to-market (Cocchi et al., 2021). Growth hacking falls into this category of frameworks. Due to this, growth hacking activities are not left to the marketing function. Rather, companies with a strong focus on growth hacking focus on creating a multi-disciplinary team of human resources with very diverse skills. This team is led by the growth hacker, namely a transversal figure within the company who makes multidisciplinarity her/his strength. The growth hacker knows how to communicate with the media and customers, and is a lover of new technologies. Growth hackers have skills in coding, data analysis, finance, networking, marketing and design. However, she/he is not an expert on all these fields. When it comes to growth hacking, in fact, it is important to possess the so-called 'T-shaped skills' (Caputo et al., 2023). In fact, the skills that a growth hacker must possess basically form a capital T. The horizontal part of the T represents all the different knowledge that a growth hacker needs to have, even if only on a general level to understand the insights provided by the growth team members. She/he needs to know a little bit about psychology, virality, email marketing, and other things. Moreover, she/he has to have in his bag those skills that create the vertical T-line. These are the skills in which the growth hacker excels, which can be related to conversion marketing, product engineering, SEO or coding.

Thus, the T-shaped worker has deep knowledge in just one area, but a good knowledge set and communication skills across many other areas (Demirkan and Spohrer, 2015). T-shaped professionals are lifelong learners with open minds who collaborate easily across their local and global networks. They are broad, empathic communicators and challenge seekers as well as deeply engaged, critical thinkers. And they are entrepreneurially minded opportunity finders with imagination who learn quickly from failure (Demirkan and Spohrer, 2015). T-shaped people are characterized by a versatility that makes them uniquely suited to implementing growth hacking and support a continuous cycle of ideating, testing, learning and implementing.

In this regard, one interviewee emphasised the importance of building a mindset associated with team management: *"To do growth hacking you also have to work on people's mindset, I'm talking about both managers and teams; unfortunately, there is still a lot of the idea that Marketing does Marketing and Product does Product. This approach in 2022 makes absolutely no sense, especially if we are talking about innovative products; what Marketing has to do is definitely distribute the product, but I wouldn't say that it is Marketing's only goal. The problem is that when this discussion remains within the team it leads to getting lost in philosophies and principles that get us nowhere, worse if these conversations also reach the top, because they obviously lead to friction and to Top-Down approaches that don't help.*

Growth Hacking is a Bottom-Up approach, the team does things and then brings insights to the executives on which to make decisions, if the executives make decisions, without them being in line with the Data Driven results of the experiments, this leads to endless inefficiencies."

5. Unravelling myth 3. Growth hacking is not just a process

As discussed, the term growth hacking has been proposed by Sean Ellis (2010), entrepreneur and start-up advisor, who defines it as "a process of rapid experimentation across the funnel to learn the most effective way to scale sustainable customer adoption". Therefore, for many, from 2010 onwards, growth hacking has been interpreted as a process. In management literature, a process is defined as a series of interrelated steps or activities that are performed in a specific order to achieve a desired outcome (Lee and Dale, 1998). It is a way of organizing and coordinating work activities to produce a desired result, and can be seen as a transformation mechanism that takes inputs and converts them into outputs.

According to this view, therefore, growth hacking should have interrelated steps or activities that are performed in a specific order to achieve goals. However, the logic of growth hacking is the opposite. More specifically, growth hacking applies the principles of lean methodology (Bortolini et al., 2021; Vamsi Krishna Jasti and Kodali, 2014) to solve problems or scale the business in the most agile way possible. Furthermore, this methodology involves experiments and continuous data-driven trial and error activities. Therefore, in growth hacking it is impossible to predict precise steps, but rather it is necessary to learn how to cope with uncertainty, and respond through agility (Bresciani et al., 2021b; Vrontis et al., 2023).

As suggested by Troisi et al. (2020), in growth hacking the funnels are clearly defined, specifying actionable goals, prioritising hypotheses, analytics, and experiments. However, the growth hacking team must be able to change goals and tactics quickly according to data and market conditions. This interpretation of growth hacking is supported by one of our interviewees, who said: *"In methodological terms, growth hacking is something very precise, a way in which companies can experiment with a very precise method. In order to innovate, companies have to experiment, you get innovation through experimentation, and when faced with the need to experiment you can proceed in two ways: unstructured, raw, home-made experimentation, done when you remember to do it; or you can experiment methodically. That is growth hacking. It means working with data, with the right frameworks, with data analysis and interpretation skills, with certain figures within the company, with certain phases, etc."*

In short, growth hacking in some respects can be considered a process, but with the characteristics of lean methodologies to innovate. So how should growth hacking be approached? According to practitioners, and also according to the interviews conducted in this study, there are two ways to guide growth hacking activities: a) problem solving approach; b) Objectives and Key Results (OKR).

In the first case, problems affecting the business are identified and the growth hacking framework is used to develop new ideas to mitigate the tensions. This framework consists of four phases: conception, prioritisation, execution, analysis (Gaito, 2017). In this way, problems are solved through a data-driven and hypothesis-testing process. Regarding the problem-based approach, Gaito said the following: *"I, for example, almost always work with a problem solving approach, because especially in a historical phase like this, growth hacking before serving to make companies grow, serves to make them survive, to transform them, to make them adapt. This is also dictated by the historical moment. Many companies, with the current crisis, have difficulty surviving, they cannot think of becoming the new Facebook. Some of my colleagues take an OKR approach instead. The choice also depends on how the company is structured, how many resources the company possesses, the health of the company."*

In the second case, the OKR method is used, i.e. a framework used to create alignment on the objectives and results to be achieved, both at company and team level, down to the individual (Niven and Lamorte, 2016). For example, let's assume that a company competing with Domino's Pizza aims to increase customer satisfaction (Objective). The key results it might need to achieve to reach the target might be: a) net promoter score of 44 or higher; b) average order rating of 4.5/5 or higher. Consequently, the growth hacking team will have specific goals and results to achieve and can formulate hypotheses to test in order to achieve them in the shortest time and with the minimum use of resources. As discussed by one interviewee (Futura), their company very often uses an OKR-driven approach: *"Let's say the macro corporate goal is EUR 1,000 sales per month. We then break down the macro goal into micro goals through an OKR approach, which we try to achieve as much as possible through the growth approach."*

As can be seen, the two approaches are not mutually exclusive. Returning to the example of the Pizza Company, it is clear that it uses an OKR approach but it is equally true that the objectives and results arise from a problem, namely low customer satisfaction compared to the competition.

6. An illustrative case: IKEA

To complement the above critical review of the literature, we employ the illustrative case methodology to delve deeper on the eradication of

myths surrounding growth hacking. Following George and Bennett (2005) and Pettigrew (1990) recommendations, we chose a case that could provide practical examples built around the three false myths on growth hacking (for similar studies see: Correani et al., 2020; De Massis et al., 2016; Lantano et al., 2022; Mancuso et al., 2023). IKEA, one of the biggest brick-and-mortar retailers worldwide, has been chosen as case study.

To develop a comprehensive understanding of the case study, multiple qualitative secondary data sources were utilized (Ployhart and Bartunek, 2019). The data collection process spanned a broad timeline, partly overlapping with the data analysis phase, following the methodology outlined by Eisenhardt (1989). Data were gathered from various sources, including the company's official website, online articles, interviews with company managers, financial and economic reports, press releases, and presentations (D'Ippolito et al., 2019). The data collection period extended from April 2020 to July 2023, commencing with the outbreak of the COVID-19 pandemic. Notably, the transformation journey undertaken by IKEA was a direct response to the pandemic's restrictions and challenges. IKEA has been selected as an illustrative case to highlight the false myths about growth hacking due to the nature and evolution of its business model. The company, which started its operations as a classical brick-and-mortar retailer, has successfully pivoted its business model, employing growth hacking processes, to align with the shift in consumer behaviour witnessed since the start of the pandemic. Ikea has been able to create a novel dual role for their physical stores (i.e., as classical point-of-sales and e-commerce distribution points), maintaining their brand identity. In the words of Bart Karis, former Dutch Chairman of IKEA: *"The brand identity connects all daily growth activities with the ultimate long-term goal. It forms an umbrella which everything the company does should fit underneath."*

Finally, we adopted a narrative approach to research, as proposed by Langley (1999), which is an approach that emphasizes the use of storytelling and narratives as a means of presenting and understanding complex phenomena within the context of organizational research.

About the company. IKEA is a multinational home furnishings retailer known for its modern and affordable furniture, home accessories, and various household products. Founded in 1943 in Sweden by Ingvar Kamprad, the name IKEA is an acronym for Ingvar Kamprad, Elmtaryd (the farm where he grew up), and Agunnaryd (his hometown). One of the defining features of IKEA is its concept of flat-pack furniture. The majority of their products are designed to be packed and shipped in flat boxes, which makes them easier and more cost-effective to transport. Customers purchase the products in their unassembled form and then assemble them at home using the provided instructions. The IKEA stores are known for their large showrooms that feature various room setups, giving customers ideas and inspiration for decorating their homes. Visitors can explore different styles and configurations, making the shopping experience more interactive and engaging.

The advent of COVID-19 has accelerated the digital transformation process of IKEA forcing the firm to undergo a swiftly adaptation of its business. Suddenly, the Swedish company had to close its 433 stores scattered worldwide due to various pandemic-related restrictions, incurring fixed costs that weighed on its financials. The only viable "business" option left was e-commerce, and IKEA responded promptly. It's worth noting that the success of IKEA's growth strategies during the pandemic was also influenced by the brand's established reputation, customer loyalty, and long-standing commitment to providing affordable and stylish home furnishings. The ability to adapt quickly and address the changing needs of customers played a crucial role in IKEA's resilience and growth during challenging times.

Eradicating myth #1: growth hacking is a framework for platforms and high-tech companies only. IKEA, one of the largest retailers in the world, has rapidly reacted to the COVID-19 pandemic adopting an agile transformation of its business model. More specifically, IKEA has transformed its retail shops into distribution and logistics centres for its e-commerce platform. Under the leadership of Chief Digital Officer (CDO) Martin Coppola, the company migrated 13 regional sites to the cloud to centralize operations, creating a single shared website for all countries. In the following three weeks, sales, pricing, and distribution employees learned to use new technologies to analyse data and leverage Artificial Intelligence (AI) to adapt the online shopping experience and provide a better customer experience. Additionally, IKEA developed the "click and collect" model, utilizing the website as an e-commerce storefront and the IKEA store as a warehouse. The e-commerce website was enhanced with AI systems to optimize product recommendations, improve customer service, and provide a seamless online shopping journey. The swift and adaptive actions taken by IKEA amid the pandemic illustrate how the company leveraged digital technologies and innovation to navigate through challenging times and ensure its continued success in the changing retail landscape. Balancing the equation of customer experience has proven to be a nuanced challenge, involving a careful juggle between setting prices high enough to avoid compromising the firm's cost leadership strategy and keeping fees low enough to prevent strain on its resources.

With a brand value of $21 billion, the Swedish giant recognized the importance of mitigating buying risks, as many customers previously made purchases without a clear idea of how the furniture and other products would fit into their homes. In response to this challenge and in line with the digital transformation trend of the metaverse era, IKEA introduced the IKEA Place app. This augmented reality (AR)-powered app, utilizing Apple's AR Kit, is available in over 25 languages, including English, Japanese, Spanish, Turkish, and Chinese. Through the IKEA Place app, consumers can virtually try, experience, and immerse themselves in the process of purchasing furniture. Consequently, IKEA achieved two significant objectives. Firstly, the company successfully minimized the purchase risk associated with online transactions. Secondly, the Swedish retail giant decreased its exposure to the prevalent issue of retail sales returns (ranging from 8 % to 37 %) that has been estimated to surpass $2 trillion due to the surge in online shopping in recent years.

To conclude, IKEA, while not classified as a platform company, has undertaken substantial digital innovation to revolutionize its business model. The company strategically employs growth tactics to optimize sales, encompassing both offline and online channels. By effectively acquiring leads and encouraging customers to embrace their platform, IKEA fosters customer loyalty and retention. Moreover, the integration of AI technology enables the adoption of sophisticated upselling and cross-selling strategies, further enhancing their business operations. To conclude, it is possible to infer that growth hacking strategies are not only meant to acquire new leads and scale. These strategies have also proven to be effective in transitioning customers from offline to online, retaining them, and optimizing processes such as pricing strategies. The advantage of migrating customers from offline to online is that in the latter case, it is possible to continuously acquire customer data. This enables conducting experiments, campaigns, and optimizing certain processes.

Eradicating myth #2: growth hacking is only a marketing strategy. IKEA was not born as a digital or born-global company but its success in navigating through the challenges presented by the pandemic with success can be ascribed to several factors, including its innovative approach to growth hacking techniques, focused not only on pushing the right marketing levers but to rapidly transforming a business through unconventional and creative means.

With physical stores temporarily closed or operating with restrictions during lockdowns, IKEA intensified its online presence. They improved their website's user experience, optimized the online shopping process, and expanded their e-commerce capabilities to cater to the increasing demand for online shopping. To replicate the in-store experience virtually, IKEA implemented virtual showrooms and online consultations with interior designers. Customers could explore room setups, get design inspiration, and receive personalized assistance, all from the comfort and safety of their homes. As people spent more time at home

due to lockdowns and restrictions, the DIY (Do It Yourself) home improvement trend gained momentum. IKEA tapped into this trend by promoting DIY ideas, easy assembly guides, and providing tools and materials for home improvement projects. For example, IKEA rode the wave by developing strategic initiatives that could foster the community of DIYers by putting in place the exhibition "IKEA Hacked: Our Products. Your Ideas." at the IKEA Museum in Älmhult, Sweden, which explores the movement of hacking. The initiative reflects the strategic need of riding this growing trend for adapting IKEA products and invites visitors to get involved. The aim of co-creating products that respond more and more to the needs of consumers is also stated by the organizers, "there's also the chance that your ideas will become a source of inspiration for IKEA. The results may end up in the exhibition, or even inspire future collections. Co-create is here to stay, and what we see here is only the beginning of a more democratic design involving the many people."

Like any successful growth hacking strategy, IKEA uses data analytics to understand customer behaviour, preferences, and trends. This information has helped them to optimize their efforts and make data-driven decisions to improve customer experience, by introducing new services that could improve the experience itself and retain customers. This has consequently impacted IKEA's ability to agilely adapt its product offering.

As people's needs and priorities shifted during the pandemic, IKEA adapted its product offerings to align with the changing demands. For example, they highlighted products suitable for home office setups, home fitness, and storage solutions to accommodate the increased time spent at home. IKEA has been able to proactively communicate their health and safety measures in stores, reassuring customers about their commitment to providing a safe shopping environment. This messaging helped build trust and encouraged customers to visit the stores when allowed. In conclusion, growth hacking is not just digital marketing used for scaling. Growth hacking is a methodology aimed at achieving specific goals through data-driven experiments. As demonstrated, growth hacking also allows for co-creating content, ideas, products, and services with the customer.

Eradicating myth #3: growth hacking is a predefined process. Growth hacking is not a predefined process with fixed steps that apply universally to all businesses. Instead, growth hacking is a mindset and a set of experimental techniques used by businesses (and not only by startups and high-tech companies), to achieve rapid and significant growth in a cost-effective manner. Even in large corporations such as IKEA, with a phygital business model can leverage growth hacking techniques. In fact, growth hackers focus on identifying the most efficient and effective ways to acquire and retain customers, often through unconventional or non-traditional methods. They prioritize experimentation, iteration, and scalability to drive growth, just like IKEA's management has done to digitally revolutionize the company and to face the Covid-19 pandemic.

While growth hacking principles can be applied across different industries and businesses, the specific strategies and tactics used will vary based on factors such as the company's target market, product/service offerings, and available resources. Some common growth hacking techniques include viral marketing, A/B testing, referral programs, content marketing, social media engagement, and optimizing conversion funnels. IKEA's growth hacking efforts, for instance, would be tailored to its unique business model and the home furnishings industry. As discussed earlier, IKEA leveraged strategies like viral marketing through its flat-pack furniture concept, word-of-mouth marketing through its showroom layouts, online focus during the pandemic, and creative collaborations with designers to attract new customer segments. From another perspective, growth hacking has helped IKEA generate leads on the new e-commerce platform, bringing a portion of offline customers into the online store to immerse them in a new omnichannel experience. Bringing customers online means acquiring an almost unlimited amount of data, which enables new experiments, data analysis, user behaviour analysis, marketing campaigns, and more.

Ultimately, growth hacking is about being adaptable, data-driven, and willing to take risks to discover what strategies work best for a specific business. It involves continuous learning, rapid experimentation, and the ability to seize opportunities as they arise. While it may not be a predefined process, growth hacking has proven to be a valuable approach for businesses seeking rapid growth and success in competitive markets. Overall, growth hacking acts as a dynamic and results-oriented approach that connects strategic vision with actionable steps. It empowers businesses to move beyond traditional marketing and explore creative and innovative ways to achieve significant growth in a competitive landscape. As emphasised by IKEA's management, growth strategies must be driven by data. For this reason, data is made readily available to all IKEA employees, empowering them to make informed decisions and manage processes with guided precision. As mentioned earlier, achieving growth extends beyond the confines of the marketing department and requires the collaborative efforts of multifunctional teams. In this context, the vital role of data sharing emerges as it bolsters and supports growth-centric activities.

7. So what? The role of growth hacking in bridging the strategy-execution gap

Change is embedded in almost every industry, leading to business model adaptation, industry consolidation or disruptive changes in technologies and infrastructures (Ribeiro Soriano, 2012). More often this change is driven by the evolution of customer segments and behaviours (Bargoni et al., 2023b). For example, airports represent now a multi-faceted business, operating in the B2B sector with air transportation companies but at the same time facing B2C relationships with travellers, airport employees and other stakeholders. Michael Porter (1985), through his five forces model, well depicted the forces that concur in these dynamic changes. However, since Porter developed the five forces model there has been a gradual shift from a strategy-design standpoint. The change brought by digital technologies, the need to better understand customer needs and the social changes has gradually shifted the firm from the adoption of compliance and operational excellence centred strategic planning and forecasting to a fully customer centric approach (Gupta and Ramachandran, 2021). This happened to avoid the risk of having an introspective strategy that took into account only the organisation's history, values and aspirations but leaving behind important external factors such as customer needs, industry disruptors and rivals.

Failure of translation, adaptation and sustained change over the long term can be identified as key contributing factors. Poor translation of strategy typically occurs when strategic objectives are insufficiently clear and specific. This results in academic strategies that talk archetypical 'management language', but which hold little appeal and relevance for the wider organisation. They neither inspire nor help staff to respond to the external threats and opportunities they encounter on a daily basis. Not surprisingly, this will not work terribly well, as successful strategy execution, to a large extent, relies on reaching both the hearts and minds of everyone across the organisation, irrespective of rank or position. Adaptation to change means that the strategy can be adjusted at the speed of change. If change happens faster than the strategy can handle, the business has already become a follower, irrespective of its strategy targeting quite the opposite. Key factors to prevent this from happening will typically include structured processes and systems, to forecast trends, monitor the competitive landscape and understand the underlying drivers of change. Organizational development plays a key role in sustaining strategy. For example, this is where the organisation's capability to manage change, its learning capability and its cultural pivot towards innovation, new customers, markets and technologies come in.

In this scenario, firms must adapt their way of managing innovation. As we have discussed, growth hacking represents a great opportunity to embrace change in a systematic and organised way. This paper, in detail, proposed first of all that growth hacking is not a methodology for

platform or high-tech companies only. In fact, it is a method suitable for many, if not all, enterprises. These must be equipped with data gathering and analysis tools and build capabilities in this regard. However, it is important to point out that growth hacking strategies must be implemented according to the type of enterprise. For example, so-called digital firms (Giustiziero et al., 2022) have a business model that employs digital resources that are scale free. Furthermore, they are often subject to network effects (Cusumano et al., 2019). In other words, marginal costs remain low for large production/selling quantities and the value of the platform increases exponentially as the number of users/customers increases. Therefore, growth hacking strategies in the context of these businesses should develop experiments to exponentially increase the user base. Traditional businesses, on the other hand, should adopt growth hacking strategies with different objectives, considering that they are often subject to decreasing demand-side returns to scale.

Furthermore, it was emphasised that growth hacking is not simply a marketing strategy to boost sales. In fact, we posit that growth hacking followed two waves. The first, in which it was considered as a series of marketing activities to scale a business (Sean Ellis' vision). The second, currently underway since the pandemic, involves growth hacking as a methodology for testing and improving processes, activities, products, and services, through data-driven experiments (see Table 1). Growth hacking is a method used consistently to innovate products, processes, activities, services, and elements of the business model. From a practical perspective, this means organizing heterogeneous teams that have different skills and can conduct experiments with and for other functional areas.

Finally, growth hacking is not a defined process. It is a mindset, a working methodology in which people with different skills work, supported by data, to improve the decision-making process. This methodology creates a continuous work loop, driven either by a problem-solving approach or by specific objectives (OKR).

Table 1
Evolution of growth hacking.

From (first wave) …	To (second wave) Growth hacking
From Tech Start-ups to Mainstream approach for all Businesses.	Growth hacking initially gained prominence in the tech start-up world, where limited resources and fast growth were critical. However, over time, the principles of growth hacking have been adopted by businesses of all sizes and industries, making it a mainstream approach to marketing and business development.
From data collection to data-driven decision making.	The emphasis on data-driven decision-making has grown even stronger. Advanced analytics tools and technologies allow growth hackers to gather and analyse vast amounts of data, leading to more precise targeting, personalized marketing, and optimization of growth strategies.
From a stand-alone process to the integration with traditional marketing activities.	While growth hacking techniques are still innovative and unconventional, they have become more integrated with traditional marketing practices. Companies now combine growth hacking tactics with traditional marketing efforts to create more comprehensive and effective growth strategies.
From customer acquisition to customer retention.	Initially, growth hacking was primarily associated with customer acquisition. However, businesses have realized the importance of customer retention and long-term value. As a result, growth hacking strategies now extend to improving customer engagement, loyalty programs, and ongoing relationship building.
From a stand-alone approach to a holistic and cross-functional approach.	Growth hacking has evolved to involve multiple teams within an organisation. It's no longer just the domain of marketers; it includes product teams, engineers, customer support, and more. This cross-functional collaboration ensures that growth initiatives are aligned and integrated throughout the business.
From simple A/B testing to focus on user experience.	User experience (UX) has become a critical aspect of growth hacking. Companies are investing in creating seamless, user-friendly experiences to attract and retain customers, leading to increased referrals and positive word-of-mouth marketing.
From digitalization to automation and artificial intelligence.	The advancement of automation and artificial intelligence has enabled growth hackers to scale their efforts efficiently. AI-powered tools help with personalization, lead generation, and customer engagement, enhancing the overall effectiveness of growth hacking strategies.
From single project experimentation to continuous experimentation.	The culture of rapid experimentation remains at the core of growth hacking. However, businesses have become more systematic in their testing processes, conducting structured experiments to validate hypotheses and drive growth.

8. Implications

8.1. Implications to theory

The results and the discussion allow us to offer the following theoretical implications.

First, the paper contributes to the literature by shedding light on the concept of growth hacking, which has undergone various interpretations since its conception. In detail, we attempted to discuss and advance definitions of growth hacking (Gaito, 2017; Troisi et al., 2020), complemented with interviews with experts in the field, thus offering a more up-to-date view on the concept of growth hacking. In the discussion, we defined growth hacking as "…a methodology that allows companies to experiment methodically, to improve products, services, processes, activities and business models." Furthermore, the study helps to understand what is growth hacking and what is not, emphasising that growth hacking is not simply digital marketing strategies. More specifically, we contribute to the literature proposing that growth hacking followed two waves (see Table 1). The first, in which it was considered as a series of marketing activities to scale a business (Sean Ellis' vision). The second, currently underway since the pandemic, involves growth hacking as a methodology for testing and improving processes, activities, products, and services, through data-driven experiments. Hence, we propose and show that growth hacking can be implemented for various business model dynamics, including validation, scaling, and innovation (Sanasi, 2023).

Secondly, also thanks to the interviews conducted and the illustrative case study, the paper helps to stress the fact that growth hacking is a suitable methodology for all companies and all sectors. The insights from the literature discussion and interviews should raise awareness of the importance of this methodology for business growth. Moreover, the illustrative case study presented in this paper serves as a practical demonstration of growth hacking's adaptability and efficacy for traditional businesses. By showcasing how a non-tech-centric company successfully leveraged growth hacking principles to achieve tangible growth outcomes, we illustrate the versatility and applicability of growth hacking methodologies beyond its traditional associations with digital start-ups. This also allowed us to unravel the false myths concerning growth hacking. Furthermore, the research sought to emphasise that, although it is a useful methodology for all companies, there is no one size fits all formula. In short, the method must be adapted according to business conditions, objectives, and available resources. From this

point of view, building on the RBV of the firm (Wernerfelt, 1984) the paper enriches the literature by suggesting that growth hacking, regardless of the size and sector of the firm, must be supported by data gathering and analysis processes and skills.

8.2. Tips for managers and practitioners

The paper offers the following tips for managers and practitioners. First, growth hacking is a methodology that can only be applied if you collect data. Therefore, managers must make data collection tools available and hire personnel capable of analysing and interpreting them. In other words, the company must build a data-driven culture to support experiments and innovation in general. This also involves being able to recognize which data to collect and which to discard, which tools to use to collect and analyse it, and building capabilities accordingly.

Second, data is not enough. As discussed, the company must be able to change the organisation's structure to support flexible decision-making in line with the agile methodologies. In implementing growth hacking, speed matters. Therefore, the organisation must be flexible enough to ensure lean, data-driven decision making. If the data confirm hypotheses, for example concerning an A/B test, the decision on product/service adaptation should not go through several hierarchical levels. The growth hacking team should have the freedom to promote projects without being slowed down by a rigid hierarchical structure.

Thirdly, growth hacking is not a marketing strategy. Managers should assimilate this concept by building ad hoc teams with different skills. The team should collaborate with other functions. Conversely, growth hacking is a methodology to adapt the organisation, improve activities, processes, and products alike. Therefore, it should also be used together with other methodologies (stage gate, agile, design thinking) for even greater effectiveness. This approach, which is also considered a mind-set, can be used by different organizational functions.

Fourth, team members should possess T-shaped competences, to be able to confront each other on a daily basis on all the contents of growth hacking projects.

Finally, growth hacking can be problem-driven, OKR driven or both. In this sense, it helps to manage ideas from specific problems or goals. Specifically, once a problem or definitive goal is identified, the team comes up with ideas to achieve it. After that, it prioritizes by trying to understand which idea is likely to be most successful. Then the chosen strategy is executed, and the results are analysed through specific KPIs. If the strategy has not been effective, you try other ideas through new agile experiments.

9. Conclusions

This paper has tried to offer a critical review complemented with insights from interviews with practitioners to shed light on what growth hacking is and give practical tips on how to implement growth hacking. The paper unravels the following myths. First, growth hacking is not a framework for platforms and high-tech companies only. Second, that it is only a marketing strategy and third, that growth hacking is a pre-defined process. These issues are traced back to the two flawed assumptions underlying growth hacking; namely that (a) it is a framework designed for start-ups only and (b) that a "one size fits all" approach to growth hacking is appropriate. By unravelling those issues, the paper provides ground for a fundamentally different approach to growth hacking, designed for business model scalability, enabled for adaptability in a changing business environment and focused throughout on the effective management of a firm's resources and capabilities. Despite this contribution, the paper is not without limitations. The main one concerns the methodological approach. In fact, the research is based on critical review along with semi-structured interviews. Future studies should provide more empirical evidence to add knowledge on this increasingly important issue.

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Augusto Bargoni: Writing – original draft, Resources, Methodology, Data curation. **Gabriele Santoro:** Writing – review & editing, Validation, Conceptualization. **Antonio Messeni Petruzzelli:** Writing – review & editing, Conceptualization. **Alberto Ferraris:** Writing – review & editing, Supervision, Conceptualization.

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