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Growth hacking as a driver of innovative development of start-ups: Between marketing and product

Abstract. The aim of this study was to determine how tools of high-speed experimentation and data analysis can strengthen the innovative development of start-ups and increase the effectiveness of aligning marketing and product decisions. The methodology was based on a theoretical-empirical approach and included the systematisation of academic sources, the analysis of digital platforms, the comparison of technology companies and the study of practical cases that reflected the use of experimentation, recommendation models and optimisation of user experience. The results established that models with an emphasis on the product as the main growth tool ensured higher financial performance: companies that applied a product-led growth approach demonstrated an average annual increase in Annual Recurring Revenue of 35%, whereas companies with traditional approaches achieved only 26%, and customer acquisition costs in product-oriented businesses were 39% lower. The significance of experimentation cycles was confirmed by the high intensity of tests: the company Nebula conducted 612 experiments in 2024, which helped to increase conversions on average by 4-7%. Optimisation of user experience, researched on the example of Duolingo, provided an increase in user retention of 15-25%, while speeding up the process of first use of the product increased user activation by 10-30%. The most powerful viral mechanism proved to be recommendation models: the example of Dropbox demonstrated growth of 3,900%, and the number of users increased from 100 thousand to more than 4 million, which confirmed the effectiveness of viral dissemination cycles. The practical significance of this study lies in the fact that its results can be used by start-ups to build effective growth mechanisms, optimise product-marketing decisions and increase the effectiveness of experimentation

Keywords: rapid experiments; optimisation; viral mechanisms; scaling; business; conversion

INTRODUCTION

The rapid growth of the digital economy and the intensification of competition in the market for technology projects require start-ups to apply new approaches to product development and user strategies. Traditional marketing tools and linear product planning models are increasingly less likely to provide the desired results, especially at early stages, when speed, flexibility, and resource efficiency are critically important. This is precisely why the need is growing for approaches that combine work between marketing and product and provide dynamic hypothesis testing, risk minimisation and acceleration of development cycles.

Digital transformations show that enterprises face difficulties in choosing effective tools for rapid growth and increasing competitiveness, especially when traditional marketing approaches do not provide adequate development dynamics. In this context, the attention of researchers is drawn to the concept of growth hacking, which was considered by A. Yakivchenko (2025), who emphasised its ability to combine analytics, experiments, User Experience (UX) optimisation, gamification and digital automation to form innovative models of enterprise development. The author stressed that the use of data-driven solutions, A/B testing, behavioural analytics and viral mechanisms enables companies to scale the client base quickly, reduce acquisition costs and increase the effectiveness of strategic marketing in industry. Crisis economic conditions strengthen the need

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to search for effective approaches capable of ensuring the recovery and sustainable development of entrepreneurial initiatives. This issue was examined in the study by T. Zinchuk (2024), where the author analysed the factors that determine the dynamics of innovative entrepreneurship and outlined the key drivers of its strengthening. The results of the work highlighted the importance of financial support, institutional change, infrastructure modernisation and the development of an innovation culture as preconditions for the formation of a favourable environment capable of activating innovative initiatives and creating additional opportunities for the country's economic growth.

The growing uncertainty and intensification of market challenges complicate the choice of effective approaches to enterprise management, which increases interest in tools capable of ensuring organisational resilience and adaptability. This issue was considered by N. Rud (2021), who analysed innovative management methods in conditions of digital transformation and outlined the key factors influencing the effectiveness of managerial decisions. In N. Rud's work, the author emphasised the importance of modernising managerial approaches, integrating digital technologies, improving the quality of human resources and strategic flexibility of enterprises, which contributes to the creation of favourable conditions for development and reduces the impact of external risks. At the same time, V. Prokhorova & V. Chobitok (2023) analysed the strategic foundations of start-up development in an innovative environment and identified factors that influence the viability and market resilience. The authors emphasised that the creation of innovation infrastructure, the improvement of organisational mechanisms of interaction and investment support are key conditions for the successful transformation of start-ups and the entry into advanced technology markets. N. Mykytyuk & A. Chaykovsky (2025) focused on the role of creative management and defined it as a key driver of innovation in a company's marketing approaches, especially under conditions of active use of social networks. In the work, the authors showed that integrating creative ideas into digital communication channels makes it possible to create unique marketing campaigns and promotional tools that can adapt rapidly to dynamic changes and form a sustainable innovation effect in interaction with the audience.

The intensification of competition in the digital environment and the growth of consumer demands for speed, convenience, and personalisation of interaction stimulate the need to search for approaches that allow enterprises to develop effective marketing strategies and maintain stable development dynamics. This issue was examined by A. Tkachenko & D. Voronin (2024), who analysed digital tools and methods that determine the effectiveness of modern marketing. The authors showed that the use of internet marketing makes it possible to identify target segments, assess competitiveness and form an evaluation of strengths and weaknesses through the use of analytical methods, including Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis, audience segmentation and competitive content analysis. At the same time, O. Dmytrieva (2022) drew attention to the growing role of innovation activity and start-up projects as a driving force for structural change and the modernisation of Ukraine's economic processes. The author summarised the approaches of different researchers to the interpretation of innovative entrepreneurship and showed that it can be considered as an activity aimed at creating new products and technologies, commercialising intellectual property or generating innovative ideas within entrepreneurial structures.

The growing uncertainty of the market environment and the need for enterprises to adapt internal management mechanisms to rapid changes create a demand for tools capable of ensuring stable innovation renewal and increasing the effectiveness of managerial decisions. M. Tymoshenko (2022) analysed the role of innovation as a key factor in the renewal of the economic system and emphasised that innovative development is based on the effective use of scientific achievements, institutional transformations and the high speed of dissemination of new ideas in the economy. The study also focused on the fact that innovation creates a foundation for increasing competitiveness and ensures an effective restructuring of economic processes through the use of scientific and technological achievements, new methods of organisation and economic mechanisms.

The mechanisms of operation of growth teams, product-led approaches, the formation of sustainable growth loops, tools for the implementation and evaluation of innovative solutions, the integration of creative and digital methods, as well as the dynamics of start-up development, the effectiveness of business incubators and the role of the start-up ecosystem in macroeconomic recovery remain insufficiently researched. The aim of this study was to substantiate approaches to the use of high-speed experimentation tools and data in start-ups to strengthen the innovation dynamics and increase the effectiveness of interaction between marketing and product decisions. On the basis of the stated aim, the following research tasks were formulated: to analyse the key tools and mechanisms of growth approaches that influence the processes of user acquisition, activation, and retention in start-ups; to investigate the role of the integration of marketing and product decisions in the formation of innovative development models and to determine the conditions under which such interaction ensures stable growth at early stages of the start-up life cycle.

MATERIALS AND METHODS

This study had a theoretical-empirical character and covered the period 2024-2025. The theoretical block was examined on the basis of the method of systematisation and critical analysis of academic sources, which made it possible to determine the essence of growth hacking, its differences from traditional growth models and to reconstruct the structural components of this concept. Within the framework of the theoretical analysis, the stages of the growth hacking cycle were reconstructed in accordance with the approach of the academic publications of R. Bohnsack & M. Liesner (2019), and the essence of the Acquisition – Activation – Retention – Revenue – Referral (AARRR) metric was also examined. The use of this method made it possible to form an analytical framework for the further study of start-up growth mechanisms.

The role of cross-functional growth teams, experimentation cycles and growth loops (Mahadik *et al.*, 2024) was analysed using content analysis, which made it possible to assess the importance of cross-functional interaction and

high-speed iterations in shaping innovation dynamics. To illustrate the effectiveness of viral mechanisms, the case method was applied in the analysis of the DeepL referral programme, which made it possible to show how recommendation incentives ensure growth without additional traffic costs. The dissemination of content via TikTok, YouTube, and Instagram was studied using the method of comparative analysis, taking into account criteria that reflected real differences between platforms: the speed of initial reach, the length of the content life cycle, the intensity of organic scaling and the role of algorithmic recommendations. The use of the marketplaces Rozetka, OLX and Prom.ua to assess the role in accelerating the Acquisition and Activation stages was studied by an analogous method.

The impact of high-speed hypothesis testing on the innovation dynamics of start-ups was analysed by interpreting the results of empirical academic studies by V. Berg *et al*. (2020) and X. Zhang (2022). This approach made it possible to clarify how the frequency of experiments, the low cost of tests and the speed of feedback influenced the ability of start-ups to adapt the product quickly. The next stage was the study of the integration of marketing and product decisions, including Product-led growth (PLG), data-driven management and UX optimisation, carried out using the method of conceptual analysis. In this context, the role of the financial metrics Annual Recurring Revenue and Monthly Recurring Revenue was analysed, as well as the practical example of Nebula on the basis of the online publication by O. Lychak (2025) on the intensity of experimentation as an indicator of growth.

UX optimisation on the example of Duolingo was studied using the case analysis method to determine the impact of behavioural metrics on Retention. The dynamics of A/B testing in 2024-2025 and the example of Preply regarding statistically significant experiments were examined using content analysis in accordance with information from the online publication of Complex Agency (2025), which made it possible to assess the role of an evidence-based approach in product changes. The attribution tools Branch, AppsFlyer and Adjust were analysed using the method of functional comparison to determine the effectiveness in measuring growth channels. Within the final stage of the study, a comparative analysis of the cases of Dropbox, Airbnb and Gmail was carried out according to the criteria of the type of viral trigger, the speed of scaling and the level of user engagement. This made it possible to identify differences in the mechanisms of viral and product growth. Separately, the cases of HubSpot, Notion and Canva were examined using targeted case analysis in order to determine the approaches to product scaling. Additionally, Figma, Discord and Calendly were analysed using comparative analysis according to the criteria of the type of growth strategy, the main mechanism, the factor on which the scaling effect was based and the nature of the scale achieved. This made it possible to identify differences in the growth models in the context of the overall logic of the study.

RESULTS

Conceptual foundations of growth hacking in the context of start-up development

Growth hacking in the innovative environment of start-ups is regarded as an approach aimed at achieving sustainable growth through rapid experimentation, flexible use of data and the combination of marketing, product and technical solutions in a single system. Its essence lies in the fact that company growth is not a side effect of activity or the result of large-scale investment, but becomes the main goal around which all processes are built – from product development to communication with users. At the centre of the approach is the constant search for the most effective growth points, where even small changes can cause a significant effect thanks to the multiplicative impact on behavioural metrics. Growth hacking proceeds from the assumption that every stage of user interaction with the product hides potential for optimisation and therefore makes growth possible through a series of sequential, rapidly tested experiments (Bohnsack & Liesner, 2019). A key element of the essence of growth hacking is the cyclic nature of the process, which is based on the logic shown in Figure 1.

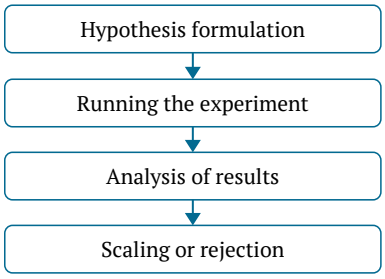

Figure 1. Stages of the growth hacking cycle
Source: compiled by the author based on R. Bohnsack & M. Liesner (2019)

This creates a continuous loop of improvement of the product and marketing techniques. Unlike approaches in which updates are planned in advance and implemented within long cycles, growth hacking presupposes constant readiness for change, a high work tempo and the ability to translate analysis results into practical actions quickly. Such an approach shortens the time between an idea and its verification (from several months to days), which is critically important for start-ups with limited resources and high market uncertainty. The essence of growth hacking is also closely linked to the use of behavioural and product-marketing metrics, which make it possible to evaluate not the overall result but specific elements of user interaction with the product. At the centre of such a system are AARRR metrics, which cover acquisition, activation, retention, monetisation and virality. These metrics make it possible to see the entire user journey as a sequence of points at each of which changes can be tested, the strength of impact analysed and those that can become a source of long-term growth identified. The use of product-behavioural indicators makes the approach as targeted as possible, since decisions are based not on assumptions but on real data (Rizvanović *et al*., 2023).

Another aspect of the essence of growth hacking is the close integration of cross-functional teams that combine the competences of marketing, product management, analytics, UX design and engineering. Unlike a division of roles in which each team works autonomously, growth teams operate as a single organism aimed at creating rapid innovations. Such teams focus not on extensive plans or

large-scale projects, but on micro-solutions that form a cumulative effect. Such an organisation of work strengthens the ability of start-ups to adapt to user feedback, quickly remove barriers and develop solutions that increase product efficiency (Mahadik *et al*., 2024). An important part of the essence of growth hacking is the construction of self-reinforcing cycles, or so-called growth loops, which create mechanisms for autonomous product growth. A growth loop is not a one-off marketing action, but a structured process in which the result of one user's interaction automatically creates conditions for the emergence of new users or for strengthening the activity of existing ones. In other words, it is a closed loop in which each subsequent cycle becomes stronger thanks to the accumulated effect of previous actions. In such loops, growth ceases to depend on external advertising or financial investment and begins to be generated by the internal logic of the product.

Referral programmes are the most common type of growth loop. The mechanism of operation lies in the fact that the user receives an incentive to share the product with friends or acquaintances – this may be a bonus, a free period of use or another benefit. A striking example is the DeepL referral programme, in which the user receives additional free translations or an increased feature limit after the person the user invited registers on the platform and starts using the service. New users who join via a recommendation, in turn, can repeat this cycle, creating a constant inflow of traffic. The importance of referral growth loops lies in the fact that every new user becomes a "growth agent", and thus scaling takes place naturally rather than through paid channels. Content loops are another type of growth loop, based on the creation of valuable content by users or on the interaction with content. These include reviews, social media posts, user photos or videos, comments and ratings. When content created by users is disseminated externally, it attracts other people who become new users, create the own content and repeat the cycle. The effectiveness of this mechanism depends largely on the characteristics of the platform, primarily on the speed of reach and the potential for organic scaling.

On TikTok, virality is formed by the algorithmic recommendation model of the For You Page, which is capable of showing new videos to thousands of users within the first minutes after publication. This makes TikTok one of the most dynamic platforms in the context of rapid organic growth, where even a small volume of interaction (a few likes or views) can cause swift dissemination of content. On YouTube, the scaling mechanism has a different nature: a video gains reach gradually but maintains a longer life cycle, since the search and recommendation algorithm continues to show it to new audiences over weeks or months. This ensures stable organic growth through the accumulation of views and increases the chances of long-term virality. On Instagram, the speed of reach is determined by the content format: Reels receive the highest potential for organic spread because the platform promotes short videos as a competitor to TikTok, whereas posts and stories provide more limited but targeted access to audiences. Similar mechanisms operate on marketplaces such as Rozetka, OLX and Prom.ua, where organic growth is conditioned by user interaction with products, reviews, and ratings. Recommendation algorithms rank content based on user behaviour – clicks, search queries, viewing time and interactions – which allows popular products and listings to rise rapidly in search results without additional advertising expenditure. As a result, such platforms create conditions for accelerated virality based on a combination of user content, social signals and algorithmic promotion, which significantly increases the pace of organic scaling.

A separate class of growth loops consists of collaborative or joint user actions that amplify the effect of network interaction. For example, in collaboration services or gamified products, inviting colleagues, friends or team members is an integral part of functionality. In such cases, the growth cycle not only generates new users but also increases the value of the product with each new participant, forming a network effect. This makes the product more attractive, as users receive a better experience only when others are involved. The essence of growth loops lies in the fact that such loops create a long-term, reproducible scaling mechanism that does not depend on temporary marketing campaigns. Instead of repeatedly attracting new waves of users through paid advertising, the product itself begins to form an inflow of new users thanks to its internal architecture of interactions. As a result, the start-up achieves a stable growth dynamic that accumulates effect with each new iteration of the loop. This turns growth into a systemic process in which every element of the product is aimed at reproducing and strengthening the previous cycle, giving the product the ability to scale faster, more economically and more sustainably (van Gasteren, 2025).

High-speed hypothesis testing is one of the key elements of the innovation dynamics of start-ups, as it provides the ability of a company to test assumptions about user behaviour, product potential and the effectiveness of individual solutions promptly. In an environment where start-ups operate under conditions of high uncertainty – when market reaction, user needs, monetisation speed and product viability cannot be predicted, and technological trends change too quickly – hypothesis iteration becomes the key foundation of data-driven decision-making. This is typical for technology start-ups at early stages of development, in particular mobile applications, Software as a Service (SaaS) solutions, platforms and Artificial Intelligence products that operate with minimal budgets, a lack of historical analytics and intense competition. Under such conditions, intuitive judgements and long planning cycles are unreliable, whereas short experimental cycles allow ideas to be tested quickly, behavioural data to be obtained and product logic to be adjusted. The essence of this approach lies in the fact that instead of launching large-scale features or costly marketing campaigns, teams create small changes that can be tested over a short period of time and on this basis draw conclusions about further actions. This significantly accelerates the innovation cycle, as each test conducted becomes a source of knowledge that is immediately integrated into the product and influences subsequent decisions (Scheuenstuhl *et al*., 2021).

A critical consequence of high-speed testing is that it enables start-ups to reduce the risks of erroneous investment. In traditional approaches, teams spend resources on developing major features or conducting large-scale marketing activities before it becomes clear whether such initiatives will actually have an effect. In contrast, rapid

hypothesis testing makes it possible to confirm or refute key assumptions at an early stage. If a feature does not deliver the expected result, the start-up avoids significant losses of time and budget; if the experiment shows potential, the team can scale the solution confidently and on a sound basis. Rapid experiments also have a positive impact on the ability of start-ups to respond to market changes. Since each hypothesis is tested over a short period, the company receives up-to-date data on user needs, changes in the behaviour and reactions to new features or mechanics. This provides flexibility and allows the product strategy to be adjusted quickly to new conditions. The dynamic nature of the start-up market presupposes the need for constant product updates, and it is high-speed testing that makes it possible to maintain such a pace without losing quality and without disrupting system integrity (Berg *et al.*, 2020).

The impact of high-speed hypothesis testing on the formation of an innovation culture within the team is particularly notable. Continuous experimentation creates an environment in which mistakes become not failures but sources of knowledge. This approach motivates employees to put forward new ideas boldly, as the risks of testing these ideas are minimal and the lessons valuable. A culture of rapid testing encourages the team to act proactively, seek new growth mechanisms, work on improving functionality and analyse user behaviour from the perspective of constructive experimentation. Ultimately, this increases the overall innovation capacity of the start-up. In addition, rapid hypothesis testing contributes to the creation of effective growth loops – self-reinforcing cycles that ensure product scaling through repeated user actions. Since experiments make it possible to identify quickly the mechanics that have the greatest impact on acquisition, virality or monetisation, start-ups can build systems in which successful actions by one user create conditions for the emergence of new ones. This turns the innovation process from a rare event into a constant, self-renewing mechanism (Zhang, 2022). Overall, high-speed hypothesis testing plays a key role in the development of start-ups, as it ensures accelerated decision-making, increases innovation activity, reduces risks, shapes a flexible culture and creates conditions for stable product growth. It is not merely a method, but a strategy that determines the pace and logic of the development of innovative companies.

Integration of marketing and product decisions as the basis of an innovative growth model

PLG, data-driven management and UX optimisation form the conceptual basis of innovative strategies for start-ups in which the product acts as the main scaling mechanism. Since 2022, around 58% of SaaS companies and technology start-ups have already applied PLG as a key growth model, with 91% of these firms planning to increase investment and 47% intending to double spending in this area (Kluz, 2025). PLG is becoming a basic strategy, especially in the fast-growing DevTools and Cloud Infra segments, where 40-70% of start-ups use this approach already at early stages of development. The effectiveness of PLG is confirmed by financial results: companies with this model show an average annual increase in Annual Recurring Revenue of 35%, whereas non-PLG firms achieve about 26%, reach the USD 100 million Annual Recurring Revenue mark more quickly (in 83% of cases) and spend 39% less on customer acquisition owing to higher levels of activation and retention (SaaS Writing Team, 2025).

The essence of PLG lies in providing value to the user from the first minutes of interaction, which shortens the decision-making cycle and stimulates the organic spread of the product. In this logic, performance is defined by indicators such as Monthly Recurring Revenue, Annual Recurring Revenue, activation rate and retention. In PLG products, the average time-to-value ranges from a few minutes to 1-2 days, and in some cases less than 30 minutes. In traditional sales-led models, this indicator may stretch over weeks or months. It is precisely the ability to bring the user quickly to the "aha moment" that gives PLG companies an advantage in the speed of scaling. It is not accidental that about 40-45% of start-ups that achieve high valuations and investment use PLG already in the first year (SaaS Writing Team, 2025).

A fundamental pillar of PLG is a system of data-driven management based on analytics. In 2025, 60-65% of technology start-ups make business decisions on the basis of data, using key metrics such as activation rate, retention rate, Lifetime Value, Customer Acquisition Cost, Monthly Recurring Revenue, Annual Recurring Revenue, churn and the virality coefficient. Serial testing is actively applied in growth teams: successful start-ups carry out 10-50 experiments per month, and at Nebula this figure in 2024 reached 612 experiments per year. A/B testing provides an average conversion increase of 4-7%, and in some cases up to 20% and more. The regularity and speed of experiments allow start-ups to assess the impact of even small changes and to determine precisely the direction of further optimisations (Lychak, 2025).

The third strategic component of PLG is UX optimisation, which directly affects activation and retention. Data show that reducing the number of steps in onboarding, speeding up loading or simplifying core actions increases the activation rate by 10-30%, and in products such as Duolingo UX improvements increase retention by 15-25% (Raj, 2023; Gangurde, 2025). Loading speed is also critically important: every second of delay reduces conversion by approximately 2.5-3%, whereas speeding up a page by 1 second increases it by 2.7%. Virality within UX mechanisms is also supported by referral programmes, where the average k-factor is 0.1-0.5, which ensures organic user growth even without an exponential effect (Moiseeva, 2025). High-quality UX also has a significant impact on the long-term value of the customer. Optimised onboarding can increase Lifetime Value by 20-30%, as satisfied users have a lower churn rate and more often switch to paid features. An increase in retention of just 5% can raise company profit by 25-95%, which demonstrates the direct link between UX and financial results (Krisko, 2025).

Effective growth of start-ups in the modern, highly competitive environment increasingly depends on the ability to combine marketing and product data into a single analytical system. Traditionally, these two areas operated separately, which created gaps between user acquisition and the subsequent behaviour in the product. In PLG models, this approach is considered outdated, since the user journey is a holistic process in which marketing stimuli directly determine the quality of activation, and the product experience influences the effectiveness of marketing

investment. Therefore, the integration of analytical tools capable of synchronising behavioural, product and marketing data becomes critical. One of the key components of such integrated analytics is A/B testing, which has become a standard in 2024-2025: around 77% of companies worldwide regularly conduct A/B experiments on the web platforms. At the same time, launching 1-5 tests per week, typical for flexible technology teams, remains characteristic mainly of strong product-led start-ups. The experience of companies such as Preply shows that such a testing pace ensures a stable flow of data for decision-making, although for most companies it is more an exception than the rule. It is important that only 10-30% of experiments become statistically significant, which is linked to requirements for correct design, sufficient sample size and maintaining a significance level of 93-95%. Despite this, even such a share of "successful" tests provide substantial practical benefits in scaling the product (Complex Agency, 2025).

The second group consists of CDP platforms (Customer Data Platforms), which act as a single centre for storing customer data. CDPs aggregate data from dozens of sources – marketing channels, mobile applications, desktop platforms, Customer Relationship Management (CRM) systems, billing services and email communications. Platforms such as mParticle or RudderStack make it possible to create holistic user profiles and link events occurring in different environments. This provides start-ups with the opportunity to analyse the full life cycle of interaction – from the first advertising click to the formation of recurring revenue (Thorenberg, 2025). Attribution tools occupy a special place, as these tools determine the contribution of each channel to the final conversion. For PLG companies, where part of growth is formed organically or through referral cycles, attribution tools are critically important because these tools make it possible to assess the contribution of each channel to user acquisition and activation. Branch, AppsFlyer and Adjust are used to determine the traffic source, track transitions via referral links and analyse the quality of users coming from different channels. Branch makes it possible to record the effectiveness of referral mechanics and identify which types of invitations work best. AppsFlyer allows comparison of organic and paid channels, measuring the impact on activation, retention, and Lifetime Value. Adjust is used to assess how changes in UX affect conversions across channels, helping to determine where the most valuable users come from. Taken together, these tools provide a comprehensive view of the effectiveness of growth channels. This is particularly relevant given that the average proportion of significant A/B experiments in technology companies is only 10-30% (Complex Agency, 2025). Thus, integrated analytics becomes a key tool in building an effective PLG strategy and provides stable innovative growth of products.

PLG, data-driven management and UX optimisation form a coherent strategic model in which the product becomes the main factor of scaling, and data the key to precise management decisions. Current statistical data indicate that the PLG model is being implemented ever more actively in technology companies, ensuring a faster pace of revenue growth, higher levels of activation and more efficient use of resources. The combination of product and marketing analysis creates an end-to-end system for understanding the user, in which every stage – from acquisition to monetisation – is measured and optimised on the basis of experiments. At the same time, UX optimisation acts as a critical component that directly shapes activation, retention and Lifetime Value, ensuring stability and scalability of the product. As a result, the interaction of these three elements creates a resilient model of innovative growth that allows start-ups to adapt rapidly to market conditions and form competitive advantages.

Assessment of the impact of growth hacking on the innovation dynamics of start-ups

Classical examples of growth hacking in technology companies have formed the foundation of scaling approaches that thousands of start-ups actually use. The most well-known cases – Dropbox, Airbnb, Gmail – show that growth can be based not on large budgets, but on the ability to identify the key points of user interaction and to create self-reinforcing mechanisms. These cases became the basis for the PLG concept, as the cases demonstrated that the product can be not only the final result of development, but also the key channel for acquisition, retention and viral dissemination. One of the most iconic examples is the Dropbox referral programme. The company offered users an additional 500 MB of storage space for each new friend invited. This scheme created a direct incentive to spread the service and turned users into a channel of organic growth. As a result, the user base grew from 100,000 to 4 million, and later to 15 million in just a few months, ensuring 3,900% growth. The key element of this approach was the so-called growth loop: the attracted user generates new users, reinforcing the growth effect (Loukas, 2025).

Another illustrative case is Airbnb, which at an early stage integrated the ability to publish listings simultaneously on Airbnb and Craigslist. Craigslist already had a huge base of active users, and exploiting this resource allowed Airbnb quickly to increase the visibility of its listings among the target audience. This tactic enabled the company to "borrow" traffic from a large platform without advertising costs and to obtain a critical mass of users for accelerated growth. The integration strategy was based on understanding the behaviour of hosts and guests, which made it possible to reduce entry barriers and increase trust in the service. The launch of Gmail also demonstrates the effectiveness of growth hacking through psychological mechanisms. Access to the service was available only by invitation, which created artificial scarcity, heightened the sense of exclusivity and increased the perceived importance of the product. Invitations were sold on eBay, generated information noise and ensured exceptionally high demand even before the full functionality of the service had been formed. Gmail used a principle of behavioural economics: limited access strengthens perceived value for the user. The HubSpot case shows how free value can become a source of scaling. The company created a number of free tools – an SEO analysis service, a website speed test, content generators – which provided real value from the first contact. In return, HubSpot received contact details of potential clients and moved these contacts into its sales funnel. This approach combined content marketing, analytics and product thinking, creating a unique system of organic lead-generation growth (Dois, 2025).

A common feature of all these cases is the identification of "points of maximum impact" – behavioural triggers that determine the product's value for the user. Companies did not invest large budgets in advertising; instead, the companies-built mechanisms in which the user became the driver of scaling. Such examples formed the basis for PLG models, in which the product integrates marketing functions, ensuring sustainable growth, virality and innovativeness. The experience of leading technology companies shows that effective growth hacking strategies are formed on the basis of deep behavioural analytics, optimisation of the product experience and the creation of self-propagating mechanisms. New-generation start-ups demonstrate that scaling can be almost entirely organic if the product is designed as a user acquisition channel. As shown in Table 1, it is precisely the combination of viral features, collaboration, and a low entry threshold that has become the foundation of the exponential growth.

Table 1. Examples of growth hacking strategies in technology companies

Company	Type of growth strategy	Main mechanism	Basis of the effect	Scale result
Notion	Collaboration-driven growth	Public templates, shared documents	Rapid spread through templates and open workflows	20+ million active users
Canva	User-generated virality	Content with watermark	Natural virality through sharing designs on social media	185 million users (2024)
Figma	Product-as-a-network	Real-time collaborative work	Users attract the team through collaboration	Accelerated Scaling, acquired by Adobe for USD 20 billion
Discord	Community-led growth	Servers as separate "ecosystems"	Self-scaling through communities	Transition from gaming focus to mass market
Calendly	Workflow-embedded virality	Sending booking links	Every interaction creates a viral cycle with new users	20 million+ users in 2024

Source: compiled by the author

The examples given show that successful growth hacking strategies are based not on isolated tactics, but on a deep understanding of how the user interacts with the product and what mechanisms can turn this interaction into a self-reinforcing growth cycle. Each of the analysed companies forms its own system of virality, which naturally scales its audience without a proportional increase in marketing expenditure. Notion demonstrates that user-created content can form an entire ecosystem of templates that itself attracts new users. Canva confirms the power of "virality through outcome": when a design is shared with a watermark, the product advertises itself without additional spending. In the case of Figma, it is worth mentioning that collaboration becomes the key driver of scaling – every new project brings in additional participants, and every team becomes a separate growth centre. Discord proves the effectiveness of the community-led approach, in which users create an environment for further engagement, forming unique communities that ensure long-term retention. Calendly demonstrates the power of workflow virality: every link sent is an embedded marketing action that automatically brings in new users.

What these strategies have in common is that growth arises not thanks to external campaigns, but through internal product characteristics that create stable cycles of dissemination, retention and repeated interaction. This confirms the central thesis of growth hacking: scaling becomes the result of properly designed product-marketing mechanisms rather than separate tactical activities. All the companies analysed have built growth on deep analysis of behavioural data, rapid hypothesis testing and continuous removal of friction along the user journey. These companies not only attracted users, but also minimised time to value, which is critically important for the PLG model. Thus, the examples in the table confirm that the ability to integrate viral mechanisms into the very structure of the product is a key success factor for start-ups in the modern market, where speed, flexibility and experimental activity determine competitive advantages.

DISCUSSION

Growth hacking is one of the key mechanisms of innovative development for start-ups, as it combines product and marketing approaches in a joint process of accelerated scaling. It is based on rapid experiments, behavioural data analysis and short hypothesis-testing cycles, which make it possible to react quickly to market changes and adjust user-interaction strategies. At the intersection of product and marketing, an integrated system is formed, in which growth depends on coordinated team actions and the ability to adapt the product rapidly in line with audience reactions. This study and the work of M. Cristofaro *et al*. (2025) converged in the view that growth hacking was based on data, high-speed experiments, cross-functional interaction and constant iteration of solutions. In both approaches, experimental activity was seen as a key tool for reducing uncertainty, while analytics and metrics were treated as the basis for decision-making. At the same time, the study by M. Cristofaro *et al*. interpreted growth hacking as a formalised scientific approach to data-driven decision-making with clear preconditions and a standardised analyse-ideate-prioritise-test cycle, whereas this study focused on its applied role in start-ups, where growth was ensured through AARRR metrics, product-led models, viral mechanisms and the construction of growth loops. This difference between strategic and tactical dimensions also appeared in the comparison with A. Cavallo *et al*. (2024). Both this study and the current one started from the premise that modern companies grew thanks to innovativeness, adaptability, and work with data. However, authors moved towards entrepreneurial resilience – the restoration of business models, the use of social capital and shock management. In contrast, this study showed how companies could act even before negative scenarios occurred –

through constant experiments, UX optimisation and behavioural hypothesis cycles that created an "accelerator" effect for growth. Whereas in authors' the scale of analysis was macro-level, in this study it was micro-processual, focused on the daily work of growth teams.

In comparison with A. Rezazadeh *et al*. (2025), the centre of gravity of both works was again innovativeness, but its interpretation differed. Authors interpreted it through organisational ambidexterity – the ability simultaneously to exploit existing competences and explore new directions. In this study, innovativeness had a different configuration: it was defined by the intensity of experiments, AARRR analytics, product-led development and viral interaction cycles. Whereas in the aforementioned study innovativeness was a strategic construct, here it took on an applied dimension and immediately influenced conversions, activation, and user retention. The work of C. Gerlich *et al*. (2025) continued this logic of differentiation. It explained growth hacking through the concept of dynamic capabilities, emphasising the processes of sensing, seizing and reconfiguring as the basis of organisational adaptability. This study revealed a shared reliance with aforementioned one on data and experimental activity, but interpreted these data in a much more operational way: as tools for rapidly influencing user behaviour, optimising the funnel and building growth loops. Whereas authors discussed strategic reconfiguration of the company, this study focused on the day-to-day tactical work of growth teams. Comparison with L. Zhou *et al*. (2025) showed that both studies considered growth hacking a cyclical, data-oriented and experimental approach. However, researchers interpreted it as an organisational capability within the Resource-Based View and Dynamic Capabilities Theory, which shaped the performance of small and medium-sized enterprises. This study, by contrast, interpreted growth hacking as a set of practical actions – AARRR metrics, PLG, UX optimisation and serial tests – aimed at attracting, activating and retaining users. Thus, the common element was the logic of iterativity, while the difference lay in the depth and level of strategicity at which these iterations were analysed.

This study and the work of C. Foggetti *et al*. (2025) converged in the view that growth hacking was an effective tool for accelerated growth in the digital economy and depended on experimental activity, analytics, and a rapid hypothesis-testing cycle. Both studies recognised the central role of behavioural data, testing, optimisation of acquisition channels and close interaction between marketing and product teams. These studies also shared an understanding of growth hacking as a dynamic process that integrated technology, creativity, and adaptability. At the same time, the differences were substantial. This study focused on start-ups and the operational mechanisms of rapid scaling – AARRR metrics, growth loops, PLG, UX optimisation and experiments aimed at influencing user behaviour. Here, growth hacking was interpreted as an applied toolkit that shaped the short-term dynamics of growth through product-marketing actions. The study by C. Foggetti *et al*. (2025) on the contrary, analysed growth hacking in the context of broad digital marketing ecosystems, emphasising the role of technological platforms, algorithmic personalisation, advanced marketing analytics and environments that combined SEO, content strategies, social media and automation.

This difference in perspectives became a logical basis for the distinctions observed in comparison with the work of N. Petersen (2024). Author went beyond the product level, but did so towards the strategic analysis of business models of Born Digital and Born Global companies. Both studies recognised experimental activity and digitalisation as the foundation for growth, but this study worked with micro-processes – behavioural analytics, tactical experiments and the AARRR model – whereas the reaserch-er described how growth hacking shaped the trajectories of internationalisation and the strategic architectures of firms. Thus, in the first case, it was an instrument of rapid scaling, while in the aforementioned study it became a tool of strategic positioning. A similar logic appeared in comparison with the work of Y. Joshi (2025), although the emphasis shifted significantly towards the market. Both approaches recognised the importance of A/B testing, behavioural analytics and digital experiments, but this study interpreted these practices as mechanisms of internal growth for the start-up. In author's research, by contrast, growth hacking was embedded in the external competitive environment, where the key roles were played by demand dynamics, platform algorithms and the intensity of digital competition. In other words, this study explained how start-ups grew, while reasercher clarified in what market environment these mechanisms operated or were destroyed.

Comparison of this study with the work of J. Jung *et al*. (2025) showed that both approaches treated growth hacking as an innovative model of accelerated development built on data, rapid experiments and short decision-making cycles. Both studies stressed the importance of iterativity, hypothesis testing and the integration of marketing and product functions in order to increase user activation and retention. At the same time, the differences lay in the focus: this study analysed the practical mechanisms of scaling start-ups, whereas authors devoted primary attention to organisational conditions – in particular digital culture, team coordination and management processes – that determined companies' ability to apply experimental strategies effectively. In the study by O. De Almeida Andrade *et al*. (2020), growth hacking was viewed as a tool of exponential scaling using the example of Uber, where the main drivers were marketing accelerators, viral promotions, dynamic pricing and word-of-mouth effects. The authors analysed growth hacking at the macro level – through the interaction of the platform with the market, the behaviour of drivers and users, and the influence of the sharing economy on the traditional transport industry. In this study, growth hacking was interpreted differently – as a micro-processual system based on rapid experiments, UX optimisation, AARRR analytics and viral interaction cycles that formed the product's internal growth mechanisms. Unlike the Uber model, where virality was created mainly by marketing activities, in this study it arose from user behaviour and product design. The two works shared recognition of the importance of digital experiments and rapid iterations. The difference lay in the level of analysis: authors described market dynamics and platform scaling, whereas this study focused on the product's internal

processes and analytics that directly influenced user activation and retention.

The comparison showed that different scholarly approaches treated growth hacking as an iterative, experimental and data-oriented process in which the combination of product and marketing decisions ensured innovative development of start-ups. The common elements were an emphasis on rapid hypotheses, behavioural analytics and optimisation of user interaction. At the same time, the differences related to the level of analysis: some works considered growth hacking in a strategic dimension, others in an operational-applied one. In this context, this study occupied an applied position, detailing the mechanisms of tactical scaling through digital experiments.

CONCLUSIONS

The study showed that growth hacking is emerging as a key tool for the innovative development of start-ups, capable of ensuring growth speed, high flexibility and resource efficiency in an environment of intensified digital competition. The results obtained confirmed that the basis of this model is data-driven management, serial experiments, integration of marketing and product decisions, and the construction of cyclical growth mechanisms. Current market trends show that technology companies are actively moving towards PLG: already in 2022-2025, around 58% of SaaS start-ups used PLG, and 91% planned to increase investment in this approach, which indicates its strategic significance. The effectiveness of PLG is confirmed by financial metrics: companies with this model show an average annual increase in Annual Recurring Revenue of 35%, whereas non-PLG firms reach only 26%, and 83% of such companies attain USD 100 million in Annual Recurring Revenue, while spending 39% less on customer acquisition.

Experiments occupy a central place in growth hacking: in leading technology companies, the number of tests reaches dozens per month – for example, Nebula conducted 612 experiments in 2024, ensuring a continuous flow of behavioural data. Although only 10-30% of tests become statistically significant, these form the basis of targeted product and marketing improvements. Such experiments ensure an average conversion increase of 4-7%, and in some cases more than 20%. UX optimisation proved to be no less important: improving onboarding can increase activation by 10-30%, raise retention by 15-25%, and shortening time-to-value provides rapid achievement of the "aha moment". It is indicative that improving retention by 5% can increase company profit by 25-95%, which is why UX becomes the foundation of long-term growth.

Growth loops and viral mechanisms play a distinct role, enabling autonomous scaling without rising costs. The clearest example is Dropbox, which increased its user base from 100,000 to 4 million, and later to 15 million, thanks to a referral programme, achieving 3,900% growth. Similar dynamics are demonstrated by Canva (185 million users), Notion (20+ million), Calendly (20 million+) and Figma, where collaboration has become a source of exponential scaling. A limitation of this study is that it focuses mainly on theoretical approaches and open statistical data, which naturally narrows the depth of analysis of practical cases. The prospects for further research lie in forming an empirical sample of start-ups in order to compare the effectiveness of growth approaches across different sectors and at different stages of development.

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Growth hacking як драйвер інноваційного розвитку стартапів: між маркетингом і продуктом

Анотація. Метою даного дослідження було визначити, як інструменти швидкісного експериментування та аналіз даних можуть підсилювати інноваційний розвиток стартапів і підвищувати ефективність узгодження маркетингових та продуктових рішень. Методологія ґрунтувалася на теоретико-емпіричному підході та включала систематизацію наукових джерел, аналіз цифрових платформ, порівняння технологічних компаній і дослідження практичних кейсів, що відображали застосування експериментування, рекомендаційних моделей і оптимізації користувацького досвіду. У результатах було встановлено, що моделі з акцентом на продукт як основний інструмент зростання забезпечували вищі фінансові показники: компанії, які застосовували підхід product-led growth, демонстрували середньорічне зростання регулярного річного доходу на рівні 35 %, тоді як компанії з традиційними підходами – лише 26 %, а витрати на залучення клієнтів у бізнесів, що орієнтувалися на продукт, були на 39 % нижчими. Значущість циклів експериментування підтверджувалася високою інтенсивністю тестів: компанія Nebula проводила 612 експериментів у 2024 році, що сприяло підвищенню конверсій у середньому на 4-7 %. Оптимізація користувацького досвіду, досліджена на прикладі Duolingo, забезпечувала приріст рівня утримання користувачів на 15-25 %, тоді як пришвидшення процесу першого використання продукту підвищувало активацію користувачів на 10-30 %. Найпотужнішим віральним механізмом виявилися рекомендаційні моделі: приклад Dropbox продемонстрував зростання на 3 900 %, а кількість користувачів збільшилася від 100 тис. до понад 4 млн, що підтвердило ефективність циклів вірального поширення. Практичне значення даного дослідження полягає в тому, що його результати можуть бути використані стартапами для побудови ефективних механізмів зростання, оптимізації продуктово-маркетингових рішень та підвищення результативності експериментування

Ключові слова: швидкі експерименти; оптимізація; віральні механізми; масштабування; бізнес; конверсія