

# ONLINE METHODS FOR VALIDATING AND TESTING ENTREPRENEURIAL IDEAS: A NEW PRODUCT DEVELOPMENT PERSPECTIVE

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## Abstract

In the new digital and dynamic world, the validation and testing of business ideas could be crucial for the entrepreneurial success. This paper explores the transformative role of online methods and tools within the framework of the 8 stage New Product Development (NPD), highlighting their role and indicating an iterative, customer-centric approach. Drawing on academic literature and contemporary online resources, the study classifies and analyzes various online methods, differentiating between validation (understanding market demand and customer needs) and testing (gauging customer responses to concrete concepts). Search interest tools, competitor analysis platforms, and customer feedback mechanisms enable early-stage validation. For concept testing, methods like crowdfunding, pre-sales, and simulated sales provide valuable feedback before product development begins. Finally, product testing utilizes prototypes, minimum viable products (MVPs), beta versions, and test marketing to refine the offering before broad market launch. While acknowledging challenges like potential biases and the digital divide, the study underscores the advantages of online tools in democratizing market research and enabling rapid idea validation. Looking ahead, the study calls for further research to explore the evolving landscape of online tools and methods for idea validation and testing, and their applicability across different industries and contexts. It also highlights the potential of AI and big data to enhance predictive analytics and further refine the business idea validation process.

**Keywords:** validating ideas; idea screening; testing ideas; online business tools; new product development;

## 1. INTRODUCTION

Business ideas are the cornerstone of entrepreneurship and innovation, as they form the foundation for new businesses and products. However, the success of these ideas depends on their ability to fulfil market demand, meet consumer needs, solve problems, and generate revenue. Generating novel ideas in the process is particularly important, however, strategically filtering the most feasible ideas at an early stage is vital for conserving time and resources before advancing to later stages of the venture creation or the product development.

The innovation process that leads to new business and/or product creation is comprised of several stages that include idea generation, idea selection, product design, idea implementation, commercialization and diffusion (Desouza et al. 2009). The front-end innovation (FEI) that takes place prior to the formal, well-structured New Product and Process Development consists of 5 iterative elements: Opportunity Identification, Opportunity Analysis, Idea genesis, Idea Selection, Concept and Technology Development (Koen et al 2001). It is evident that there is continuum between the FEI and the New Product Development (NPD), so Idea Generation and Idea Screening are the first two of the 8 stages in the New Product Development Process elaborated by Kotler and Armstrong (2012).

During the stage of generating business ideas, entrepreneurs and companies may develop plentiful of ideas that need to be further evaluated and reduced before they be considered for implementation. The reduction of the ideas mostly takes place in the front end, but also the ideas may be abandoned in the later stages of the NPD as concept testing, product development and the market test. Since the later stages increase the investment cost significantly, it is important to have handy methods and tools for evaluating ideas and selecting the most viable as early as possible in the process and minimize the risk of failure.

The genesis of any successful product or service is grounded in a well-tested and validated idea (Maurya, 2012). In traditional settings (not considering the newly available internet approaches) several methods such as competition analysis, surveys and panel groups are used. While traditional validation methods are often resource-intensive and time-consuming, online techniques offer speed, scalability, and access to a global audience (Osterwalder et al., 2014). In the dynamic landscape of business and technology, effective testing and validation of business ideas have become pivotal (Blank, 2013). The digital era has introduced a variety of online methods and tools that have revolutionized the way entrepreneurs and businesses validate hypotheses about customer needs and product viability (Ries, 2011). The internet and digital technologies have democratized business idea validation, enabling startups and entrepreneurs to conduct market research, gather feedback, and iterate on their ideas efficiently (Furr & Dyer, 2014).

In a previous research (Bezovski et al., 2021) we studied online methods for generating ideas that the innovators and entrepreneurs have at disposal. This time, our study is focused on online and practical methods and tools that can enhance the process of validating and testing ideas, specifically in the online environment. In order to systematically investigate the methods, we first distinguish between methods validating and testing as different approaches in the light of the stages of the NPD process. Our analyses further delve into various online methodologies, starting from search interest tools, competition analyses, customer feedback, concept testing methods as crowdfunding and product testing methods such as MVPs and test marketing.

By understanding and leveraging the power of online methods and tools, businesses can enhance their chances of launching successful products and services in the competitive marketplace (Cooper & Vlaskovits, 2010). New business ventures, by using online methods, could perform market research using a very cost-efficient means (Lavery & Little 2020). These tools and methods facilitate a deeper understanding of market dynamics and enable real-time adjustments to business strategies (Kohavi et al., 2009).

It is important to note that the online environment enhances the traditional method used but also enables new tools and methods for validation and testing business ideas. Additionally, online methods and tools constantly evolve and can significantly help entrepreneurs and companies make more informed decisions regarding their innovation process.

The main objective of our study is to examine and systematically present the online methods and tools for validating and testing business ideas in the light of the new venture creation and/or the new product development.

## 2. METHODOLOGY AND LITERATURE REVIEW

This conceptual research paper, drawing on theory synthesis and typology methods (Jaakkola, 2020), aims to fill a critical gap in understanding the emerging methods and tools used to validate business ideas and their alignment with modern new product development (NPD) concepts.

### 2.1. Methodology

We employ a mixed-methods approach. First, an extensive literature review delves into academic journals and scholarly publications to identify relevant methods and tools focused on online business idea validation. Additionally, we review contemporary web articles and other online resources to capture current market trends and digital tool usage within NPD.

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Our study primarily takes a descriptive approach, classifying and examining different validation methods and tools. However, an exploratory element is also present, utilizing observation and online research to identify the most prominent tools currently employed in the field.

The selection criteria for these sources included relevance to the topic, credibility of the source, and the date of publication, with a preference for the most recent and authoritative information. The analysis involved a thematic review of the literature, identifying key themes, methodologies, and findings related to the use of online tools in business idea validation. This approach ensures a comprehensive understanding of the subject, combining the rigor of academic research with practical insights from current industry practices.

## 2.2. Literature Review

The landscape of business idea validation (and idea screening) has been extensively discussed in academic literature (Asmar et al., 2021; Tauqeer & Bang, 2019). Ries (2011) emphasizes the role of lean startup methodologies, highlighting the importance of rapid prototyping and iterative design in validating business ideas. Blank (2013) extends this discussion by introducing the concept of customer development, advocating for a customer-centric approach in the initial stages of business development.

Studies by Maurya (2012) and Osterwalder et al. (2014) provide insights into the practical tools and frameworks used in the validation process, such as the Lean Canvas and Business Model Canvas. These tools facilitate a structured approach to hypothesis testing and business model iteration.

Furr & Dyer (2014) explore the digital transformation of these methodologies, focusing on how online tools and platforms have made the validation process more accessible and data-driven. They argue that digital technologies enable real-time feedback and wider audience reach, crucial for validating business ideas in the modern market. Furthermore, Kohavi et al. (2009) delve into the analytical aspects, discussing how online data analytics and A/B testing can provide empirical evidence to support business decisions. Their work underscores the importance of data in validating business hypotheses and guiding product development.

In recent years, there has been a notable increase in the use of digital platforms for crowd-based feedback, minimum viable products (MVPs), and customer development techniques (Chen et al. 2018). Tools like Google Trends, SEMrush, and Hotjar have become essential for understanding market dynamics and making real-time adjustments to business strategies. These tools represent a significant shift from traditional methodologies, offering faster, more scalable, and cost-effective solutions for validating business ideas.

Osterwalder and Pigneur (2010) discuss the option to use digital platforms to gather and analyze customer data. Evans and Mathur (2018) provide a comprehensive analysis of the evolution, current state, and future of online survey research. User generated data, including the search engine interests, could be utilized to test the viability of business and product ideas (Vosen and Schmidt 2011; Duwe et al, 2018; Schaer et al., 2019; Du & Hsieh, 2023; Siliverstovs & Wochner 2018). Use of Google Trends is analyzed for idea validation in various industries, including automobile (Choi and Varian, 2012; Carrière-Swallow and Labbé, 2013) and retail sales (Bughin, 2014)

Several studies discuss the crowdfunding approach not only for raising capital but also for validating/testing business ideas (Stevenson et al., 2022; Junge et al., 2022; Petras et al., 2019). Additionally, Eid and El-Gohary (2013) assess the importance of e-marketing skills for conducting presales.

Among the most researched testing methods is the A/B testing, also known as split testing, which is widely used in various fields, including product development, and design (Koning, 2022; Kohavi and Longbotham, 2017; Quin et al., 2023; Kohavi et al., 2020).

The Minimum Viable Product (MVP) (Moogk, 2012; Lenarduzzi & Taibi, 2016; Gocke and Weninger, 2012) and Beta versions (Dolan & Matthews 1993; Mohd & Shahbodin 2015; Olsson & Bosch, 2015), is also extensively researched especially in the software development industry for the purpose of idea testing.

Regarding the topics that lack academic references, we consulted current web articles, specifically for the Google Keyword Planner, competitor analysis tools, Large Language Models, engaging target audiences, online communities and simulated (mock) sales.

While academic literature is abundant with studies of specific methods for validating and testing business ideas, at the best of our knowledge, there is only one attempt, from a precisionist aspect, to present a bundle of validating and testing ideas. Bland & Osterwalder (2020) developed a practical guide for entrepreneurs and innovators who want to validate their business ideas through rapid experimentation. However, there are no academic papers that systematically classify, group, or correlate the methods with the entire process of new venture creation or new product development.

### 3. VALIDATING AND TESTING BUSINESS IDEAS IN THE CONTEXT OF THE NPD

In order to explore various online methods and to present the finding of our study in a systematic way, we find it is essential to first differentiate between the validating and testing methods. Subsequently, we should align them with an established framework for business or product development, such as the 8 stage New Product Development (NPD) process.

Testing and validating business ideas are two important concepts that are used to determine the feasibility and potential success of a new business concept. Although these terms are often used interchangeably, they refer to different approaches in the idea validation process and serve different purposes.

Validation is the process of confirming that a business idea aligns with customer needs and market demands. It involves hypothesis generation about the market and potential customers, followed by data collection to support or refute these hypotheses. A key approach in validation is customer discovery, which seeks to understand customer problems and needs through direct engagement (Blank, 2013; Ries, 2011). This phase is critical to ensure that the business idea solves a real problem and has a viable market. Testing, on the other hand, is more hands-on and involves presenting a product or a product concept in real market settings in order to gauge customer response. This may involve presales or development of a minimum viable product (MVP), prototypes, or beta versions that are introduced to a segment of the target market (Maurya, 2012). Testing provides direct and practical feedback on how the product is used and perceived, allowing businesses to iterate and refine their offering.

If we observe the idea validation and idea testing through the 8 Stage New Product Development (NPD) process described by Kotler and Armstrong (2012), in Figure 1, it is evident that the idea validation takes place at least in the first two stages, the Idea generation and Idea validation. The (concept) testing of the selected ideas usually starts in the third stage, where the costs for development are still low. The real market tests (product testing methods) that take place in the sixth and seventh stage bring higher associated costs. Thanks to the digital environment, there are methods and tools that could begin with the idea validation very early in the process, starting with exploration the Search Interests of the internet users, enabled by the Search Engine provided tools. Additionally, specific idea testing methods could replicate market conditions in order to test the business ideas as early as in the third stage (concept testing) and therefore effectively reducing the costs and the risks associated with new product development in the later stages.

The overall purpose for introduction of this Figure is to serve as a visual guide that portrays the diverse methodologies employed when validating and testing ideas. It's designed to clarify the distinct methods for validating, concept testing, and product testing—while also emphasizing their interconnected nature. It also indicates that the validation methods are employed at the outset of the NPD journey, where preliminary ideas are assessed for their potential. Following validation, concept testing methods take center stage, where theoretical ideas begin to take tangible shape through various forms of market interaction and feedback. Finally, the diagram indicates that product testing methods are situated towards the end of the NPD progression, where the focus shifts to rigorous testing of the product's functionality, market acceptance, and performance before culminating in test marketing and commercialization.

The figure illustrates the integration of various methods for validating and testing business ideas within the framework of the New Product Development (NPD) process. The NPD stages on the right side of the figure,

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from idea generation to commercialization represent a typical product development lifecycle. The left side of the figure lists methods for validating and testing ideas, which could be crucial activities during several NPD stages. The absolute position of the method does not imply that it is strictly related to the stage in the right. The figure visualizes how these methods correspond with the NPD process, suggesting that the idea validation and testing are not isolated activities but occur throughout the development of a new product and indicates interwoven and iterative approach, where feedback and testing inform each stage of development, which is an agile way to handle product development (Kettunen, 2009).

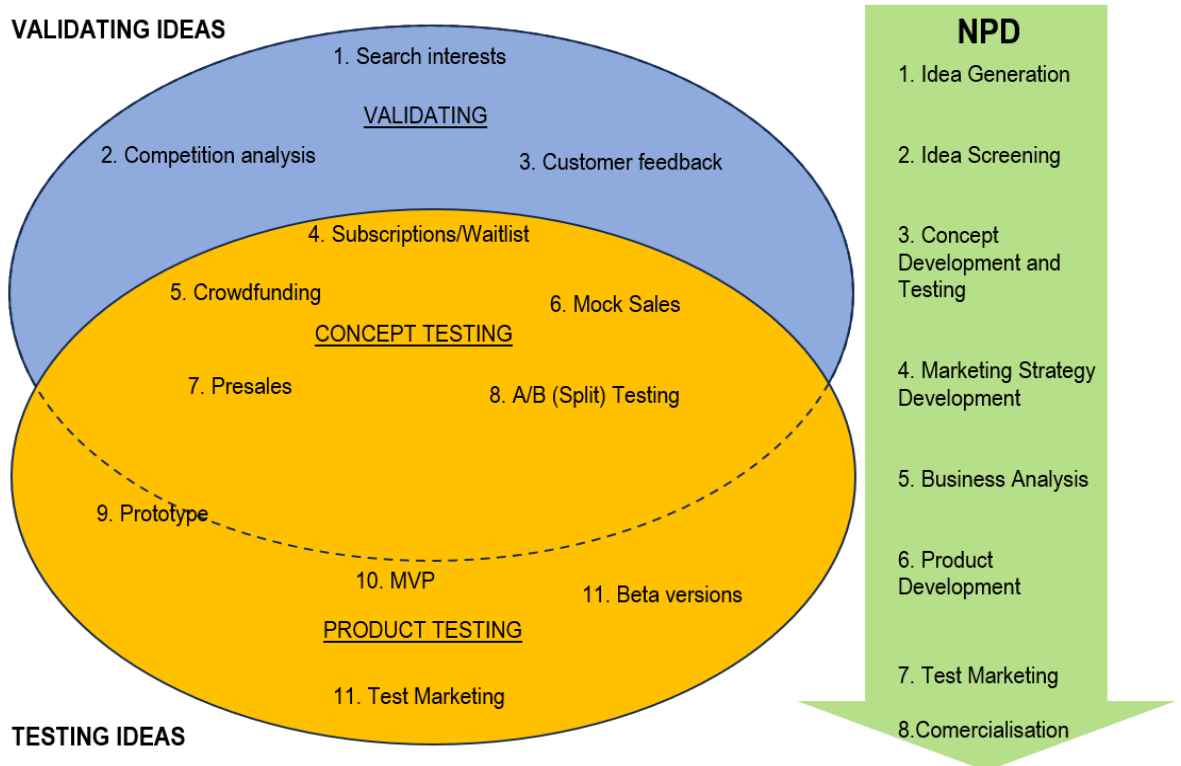


FIGURE 1 - VALIDATING AND TESTING BUSINESS IDEAS IN THE CONTEXT OF THE NPD

The number on each method indicates an assumed simplicity of conduction from the simplest and earliest methods towards the later and more complex. Anyway, this is not always the case since, for example, split testing could be done in parallel with Subscriptions and/or later during the Beta version testing. Additionally, we consider the methods numbered from 4 to 8 as concept testing methods since they mimic market conditions, but due to their simplicity and possibility to be introduced early in the NPD process could also be considered as validating methods. Prototyping is usually considered as concept testing method (Kotler & Armstrong, 2012), but since it starts the product development process, we take it into consideration in the product testing group of methods..

4. EXPLORING ONLINE METHODS FOR IDEA VALIDATION AND TESTING

Delving into the digital realm, we continue with an in-depth examination of the methods and tools accessible for validating and testing business and product ideas. We begin by discussing various methods for initial idea validation, emphasizing the importance of early-stage feedback and market understanding. This is followed by an exploration of concept testing approaches, which are vital for evaluating the feasibility and potential impact of business concepts. Finally, the focus shifts to product testing methods, highlighting strategies for assessing the practicality and market readiness of diverse types of products, ensuring they meet consumer needs and preferences.

#### 4.1. Idea validating methods

Validating product and business ideas is a critical step early in the entrepreneurial process, ensuring that a product or service meets the needs and expectations of its target market. This validation phase is essential for avoiding the common pitfall of investing time and resources into a product that lacks market demand (Blank, 2013). The primary objective of idea validation is to gather evidence about a business's feasibility and potential success, thus reducing the inherent risks associated with new ventures (Ries, 2011).

Several methods can be employed for idea validation. Customer feedback, often obtained through surveys, interviews, and focus groups, plays a pivotal role in understanding customer needs and preferences (Osterwalder & Pigneur, 2010). This direct interaction with potential customers provides insights into their problems, helping entrepreneurs tailor their offerings more effectively. Additionally, competition analysis (Fleisher & Bensoussan, 2015; De las Heras-Rosas and Herrera 2021) could also offer valuable insights for idea validation.

Digital tools, including search engine data, social media analytics and online surveys, have become indispensable in this process, offering efficient ways to gather and analyze customer data (Blank, 2013; Osterwalder & Pigneur, 2010).

##### 4.1.1. Search interests

Search Engines are among the most used websites worldwide (Ruth et al., 2022, Similarweb 2024), where users, on a daily bases, try to solve their informational needs. The data collected by search engines is very useful in understanding market trends and consumer interests, but also could be used to check the viability of business and product ideas (Vosen and Schmidt 2011. Duwe et al, 2018. Schaer et al., 2019. Du & Hsieh, 2023) .

Search trends enabled by tool such as **Google Trends** provide analyzes of the popularity of search queries across various regions and languages (Choi and Varian, 2012; Carrière-Swallow and Labbé, 2013; Bughin, 2014; Siliverstovs & Wochner 2018). The tool uses graphs to compare the search volume of different queries over time and suggests related trending search queries. Google Trends can be used to spot emerging trends or fads in an industry. By entering specific keywords related to a business or product idea, one can see how interest in these topics has changed over time. This can help understand whether the demand for a product or service is increasing, stable, or declining. Consumer Behavior and Preferences: By comparing different search terms, entrepreneurs or companies could see which are more popular, giving insights into consumer preferences and behavior.

It's important to note that while Google Trends is a powerful tool for gaining insights, it should be used in conjunction with other market research methods (such as the Google Keyword Planner). The data is relative and represents interest rather than absolute search volume numbers.

Google Keyword Planner is a tool offered by Google as part of its Google Ads service. It is primarily designed to help advertisers choose the right keywords for their pay-per-click (PPC) marketing campaigns. However, it can also be an invaluable resource for validating business and product ideas (Datt, 2019; Ncube, 2018), similar as Google Trends. Additionally, the Keyword Planer provides data on the average monthly search volume for each keyword and estimated cost for paid search. This information can be used to gauge the level of interest or demand for a product or service where high values can indicate a strong market demand and/or existence of paying customers.

Other search interest indicators or keyword tools that utilize data form search engines and other popular websites include: keywordtool.io, Bing Keyword Research Tool, Ahrefs Keywords Explorer, Moz Keyword Explore etc.

##### 4.1.2. Competition analysis for idea validation

Competition analysis is a methodical process that involves the identification and evaluation of competitors to ascertain their strengths, weaknesses, strategies, and overall market positioning (Fleisher & Bensoussan,

2015). De las Heras-Rosas and Herrera (2021) contend that competitive intelligence is instrumental in augmenting a company's competitive edge, including the success with new products.

Within the ambit of NPD, competition analysis can serve as an integral input across multiple phases, encompassing Idea Generation, Idea Screening, Concept Development and Testing, Marketing Strategy Development, and Business Analysis. This paper, however, concentrates specifically on the role of competition analysis for validating ideas in the idea screening stage. The digital environment, bolstered by specialized online tools, plays an important role in facilitating this analysis. In the context of idea validation, competition analysis should concentrate on identifying competitors, including their number, time in business, the features and pricing of their offerings, their customer base, and advertising expenditures. The primary output of this analysis, in relation to idea validation, should be an estimation of the market's existing conditions, including its size, profitability, saturation levels, and the intensity of the competition.

***Identifying competitors, their offering and pricing.***

This is the first step in competition analysis, and it entails identifying businesses offering analogous products or services. It is a vital step for assessing competition levels and comprehending the market landscape. By identifying the competitors, one can scrutinize their strategies, strengths, and weaknesses, thereby gaining insights into potential challenges and opportunities. This step is fundamental in determining if a business idea is sufficiently unique or addresses a gap in the current market offerings. It involves discerning direct and indirect market competition, revealing market saturation, and potential innovation gaps.

Identification of competitors could begin with search engines, business directories, web mapping platforms (aka Google maps), social media, and any other resources relevant to the specific business or product idea. Digital marketplaces such as Amazon, eBay, Etsy, AliExpress, Alibaba, Clickbank, Craigslist, Freelancer, Upwork, Fiverr, Play Store etc. can also be beneficial for discovering competitors and competing products or services. Some of these platforms also reveal the amount of the sold products/services directly indicating the market size.

The identification of competitors should be accompanied by an analysis of the features and pricing of competitors' offerings. It provides an understanding of consumer expectations, their willingness to pay, and potential areas for improvement or innovation in a product. This analysis is crucial for setting a competitive yet profitable pricing strategy and ensuring that the product at least meets the market standards.

Tools like SimilarWeb provide insights into competitors' web traffic, user engagement, and keyword positioning.

If the product is novel and has no substitutes, meaning that there are no direct or indirect competitors, the competition analysis for idea validation is not a relevant method, so other validation methods, such as customer feedback, should be used.

***Time in Business and product evolution***

Assessing the duration of competitors' market presence can yield insights into market stability and trends. A long-standing presence may indicate a loyal customer base and a viable business model, while newer entities might suggest a dynamic market with shifting consumer preferences. This understanding aids in predicting the life cycle of the product or service and strategizing for enduring viability.

By researching competitors' history and growth trajectory through their **official websites**, business profiles on platforms like LinkedIn, or databases such as Crunchbase, one can evaluate their market experience and evolution for insights into market stability and maturity. With tools like the **Wayback Machine**, one can track the longevity of competitors, their products, and observe changes in their offerings or website pages. Similarly, analyzing competitors' **social media histories** can offer insights into their market strategies and adaptations.

***Competitors' Customer Base***

Understanding the existence, size, demographics, preferences, and behaviors of the customers targeted and attracted by the competitors is important for the idea validation. This knowledge is vital for understanding the marketing strategies and product development to better meet the needs of the target audience, thus enhancing

the likelihood of the product's market acceptance. This facilitates understanding the target audience and their behavior, reveals potentially underserved market segments, and assists in crafting marketing strategies for reaching the ideal customer.

**Social media analysis** is a powerful tool for competitive intelligence activities, as it allows for the extraction of information about competitors (He, Zha, & Li, 2013; Salminen & Degbey, 2015). Social media profiles can be analyzed for demographic information, engagement metrics, and customer sentiments. The number of followers and their engagement is a strong indicator for the existing customer base and exiting market potential.

Tools like **BuzzSumo** and **Hootsuite** enable businesses to monitor competitors' social media presence, understand their content strategy, and gauge customer engagement and response. Customer feedback and ratings on e-commerce platforms, units sold review sites, and social media should be reviewed too in order to estimate the existing customer base.

#### **Competitors' Advertising Expenditures**

Analyzing the advertising spend of competitors offers insights into the existence of paying customers, potential profitability and intensity of the competition.

Semrush as a commercial tool enables to see the keywords that competitors' ads show up for, the actual ads run by the competitors and the month-by-month record of keywords and the highest ad rankings for each keyword in your competitor's advertising campaign over the past 12 months (Semrush, 2018). Other tools as **iSpionage**, **SpyFu**, **WhatRunsWhere**, **Moat** and **Adbeat** offer functionalities like tracking PPC and social media ads, analyzing competitor keywords and ad spend, monitoring ad copy, and gaining insights into media buying strategies and landing pages. Each tool provides distinctive features to help understand competitors' advertising strategies, budgets, and campaign evolutions, aiding businesses in refining their own advertising efforts (Storm 2021). Anyway, data from such tools should be approached with caution due to their limitations in providing an exhaustive market analysis (Golden & Horton, 2021).

The **Google Keyword Planner** not only assists in budget estimation by providing suggested bid estimates for each keyword but also offers insights into competitors' spending on specific keywords. This information is valuable as it not only indicates market competition but also suggests the presence of a paying market, thereby highlighting the potential profitability of a product.

By systematically evaluating the above-mentioned aspects, competition analysis can significantly contribute to validating business ideas, understanding market gaps, and strategizing for competitive advantages. However, it is important to note that the data obtained from online tools and methods, while informative, may not provide exact figures about the market size and profitability. Instead, they offer a general market overview that and in conjunction with other methods, can assist in the idea validation process (Golden & Horton, 2021).

#### **4.1.3. Customer feedback**

Customer feedback is information provided by customers about their experience with a product, service, or brand (Meyer & Schwager, 2007). Its primary goal is to reveal their level of satisfaction and to assist teams in product development and marketing in understanding areas that need improvement. Companies can obtain customer feedback in various ways, either proactively through surveys and interviews or passively by providing a platform within their product for customers to leave comments, complaints, or compliments. Customer feedback could be specifically utilized for idea validation early in the process of the new product development (Asmar et al., 2021; Fabijan et al., 2015; Olsson & Bosch, 2015) but also in the later stages (Evans & Mathur, 2018). Various online tools could be used to gather qualitative and quantitative user feedback regarding the idea validation process.

The validation of ideas through online consumer feedback hinges on four important aspects: (1) formulation of insightful questions, (2) use of effective tools and methods for data collection, (3) access to the targeted audience and (4) analysis of the data. All these aspects could be facilitated with online methods and tools.



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Large Language Models (LLM) as ChatGPT, Google Gemini or Bing's Copilot could be beneficial in the survey design at the start, and with the data analysis at the end of the process for validating ideas (Jansen et al., 2023; Yilmaz 2024).

Online Surveying Tools such as SurveyMonkey, Google Forms, JotForm or Typeform enable businesses to design and distribute surveys quickly to a broad audience, gathering direct feedback on business concepts or potential products. DIY Survey Tools (Evans & Mathur, 2018) as Google Forms and SurveyMonkey enable users to create forms for gathering answers on free bases.

The most challenging part in the idea validation via customer feedback is to access relevant and representative target audiences and to get quality answers. The first option here is to use the personal social media profiles and e-mail contacts to ask respondents to refer others within your target audience, known as snowball sampling. Services as SurveyMonkey, SurveySparrow, QuestionPro and Typeform may provide access to more representative audiences through panels and/or Probability Sampling. Alternative to these audience providers is to use paid advertisement on social media as Facebook, X (ex Twitter) or other social media (Zhang et al., 2020; Guillory et al., 2016), where one could carefully target the desired audience by specific characteristics.

Another option to distribute questionnaires and/or questions for validating ideas is through related online communities and forums like reddit and Quora or in Facebook and LinkedIn groups (de Oliveira Santini et al., 2020; Gozuacik et al., 2021). These online communities besides for quantitative, could be also beneficial for quantitative research using open ended questions and further engagement in the communication. .

#### 4.2. Concept testing methods

In the third phase of the NPD, according to Kotler and Armstrong (2012), a promising product idea should be developed in a product concept and then tested with a group of targeted customers. (A product concept can be described as an elaborated version of an idea, articulated in terms that are meaningful and relatable to consumers.) According to this, the concept testing could start with the customer feedback methods elaborated above. Anyhow, under concept testing we include methods that tend to **emulate market conditions**, at least to some extent, starting with a subscription to a waitlist or making presales. These methods go beyond just soliciting hypothetical responses from potential customers. They also evaluate the readiness of prospects to actively engage with the product or service. This includes actions like providing contact information, making a pre-purchase, or clicking the 'buy now' button in the mock sales scenario.

##### 4.2.1. Subscriptions/Waitlists

Subscriptions and waitlists (Keith et al., 2017; Keith & Struben, 2018; Facussé, 2018) can be effective tools for validating business and product ideas, especially during the concept stage of a product. When potential customers sign up, they are expressing a preliminary interest in the product. This interest is more concrete than merely providing feedback because it often requires an action like sharing contact information or even committing to a future purchase. This approach serves as a market validation tool, helping to gauge the demand for the product before it is fully developed or launched. It also creates a base of potential early adopters who can be pivotal in providing initial sales momentum and feedback once the product is available or offered as MVP. Additionally, the data gathered from these early sign-ups can be used to refine the product concept, pricing strategies, and marketing approaches.

The same surveying tools for Customer Feedback, mentioned above, could be used to present the product concept and to collect contact information from interested future buyers. The same applies for accessing the targeted audiences where specialized services, social media, online communities, and ad services could be used.

Additionally, concept testing can be effectively conducted on **launch-up platforms** such as Product Hunt, BetaList, and Indie Hackers. These websites are renowned for showcasing new and innovative products, particularly in the technology sector. They serve as ideal platforms for startups and developers to either test or

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launch their products. By leveraging these sites, entrepreneurs can gain valuable feedback from a community comprised of tech enthusiasts, early adopters, and industry professionals what could provide them valuable insights about their idea fusibility. They can also use these platforms to start building their subscription list.

### 4.2.2. Crowdfunding

Crowdfunding is a method of raising capital by collecting small amounts of money from a large group of people, typically via online platforms. It's like a pre-order system on a massive scale, where potential customers can pledge money to support the creation of a product or service. It not only helps in raising capital but also serves as a powerful tool for testing product ideas (Stevenson et al., 2022; Junge et al., 2022; Petras et al., 2019). Besides that, backers often provide valuable feedback, suggestions, and ideas, which can be instrumental in refining the product. A successful crowdfunding campaign can help in building a community of early adopters and brand advocates. This community can provide ongoing support, word-of-mouth promotion, and valuable feedback as the product evolves. The community also serves as a ready market for future product launches.

Compared to traditional test marketing, crowdfunding offers a more cost-effective approach to testing business ideas. While traditional methods often incur high expenses, the primary costs associated with crowdfunding are linked to concept development, planning, and, if utilized, marketing efforts such as video production and advertisement. This makes crowdfunding an accessible and low-cost option for entrepreneurs to validate their business concepts.

However, it's important to be realistic about the challenges of crowdfunding. Not every campaign is successful, and it requires significant effort in marketing, campaign management, and post-campaign fulfillment. The success of a crowdfunding campaign also depends on factors like the clarity of the campaign message, the attractiveness of the rewards, the credibility of the creators, and the overall appeal of the product idea.

Among the most notable crowdfunding platforms are Kick Starter, Indiegogo, Crowd Cub, and Start Engine.

### 4.2.3. Pre-Sales

Pre-sales involve offering products or services to potential customers before the official launch (Jelassi & Leenen, 2003; D'Angelo, 2019; MacPherson, 2019). This method is particularly useful for determining market interest, securing early sales, and generating initial cash flow. The fundamental distinction between Pre-Sales and Crowdfunding lies in the approach to capital collection and customer engagement. In Pre-Sales, entrepreneurs are solely responsible for orchestrating the collection of funds and directly accessing potential customers. Unlike Crowdfunding, where platforms provide a centralized framework for fundraising and market exposure, Pre-Sales demands that entrepreneurs independently establish their own funding channels and customer outreach strategies. This often involves creating and managing their payment systems, marketing campaigns, and customer interaction channels, without the structured support and visibility offered by crowdfunding platforms.

To effectively conduct pre-sales, among the others, the following aspects are crucial: (1) providing a landing page (or a pre-sales website), (2) setting up a payment gateway and (3) accessing the target market (marketing skills). Additionally, to reinforce the credibility of the pre-sales process and the overall marketing effort, an (4) appropriate domain name could also be employed. All these aspects require a certain amount of initial, but not substantial investments. Additionally, the process needs to comply with relevant laws and regulations regarding the legality of pre-sales and collecting funds.

Tools and resources to build landing pages (or pre-sales websites) include but are not limited to: (1) open-source content management systems as WordPress, Drupal, Magento etc. that also require certain website management skills and appropriate website hosting, and (2) commercial services as Shopify, Wix and Weebly.

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Notable payment gateways suitable for presales include Stripe, PayPal, Shopify Payments, Authorize.net, Worldpay etc. (Woock et al., 2023; Rebelo, 2024).

Regarding the marketing skills, specifically the access to the target market, the same methods as in Customer Feedback mentioned above, could be used, like specialized services, social media, online communities, and advertisements service. Nonetheless, e-marketing skills may be crucial to be successful in the pre-sales process (Eid & El-Gohary, 2013).

### 4.2.4. Mock (simulated) sales

A mock sale, is a simulated sales process where a product or service is presented for sale without actually processing any payments (Bland & Osterwalder, 2020). The primary goal of a mock sale is to test the market's response to the product, including its pricing, without the need for full product development or setup. This approach allows businesses to gauge customer interest, collect potential customer data, and refine their value proposition and pricing strategy based on the market's feedback.

To effectively carry out mock sales, it's essential to (1) create a landing page or a pre-sales website to showcase the product or service, (2) employ appropriate domain name and (3) engage the target market using marketing techniques. Unlike in the pre-sale approach, there's no need to secure a payment gateway. Instead, gathering contact details, after the simulated "buy now" button, can be advantageous to reinforce the validating of the tested concept's feasibility.

The mock sale approach can be enhanced by incorporating A/B testing to evaluate various product features and/or price points, providing deeper insights into customer preferences and optimizing the offering based on real user feedback.

### 4.2.5. A/B (Split) Testing

A/B testing, also known as split testing, is a method used to validate business or product ideas by comparing two versions of a product, webpage, or other assets to determine which one performs better (Vasthimal et al., 2019; Schermann et al., 2016). This approach is widely used in various fields, including digital marketing, software development, and product design (Koning, 2022; Kohavi and Longbotham, 2017; Quin et al., 2023)

A/B testing is a powerful tool for validating business or product ideas because it relies on actual user data rather than assumptions (Kohavi et al., 2020). By methodically comparing different versions of a product or service, businesses can learn what resonates best with their audience and make informed decisions about future development and marketing strategies.

A/B testing is a versatile tool that can be effectively integrated with other methods such as customer feedback, concept testing, and product trials. For example, A/B testing could be used to test two different landing pages while conducting mock sales. This complementary approach enhances decision-making at various stages of the NPD process. For instance, A/B testing can play a crucial role for fine-tuning pricing strategies. Whether in the phase of customer feedback, conducting mock sales and presales, or during the testing of a Minimum Viable Product (MVP), A/B testing offers empirical insights that can guide the optimization of pricing models. The same applies for testing the product features.

There are various tools that could ease and enhance A/B tests, including Google Optimize, Optimizely, VWO (Visual Website Optimizer), Unbounce, Intelligems A/B Testing (For Shopify), Facebook A/B testing ads etc. These platforms offer features to design tests, segment audiences, and analyze results (Mullin, 2022).

### 4.3. Product testing methods

In the contemporary business environment, the strategic introduction of innovative products can serve as a pivotal factor in propelling businesses towards unprecedented growth. Product testing methods are designed to demystify the intricacies of the new product development process, placing a primary emphasis on the realm of software product development. NPD is not merely a series of steps; it is a strategic, organized, and well-planned process. This methodical approach aims to convert a perceived market opportunity into a tangible product available for sale. It is intricately designed not only to meet customer needs but to offer innovative solutions that can contribute significantly to business growth (EPAM Startups, 2024)

As the New Product Development (NPD) process advances beyond concept testing, and starts with the development of the product, now methods for testing emerge. What is the significance of understanding product testing in the New Product Development (NPD)? Product testing serves as a critical bridge between the theoretical framework established during concept testing and the real-world application and performance of the product. Among the product testing methods, we explore prototypes, MVPs, and beta versions as they emerge as tangible representations of the product concept, offering valuable insights into the product's practicality, user experience, and overall market potential. This transition marks a shift from concept to a more concrete product form, facilitating in-depth testing and refinement. We also explore the test marketing that besides the product itself test the entire marketing strategy around that product.

#### 4.3.1. Prototype testing

Prototype testing is the evaluation of a preliminary version of a product that has been constructed to include the core features and/or functionalities (Lauff, 2018). It is designed to test various aspects of the product's design, usability, and performance. According to Kotler and Armstrong (2012), prototype creation is initially part of the concept development in the NPD, but since the prototype development is part of the product development in general (Crawford & Benedetto, 2015) we examine it under the product testing methods.

There are different types of prototypes that could be put on test in the online environment including clickable prototypes (in software products), user experience (UX) prototypes, visual prototypes, functional prototypes (that could be presented through a video) etc. (Bland & Osterwalder, 2020; Nissinen, 2015; Kuutti, 2001; Karras et al., 2017). Online 3D printing services could be used to produce certain types of prototypes for testing (Haan, 2024). Additionally, online channels could be utilized to distribute physical prototypes to targeted users and/or could be sent to social media influencers (Backaler & Backaler, 2018; Datt, 2023) in order to test customer responses and reactions regarding the prototype.

Prototype testing could be also combined with other validating and concept testing methods such as customer feedback methods, waitlists, presales, mock sales etc.

#### 4.3.2. Minimum Viable Product (MVP)

In the context of the New Product Development (NPD) process, the MVP, or Minimum Viable Product, could be a key component (Moogk, 2012) of the product testing phase if it is applicable for the product/service type. MVP represents a version of the product that includes only the necessary features to satisfy early adopters and provide the maximum amount of validated learning about customers with the least effort (Lenarduzzi & Taibi, 2016). By concentrating on the core value proposition, an MVP helps validate the fundamental business hypotheses and assesses whether the product meets the market needs. Developing an MVP requires fewer resources compared to a full-featured product, making it a cost-effective strategy for testing in real-market conditions. Additionally, it could bring in additional finances that could help the further development.

MVPs are versatile and can be applied across various domains, from software, digital products and services to physical products. While MVPs are ideal for the former, they are also applicable for physical products, but are

more challenging due to the costs of manufacturing and it make take a form similar to functional prototypes but with larger batch.

The resources needed to conduct the MVP test are the same as in the pre-sale presale and include (1) domain name, (2) landing page (or a simple website), (3) payment gateway and (4) access to the targeted market (aka marketing skills), and most importantly (5) the MVP itself that is missing in the presale test.

#### 4.3.3. Beta versions

Beta versions are the subsequent iteration in the New Product Development (NPD) process, following (or replacing) the MVP release. This stage involves a pre-release version of the product, which is nearly complete but may still contain a few unresolved bugs or require fine-tuning based on user feedback. The primary goal of beta testing is to expose the product to a broader audience beyond the initial early adopters, encompassing a segment of the target market that can provide diverse insights into the product's functionality, usability, and overall experience (Dolan & Matthews 1993; Mohd & Shahbodin 2015; Olsson & Bosch, 2015).

During beta testing, the product is subjected to real-world usage scenarios to identify any technical or user experience issues that were not apparent during the MVP stage. This phase is critical for gathering detailed feedback from actual users, which can help developers and product managers make the necessary adjustments before the full public release. Beta versions are especially common in the software industry, where users are often invited to participate in the testing process voluntarily, providing valuable insights that contribute to the product's final refinements.

For physical products, beta versions (similar to functional prototypes) might involve limited production runs distributed to selected users who fit the target demographic. These users are typically asked to use the product in their daily lives and report on their experiences, highlighting any aspects that could be improved.

By meticulously planning and executing the beta testing phase, companies can significantly enhance the quality and market readiness of their products, reducing the risk of post-launch issues and ensuring a better fit with market needs and user expectations.

Regarding the online environment it is important to consider that beta testing is similar to prototype and MVP testing, so the same methods and resources could be used to enhance this process.

Specific online resources to test beta versions are the launch-up platforms such as Product Hunt, BetaList, and Indie Hackers. These websites not only provide a venue for obtaining insightful feedback but also serve as fertile ground for attracting potential early customers.

#### 4.3.4. Test Marketing

Test Marketing is a stage of the NPD in which the product (with its proposed marketing program) is tested in realistic market settings (Kotler & Armstrong, 2012). It enables the company to evaluate the product and its comprehensive marketing strategy, encompassing targeting, positioning, advertising, distribution, pricing, branding, packaging, and budgeting.

Test Marketing refers to the phase in the New Product Development (NPD) process where the product, along with its marketing strategy, is trialed in realistic market scenarios (Kotler & Armstrong, 2012). This stage is crucial for assessing the product's viability and the effectiveness of its marketing mix, including targeting, positioning, advertising, distribution, pricing, branding, packaging, and budgeting strategies.

However, test marketing can be time-consuming and costly, which might deter entrepreneurs and small businesses from adopting this approach. An alternative is the simulated test marketing or mock sales

(discussed above), which can provide valuable insights without the extensive resources required for traditional test marketing.

For entrepreneurs wary of the risks and investments associated with launching new, especially physical, products, test marketing in a controlled, smaller market setting might still be a viable option. This approach involves introducing the product to a select group of customers or in limited quantities to mitigate risks.

In the digital realm, leveraging established online marketplaces like Amazon, eBay, Etsy, and Aliexpress offers a practical platform for test marketing without the need for significant investment in physical infrastructure or extensive marketing campaigns. Utilizing services such as Amazon Fulfillment can further streamline distribution and payment processing (Lai et al., 2018), making test marketing more accessible. Success during the Test marketing can pave the way for a full-scale product launch in the Commercialization phase of the NPD.

## 5. DISCUSSIONS

Our investigation into online methods and tools for testing and validating business ideas underscores the pivotal role of digital platforms in contemporary entrepreneurial practice. Through a synthesis of academic literature and contemporary web-based resources, we discerned an inclination towards integrating methods and digital tools such as Google Trends, waitlists, crowdfunding, simulated (mock) sales, MVPs etc. for real-time market analytics and customer feedback. Notably, the adoption of Lean and Agile methodologies, augmented by digital tools, facilitates a more iterative and customer-centric approach to business idea validation, aligning with the principles espoused by Ries (2011) and Blank (2013).

### Academic and practical contribution

Our study addresses a notable gap in academic literature by systematically exploring the intersection of digital tools and business idea validation within the NPD process. While Bland & Osterwalder (2020) provided a practical guide, academic research has yet to fully classify and correlate these methods with the entire venture creation and product development lifecycle. Our work contributes to this emerging field by offering a comprehensive study that integrates digital validation and testing tools within the NPD stages, emphasizing their role not only in the early stages but throughout the product development continuum. Furthermore, our research contributes a nuanced differentiation within the realm of idea evaluation by categorically separating the methods into validation and testing phases, with a further subdivision of testing into concept testing and product testing. This delineation is crucial for elucidating their distinct roles and timings within the New Product Development (NPD) process. Concept testing is positioned early in the NPD cycle, focusing on assessing the viability and appeal of the idea itself before significant resources are committed. Product testing, conversely, occurs later, involving more developed iterations of the product to evaluate functionality, user experience, and market readiness. This structured approach to validation and testing not only clarifies their application within the NPD stages but also underscores the strategic importance of each in minimizing risk and maximizing the potential for market success.

This contribution not only enriches the academic discourse but also provides a practical guide for entrepreneurs seeking to navigate the complexities of business idea validation in the digital age. The shift towards digital tools offers a democratization of market research, enabling startups and established businesses alike to validate their ideas with greater efficiency and lower costs. The real-time nature of digital feedback mechanisms allows for a more agile response to market dynamics, emphasizing the need for businesses to adopt a continuous validation mindset. Entrepreneurs must skillfully integrate these tools into their validation processes, ensuring they remain adaptable and customer-focused in their approach.

Despite the advantages, online validation methods are not without challenges. Reliance on digital data can introduce biases, particularly in terms of market representativeness and data reliability. The digital divide may also skew insights, overlooking segments of the population less active online. Furthermore, the rapid evolution of digital tools necessitates ongoing learning and adaptation by businesses, posing a potential barrier to entry for those with limited digital literacy.

### Limitation and future research

This study, while comprehensive in its exploration of online methods and tools for validating and testing business ideas, is subject to certain limitations inherent to the scope and methodology adopted. Firstly, the usage on web-based resources, while beneficial for capturing contemporary practices and digital tool advancements, may introduce a bias towards more technologically driven validation methods, potentially overlooking traditional yet still relevant approaches. Secondly, the rapidly evolving nature of digital platforms and online tools presents a challenge in maintaining the currency and applicability of our findings. New tools and methodologies are continually being developed, and the landscape of digital validation and testing is subject to frequent changes, which may limit the long-term applicability of our conclusions.

Furthermore, our study's focus on online methods may not fully encapsulate the complexities and nuances of business idea validation and testing within specific industry contexts. Different sectors may have unique requirements and challenges that are not fully addressed by general online tools, necessitating a more tailored approach to validation and testing. Additionally, while we endeavored to systematically classify and correlate online validation and testing methods within the New Product Development (NPD) process, our analysis may not fully reflect the intricacies and interdependencies of these methods within the broader context of venture creation and product development. For example, the Agile Product Development (Varma, 2015) as a concept, may offer additional context for elaborating the explored methods and tools. Nevertheless, the study's attempt to bridge this gap in the literature is an initial step, and further research is needed to develop a more nuanced understanding of how these methods integrate into the holistic process of business and product development.

In light of these limitations, future research should aim to expand the scope of investigation to include a broader array of validation and testing methods, both online and offline, and explore their applicability across different industry contexts. Additionally, longitudinal studies could provide valuable insights into the long-term efficacy and evolution of online validation and testing tools, contributing to a more dynamic and adaptable framework for business idea validation. Idea validation and testing frameworks for specific scenarios, industries and product types also could be developed.

The future of online validation methods is likely to be shaped by advancements in AI, machine learning, big data and data mining tools, offering even more sophisticated approach for market analysis and customer insight. The integration of AI can enhance predictive analytics, providing deeper insights into consumer behavior and potentially revolutionizing the validation process. However, this also raises ethical considerations regarding data privacy and the need for transparent AI methodologies.

## 6. CONCLUSIONS

The advent of online methods and tools for testing and validating business ideas marks a pivotal shift in the entrepreneurial landscape. The digital era has introduced a plethora of platforms and resources that entrepreneurs and businesses can leverage to gather market insights, test hypotheses, and validate concepts with unprecedented efficiency and scale. These online methodologies, from social media analytics to crowd-sourcing platforms and virtual prototypes, have democratized access to market validation processes, enabling startups and small enterprises to compete more effectively with established entities.

This paper has delved into the nuances of how digital tools have not only democratized the process of market research but also introduced a new dynamism in New Product Development (NPD).

The accessibility and cost-effectiveness of online platforms empower startups and even established businesses to conduct extensive market research with minimal resources. This shift towards digital methods underscores a broader trend in business practices, where agility and adaptability are key. However, this digital transition is not without its challenges. The reliance on online methods may introduce biases, particularly in data collection and interpretation. Not all consumer segments are equally represented online, potentially leading to skewed insights. Moreover, the digital divide – the disparity in access to digital tools and technologies – poses a significant challenge, especially in developing regions.

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Despite these challenges, the integration of online methods in validating business ideas is undeniably beneficial. It allows for rapid testing and iteration, which is crucial in today's fast-paced market environments. Nonetheless, this paper suggests a balanced approach, where traditional methods and face-to-face interactions complement online tools to provide a holistic understanding of the market.

As we move forward, it is imperative for scholars, practitioners, and educators in the field of entrepreneurship and business development to continue exploring and refining these digital methodologies. The goal should be to enhance their reliability, inclusivity, and predictive power, ensuring that the digital revolution in business idea validation continues to be a force for innovation, competition, and growth in the global economy.

## REFERENCES

- Armstrong, G., Adam, S., Denize, S., & Kotler, P. (2014). *Principles of marketing*. Pearson Australia.
- Asmar, L., Grigoryan, K., Low, C. Y., Roeltgen, D., & Dumitrescu, R. (2021). Structuring framework for early validation of product ideas. *International Journal of Integrated Engineering*, 13(2), 229-240.
- Backaler, J. (2018). *Working with influencers: Potential paths to take*. In *Digital Influence: Unleash the Power of Influencer Marketing to Accelerate Your Global Business* (pp. 119-135). Springer.
- Bezhovski, Z., Janevski, Z., Apasieva, T. J., & Temjanovski, R. (2021). From traditional to online methods for generating business ideas. *Management Dynamics in the Knowledge Economy*, 9(3), 307-329.
- Bland, D. J., & Osterwalder, A. (2020). *Testing Business Ideas*. Wiley.
- Blank, S. (2013). *Why the Lean Start-Up Changes Everything*. Harvard Business Review.
- Blank, S., & Dorf, B. (2012). *The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company*. K&S Ranch.
- Castellion, G., & Markham, S. K. (2013). Perspective: New product failure rates: influence of argumentum ad populum and self-interest. *Journal of Product Innovation Management*, 30(5), 976-979. Wiley Online Library.
- Chen, Y., Fay, S., & Wang, Q. (2018). The Role of Marketing in Social Media: How Online Consumer Reviews Evolve. *Journal of Interactive Marketing*.
- Chumnumpan, P., & Shi, X. (2019). Understanding new products' market performance using Google Trends. *Australasian Marketing Journal (AMJ)*, 27(2), 91-103. Elsevier.
- Cooper, B., & Vlaskovits, P. (2010). *The Entrepreneur's Guide to Customer Development: A Cheat Sheet to the Four Steps to the Epiphany*. Customer Development Press.
- Crawford, M., & Benedetto, A. Di. (2015). *New products management*. McGraw-Hill.
- D'Angelo, M. (2019, June 30). Presale Strategy: How to Set Up a Successful Presale. *Business News Daily*; [businessnewsdaily.com. https://www.businessnewsdaily.com/15170-how-to-start-presale.html](https://www.businessnewsdaily.com/15170-how-to-start-presale.html)
- Datt, K. (2023) How to Successfully Launch a Product with Influencer Seeding. *Galleri5.com*. <https://www.galleri5.com/blog/how-to-successfully-launch-a-product-with-influencer-seeding>
- Datt, R. (2019, March 17). The Ultimate Series on How To Validate Your Business Idea — Keyword Research. *Medium*; *Start Your Side Hustle*. <https://medium.com/start-your-side-hustle/the-ultimate-series-on-how-to-validate-your-business-idea-keyword-research-e3e2da8f9f1d>
- De las Heras-Rosas, C., & Herrera, J. (2021). Innovation and competitive intelligence in business: A bibliometric analysis. *International Journal of Financial Studies*, 9(2), 31. MDPI.
- Dillen, Y., & Vandekerckhof, P. (2021). Does the sector matter? An analysis of high-growth firms and industry growth rates. *Journal of Small Business and Enterprise Development*, 28(6), 927-945. Emerald Publishing Limited.



ONLINE METHODS FOR VALIDATING AND TESTING ENTREPRENEURIAL IDEAS: A NEW PRODUCT DEVELOPMENT PERSPECTIVE

- Dolan, R. J., & Matthews, J. M. (1993). Maximizing the utility of customer product testing: Beta test design and management. *Journal of Product Innovation Management*, 10(4), 318-330. Wiley Online Library.
- Du, R. Y., & Hsieh, T.-Y. (2023). Leveraging online search data as a source of marketing insights. *Foundations and Trends® in Marketing*, 17(4), 227-291. Now Publishers, Inc.
- Duwe, D., Herrmann, F., & Spath, D. (2018). Forecasting the diffusion of product and technology innovations: Using google trends as an example. In 2018 *Portland International Conference on Management of Engineering and Technology (PICMET)*, 1-7. IEEE.
- Eid, R., & El-Gohary, H. (2013). The impact of E-marketing use on small business enterprises' marketing success. *The Service Industries Journal*, 33(1), 31-50. Taylor & Francis.
- EPAM Startups. (2024, January). New Product Development: Your 7-Step Journey to Success. Retrieved December 12, 1999, from <https://anywhere.epam.com/business/new-product-development-process-stages>.
- Evans, J. R., & Mathur, A. (2018). The value of online surveys: A look back and a look ahead. *Internet Research*, 28(4), 854-887. Emerald Publishing Limited.
- Fabijan, A., Olsson, H. H., & Bosch, J. (2015). Customer feedback and data collection techniques in software R&D: A literature review. In *Software Business: 6th International Conference, ICSOB 2015*, Braga, Portugal, June 10-12, 2015, Proceedings 6 (pp. 139-153). Springer.
- Facussé, L. Y. (2018). *Leveraging the indie movement in wellness through a waitlist aggregator*. Massachusetts Institute of Technology.
- Fleischmann, J. (April 13, 2021) Validate your product: 19 market testing and market validation tactics plus 7 tools for validating. *Indie Hackers*. <https://www.indiehackers.com/post/validate-your-product-19-market-testing-and-market-validation-tactics-plus-7-tools-for-validating-df82ddf259>
- Fleisher, C. S., & Bensoussan, B. E. (2015). *Business and competitive analysis: Effective application of new and classic methods*. FT Press.
- Furr, N., & Dyer, J. (2014). *The Innovator's Method: Bringing the Lean Start-up into Your Organization*. Harvard Business Review Press.
- Göcke, L., & Wenginger, R. (2021). Business model development and validation in digital entrepreneurship. *Digital Entrepreneurship*, 71.
- Golden, J., & Horton, J. J. (2021). The effects of search advertising on competitors: An experiment before a merger. *Management Science*, 67(1), 342-362. INFORMS.
- Goldstein, N. J., Martin, S. J., & Cialdini, R. B. (2014). *The small BIG: small changes that spark big influence*. Grand Central Publishing.
- Gozuacik, N., Sakar, C. O., & Ozcan, S. (2021). Social media-based opinion retrieval for product analysis using multi-task deep neural networks. *Expert Systems with Applications*, 183, 115388. Elsevier.
- Guillory, J., Kim, A., Murphy, J., Bradfield, B., Nonnemaker, J., & Hsieh, Y. (2016). Comparing Twitter and online panels for survey recruitment of e-cigarette users and smokers. *Journal of Medical Internet Research*, 18(11), e288. JMIR Publications Toronto, Canada.
- Haan, K. (2024, January 6). Best 3D Printing Services Of 2024. *Forbes*. <https://www.forbes.com/advisor/business/best-3d-printing-services/>
- He, W., Zha, S., & Li, L. (2013). Social media competitive analysis and text mining: A case study in the pizza industry. *International Journal of Information Management*, 33(3), 464-472. Elsevier.
- Jaakkola, E. (2020). Designing conceptual articles: four approaches. *AMS Review*, 10, 18-26. doi:<https://doi.org/10.1007/s13162-020-00161-0>

ONLINE METHODS FOR VALIDATING AND TESTING ENTREPRENEURIAL IDEAS: A NEW PRODUCT DEVELOPMENT PERSPECTIVE

- Jansen, B. J., Jung, S.-g., & Salminen, J. (2023). Employing large language models in survey research. *Natural Language Processing Journal*, 4, 100020. Elsevier.
- Jelassi, T., & Leenen, S. (2003). An E-Commerce Sales Model for Manufacturing Companies: A Conceptual Framework and a European Example. *European Management Journal*, 21(1), 38-47. Elsevier.
- Jovanov, T., Bezovski, Z., & Temjanovski, R. (2021). Market (ing) testing as a base for minimization of the business risk. *Macedonian International Journal of Marketing*, 7(13). Macedonian Marketing Association.
- Junge, L. B., Laursen, I. C., & Nielsen, K. R. (2022). Choosing crowdfunding: Why do entrepreneurs choose to engage in crowdfunding? *Technovation*, 111, 102385. Elsevier.
- Karras, O., Unger-Windeler, C., Glauer, L., & Schneider, K. (2017). Video as a by-product of digital prototyping: Capturing the dynamic aspect of interaction. In 2017 IEEE 25th International Requirements Engineering Conference Workshops (REW) (pp. 118-124). IEEE.
- Keith, D. R., Serman, J. D., & Struben, J. (2017). Supply constraints and waitlists in new product diffusion. *System Dynamics Review*, 33(3-4), 254-279. Wiley Online Library.
- Keith, D., & Struben, J. (2018) From excitement to frustration: The role of consumer waiting in new product launch. (DRAFT)
- Kettunen, P. (2009). Adopting key lessons from agile manufacturing to agile software product development—A comparative study. *Technovation*, 29(6-7), 408-422. Elsevier.
- Koen, P., Ajamian, G., Burkart, R., Clamen, A., Davidson, J., D'Amore, R., Elkins, C., Herald, K., Incorvia, M., & Johnson, A. (2001). Providing clarity and a common language to the “fuzzy front end”. *Research-Technology Management*, 44(2), 46-55. Taylor & Francis.
- Kohavi, R., & Longbotham, R. (2015). Online controlled experiments and A/B tests. In *Encyclopedia of Machine Learning and Data Mining* (pp. 1-11). Springer.
- Kohavi, R., Longbotham, R., Sommerfield, D., & Henne, R. M. (2009). Controlled experiments on the web: survey and practical guide. *Data mining and knowledge discovery*, 18, 140-181.
- Koning, R., Hasan, S., & Chatterji, A. (2022). Experimentation and start-up performance: Evidence from A/B testing. *Management Science*, 68(9), 6434-6453. INFORMS.
- Kuutti, K., Battarbee, K., Sade, S., Mattelmaki, T., Keinonen, T., Teirikko, T., & Tornberg, A.-M. (2001). Virtual prototypes in usability testing. In Proceedings of the 34th Annual Hawaii International Conference on System Sciences (pp. 7). IEEE.
- Lai, G., Liu, H., Xiao, W., & Zhao, X. (2018). 'Fulfilled by Amazon': A strategic perspective of competition at the e-commerce platform. Available at SSRN 3270958.
- Lauff, C. A., Kotys-Schwartz, D., & Rentschler, M. E. (2018). What is a prototype? What are the roles of prototypes in companies? *Journal of Mechanical Design*, 140(6), 061102. American Society of Mechanical Engineers.
- Lavery, M., & Littel, C. (2020). [eTextbook] Entrepreneurship.
- Lenarduzzi, V., & Taibi, D. (2016). MVP explained: A systematic mapping study on the definitions of minimal viable product. In 2016 42th Euromicro Conference on Software Engineering and Advanced Applications (SEAA) (pp. 112-119). IEEE.
- MacPherson, L. (2019, October 24). Sell It Before You Build It — How to Presell Your New Product Idea -. Designli.co; Designli LLC. <https://designli.co/blog/sell-it-before-you-build-it-how-to-presell-your-new-product-idea/>
- Maurya, A. (2012). *Running Lean: Iterate from Plan A to a Plan That Works*. O'Reilly Media.

ONLINE METHODS FOR VALIDATING AND TESTING ENTREPRENEURIAL IDEAS: A NEW PRODUCT DEVELOPMENT PERSPECTIVE

- Mavragani, A., & Ochoa, G. (2019). Google Trends in infodemiology and infoveillance: Methodology framework. *JMIR Public Health and Surveillance*, 5(2), e13439. JMIR Publications Inc., Toronto, Canada.
- Meyer, C., & Schwager, A. (2007). Understanding customer experience. *Harvard Business Review*, 85(2), 116.
- Moogk, D. R. (2012). Minimum viable product and the importance of experimentation in technology startups. *Technology Innovation Management Review*, 2(3).
- Mullin, S. (2022, November 18). The Complete Guide to A/B Testing: Expert Tips From Google, HubSpot, and More. *Shopify*. <https://www.shopify.com/blog/the-complete-guide-to-ab-testing#9>
- Ncube, M. (2018, May 2). 4 Tips To Validate A Startup Idea With Google AdWords. *MikeNcube.co.uk* <https://www.mikencube.co.uk/4-tips-to-validate-a-startup-idea-with-google-adwords/>.
- Nissinen, T. (2015). User experience prototyping: A literature review.
- Ohly, S., Kase, R., & Škerlavaj, M. (2010). Networks for generating and for validating ideas: The social side of creativity. *Innovation*, 12(1), 41-52. Routledge.
- Olsson, H. H., & Bosch, J. (2015). Towards continuous customer validation: A conceptual model for combining qualitative customer feedback with quantitative customer observation. In *Software Business: 6th International Conference, ICSOB 2015, Braga, Portugal, June 10-12, 2015, Proceedings 6* (pp. 154-166). Springer.
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers (1st ed.)*. John Wiley & Sons.
- Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2014). *Value Proposition Design: How to Create Products and Services Customers Want*. Wiley.
- Petráš, R., Vaňová, J., Horváthová, M., & Mrva, M. (2019). Idea validation for an acceleration program connected with equity-based crowdfunding. In *EAI International Conference on Technology, Innovation, Entrepreneurship and Education: TIE'2017* (pp. 163-178). Springer.
- Quin, F., Weyns, D., Galster, M., & Silva, C. C. (2023). A/B testing: A systematic literature review. *arXiv preprint arXiv:2308.04929*.
- Rebelo, M. (2024, January 2). The 6 best online payment processing services in 2024. *Zapier.com*; Zapier. <https://zapier.com/blog/best-payment-gateways/>
- Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. Crown Publishing Group.
- Ruth, K., Fass, A., Azose, J., Pearson, M., Thomas, E., Sadowski, C., Durumeric, Z. (2022). A worldwide view of browsing the world wide web. In *Proceedings of the 22nd ACM Internet Measurement Conference*, 317-336.
- Salminen, J., & Degbey, W. Y. (2015). Social Media Espionage—A Strategic Grid. In *New Technology-Based Firms in the New Millennium* (pp. 261-274). Emerald Group Publishing Limited.
- Schaer, O., Kourentzes, N., & Fildes, R. (2019). Demand forecasting with user-generated online information. *International Journal of Forecasting*, 35(1), 197-212. Elsevier.
- Schermann, G., Schöni, D., Leitner, P., & Gall, H. C. (2016). Bifrost: Supporting continuous deployment with automated enactment of multi-phase live testing strategies. In *Proceedings of the 17th International Middleware Conference* (pp. 1-14).
- Schmidt, Torsten & Vosen, Simeon. (2009). Forecasting Private Consumption: Survey-Based Indicators vs. Google Trends. *Journal of Forecasting*. 30. 10.2139/ssrn.1514369.
- Semrush. Published October 26, 2018. Accessed January 18, 2024. <https://www.semrush.com/kb/873-analyze-competitors-advertising-strategy>

- Siliverstovs, B., & Wochner, D. S. (2018). Google Trends and reality: Do the proportions match?: Appraising the informational value of online search behavior: Evidence from Swiss tourism regions. *Journal of Economic Behavior & Organization*, 145, 1-23. Elsevier.
- Similarweb*. Published 2024. Accessed January 7, 2024. <https://www.similarweb.com/top-websites/>
- Standing, C., & Kiniti, S. (2011). How can organizations use wikis for innovation? *Technovation*, 31(7), 287-295. Elsevier.
- Stevenson, R., Allen, J., & Wang, T. (2022). Failed but validated? The effect of market validation on persistence and performance after a crowdfunding failure. *Journal of Business Venturing*, 37(2), 106175. Elsevier.
- Storm, M. (2021) Where Are My Competitors Advertising? [6 Competitor Analysis Tools]. *WebFX*. Published 2021. Accessed January 18, 2024. <https://www.webfx.com/blog/marketing/where-are-my-competitors-advertising/>
- Tauqeer, M. A., & Bang, K. E. (2019). A tool for idea screening by assortment of existing literature. In ISPIIM Conference Proceedings, 1-9. *The International Society for Professional Innovation Management (ISPIIM)*.
- Toubia, O., & Florès, L. (2007). Adaptive idea screening using consumers. *Marketing Science*, 26(3), 342-360. INFORMS.
- Varma, T. (2015). *Agile product development: How to design innovative products that create customer value*. Apress.
- Vasthimal, D. K., Srirama, P. K., & Akkinapalli, A. K. (2019). Scalable data reporting platform for A/B tests. In 2019 IEEE 5th Intl Conference on Big Data Security on Cloud (BigDataSecurity), IEEE Intl Conference on High Performance and Smart Computing,(HPSC) and IEEE Intl Conference on Intelligent Data and Security (IDS) (pp. 230-238). IEEE.
- Vosen, S., & Schmidt, T. (2011). Forecasting private consumption: survey-based indicators vs. Google trends. *Journal of Forecasting*, 30(6), 565-578. Wiley Online Library.
- Wagner, C., & Bolloju, N. (2005). Supporting knowledge management in organizations with conversational technologies: Discussion forums, weblogs, and wikis. *Journal of Database Management*, 16(2), 1. IGI Global.
- Woock, K., Karrin Sehmbi, & Karrin Sehmbi. (2023, February 6). Best Payment Gateways of January 2024 - NerdWallet. *NerdWallet*. <https://www.nerdwallet.com/best/small-business/payment-gateways>
- Yilmaz, B. (2024), Top 12 ChatGPT Survey Research Use Cases in 2024. *AIMultiple*. Published 2024. Accessed January 19, 2024. <https://research.aimultiple.com/chatgpt-survey/>
- Zhang, B., Mildenerger, M., Howe, P. D., Marlon, J., Rosenthal, S. A., Leiserowitz, A. (2020). Quota sampling using Facebook advertisements. *Political Science Research and Methods*, 8(3), 558-564. Cambridge University Press.