International Journal of Data Analytics Research and Development (IJDARD)

Volume 1, Issue 1, January-December 2023, pp. 24–41, Article ID: IJDARD_01_01_003 Available online at https://iaeme.com/Home/issue/IJDARD?Volume=1&Issue=1 Journal ID: 97A6-7C77



© IAEME Publication

THE CRUCIAL ROLE OF DATA IN GROWING PRODUCTS FROM 0 TO 1: A COMPREHENSIVE ANALYSIS

Sharan Siddhartha Microsoft Inc, United States

Amritha Arun Babu Mysore

Amazon, Inc., United States

Patra, Robin ARCO Construction Inc, United States

Deshpande, Ameya Google/Alphabet Inc., United States

Agarwal, Vikrant Meta Platforms Inc, United States

Avvari, Vindhya University of Southern California, United States

> **Choudhury, Abhik** IBM, Inc, United States

ABSTRACT

This research paper explores the pivotal role of data in the process of growing products from their inception (0) to achieving market success (1). It examines how data-driven decision-making, customer insights, and iterative development can lead to successful product growth. The paper also highlights real-world examples and best practices to illustrate the importance of data in this journey.

Launching a new product requires deeply understanding users and finding productmarket fit through continuous discovery and testing. To measure adoption and guide development, teams need to identify key metrics and build data pipelines early on.

The Crucial Role of Data in Growing Products from 0 To 1: A Comprehensive Analysis

During product development it is key to identify what are the Level 0 directional or north star metrics (<u>ref. Exhibit 2</u>) that provides initial insights into acquisition, activation, retention, referral, engagement and funnel. The generation of these metrics require designing a flexible data and business instrumentation architecture in place that can channel the qualitative user feedback on the product.

These behavioral and product usage metrics indicate whether the product resonates with its target audience. Data also informs prioritization of features to double down on what provides core value. As adoption accelerates within a specific user target segment, customer cohorts reveal patterns on who finds the product most engaging. With indications of product-market fit, teams expand data collection through surveys, interviews and research.

The product and data architecture design should take into account providing appropriate transparency and controls to the customers to control the data privacy(refer. <u>Importance of data privacy</u>). Throughout the 0 to 1 journey, data offers signals to guide development and growth of the product. In this paper - we will dive into the fundamentals of how data is generated, analyzed, applied ethically to drive product growth and enable business decisions.

Keywords: Product Growth, Data-driven Decision-making, Product-Market Fit, User Metrics and Data Privacy

Cite this Article: Sharan Siddhartha; Amritha Arun Babu Mysore; Patra, Robin; Deshpande, Ameya; Agarwal, Vikrant; Avvari, Vindhya and Choudhury, Abhik, The Crucial Role of Data in Growing Products from 0 To 1: A Comprehensive Analysis, International Journal of Data Analytics Research and Development (IJDARD), 1(1), 2023, pp. 24–41. https://iaeme.com/Home/issue/IJDARD?Volume=1&Issue=1

1. INTRODUCTION

• The significance of data in modern business

Data helps critically in driving the business model for an early stage product. As data generated by products has grown exponentially and the speed or frequency with which data are recorded and analyzed (velocity), and the reliability of the captured data (veracity; e.g. <u>Chen et al., 2017;</u> <u>Hartmann et al., 2016; Schroeder, 2016; Yoo, 2015</u>). Organizations and companies which use data to drive business have a huge advantage over organizations who don't <u>Chen et al. (2017)</u>. This view is supported by empirical findings, which suggest that firms leveraging BD outperform those that do not in terms of both productivity and profitability (<u>McAfee and Brynjolfsson, 2012;</u> <u>Quaadgras et al., 2014</u>).

• Purpose and scope of this article

The purpose of this article is to help understand what kind of data is helpful when you are planning to launch a product and what kind of data could distract from your end objective. The scope of this article is limited to the real-life use cases while ensuring that intellectual property is maintained.

With respect to value of data in getting products from 0 to 1, studies emphasize the value potential of data for the improvement of managerial decision-making (e.g. Loebbecke and Picot, 2015), the optimization of internal processes (e.g. Ehret and Wirtz, 2017; Yue et al., 2015), and the prediction and proactive handling of critical events (e.g. Chandy et al., 2017; Chen et al., 2017).

Data can be used for testing initial hypotheses and ideation. As an example, when the first iphone came out, Steve Jobs product as <u>"An iPod, a phone and internet communicator. An iPod, a phone, are you getting it?</u>. The hypothesis which needed to be tested was that will users part with their money for a phone which is also a complete web browser and a music player. Earlier, these function were carried out by three different devices. In this article, we help to create frameworks around those hypothesis which can be tested by data. Benchmarking for existing similar products, dog fooding or internal usage analysis of early products to understand trends

2. DATA AS THE DRIVING FORCE

Data has become a vital strategic asset across industries, providing fuel for optimization, innovation and digital transformation. Companies that effectively collect, analyze, and act on data will gain competitive advantages in their markets.

• Data as a strategic asset

- Leading companies like Amazon, Google, and Uber have built their success on data-driven insights about customers and markets. Their business models are underpinned by data.
- In manufacturing, data from sensors and smart production systems is optimizing supply chains, improving quality control, and enabling predictive maintenance.
- For retailers, customer data allows personalized recommendations and optimized pricing. Granular data aids inventory and supply chain management.
- In healthcare, patient data is driving precision medicine and improved clinical outcomes. Data analytics enhances resource planning and hospital operations

• The transformative power of data

- Data-driven analytics and automation is reshaping industries from banking to agriculture. In financial services, AI fraud detection and algorithmic trading are transforming operations.
- Telematics and IoT data help insurance companies price policies based on real-time driver behavior and risk profiles. Claims processing is automated using AI.
- Smart factories collect massive production data to spot defects, enhance efficiency, and simulate designs increasing output.

• The relationship between data and innovation

- Online leaders like Netflix and Spotify use customer data to develop personalized content recommendations that keep users engaged. The better their data, the better product innovations.
- Autonomous vehicles rely on capturing and analyzing sensor data to improve navigation and safety features. Data fuels innovation in self-driving technology.
- In agriculture, sensor data helps farmers optimize inputs and increase yield. Data enables innovation in precision agriculture.
- Manufacturing & Supply Chain are interlinked but most of the time the supply chain is outsourced by the parent manufacturing company. This led to major product distribution issues , understanding customer issues & needs and hinders innovation.

Integrating Manufacturing and Supply Chain with Data is one of the major industrial revolutions and innovations that major organizations are undertaking

Across sectors, data provides insights to identify problems and opportunities to drive innovation. Companies that build data-driven ecosystems will continue leading digital disruption.

3. DATA COLLECTION AND ANALYSIS STRATEGIES

• Gathering and harnessing relevant data sources

- Data collection and harnessing is one of the most important facets of data driven product development. Data provides the foundation for informed decision-making. By collecting and analyzing data, product development teams can make decisions based on evidence and insights rather than gut feelings or assumptions. Understanding user behavior and preferences through data allows for user-centric product design. This means tailoring the product to meet the needs and expectations of the target audience, leading to a better user experience. When developing new features or making changes, hypotheses can be tested and validated using data. This minimizes the risk of investing time and resources in features that may not resonate with users.
- Data can inform product development by providing insights into market trends, competition, and customer demand. This information is invaluable when defining a product's positioning and unique selling points. It enables teams to measure key performance indicators (KPIs) such as user engagement, retention, conversion rates, and revenue, which are crucial for evaluating a product's success. Companies that effectively collect, analyze, and harness data can gain a competitive advantage. Data-driven decision-making often leads to better products, which can outperform competitors in the market.
- In the subsequent sections, we will explore various data collection techniques, their best practices and potential risks and how to mitigate them.

• Different types of data (qualitative, quantitative, behavioral)

• Qualitative data:

Qualitative data is pivotal in product development for comprehensive user understanding, driving innovation, and iterative refinement. It provides deeper insights into user needs and pain points, leading to innovative solutions. Through qualitative feedback, such as privacy concerns in a messaging app, teams prioritize robust encryption and enhanced data control. This approach addresses the "why" behind user issues, potentially offering a competitive edge. Qualitative data not only shapes user personas but also guides design decisions, ensuring products align closely with user expectations. In essence, it empowers user-centric development, fostering solutions that genuinely resonate with users and enhance overall product success.

- Examples of qualitative data
- **Behavioral data:** Behavioral data is pivotal in understanding user interactions with a product, gathered through event tracking, logs, and activity records. This data reveals user behavior, aiding data-driven decisions and offering significant advantages in product development.

• Quantitative data:

Quantitative data in product development involves numerical measurements, gathered through surveys, analytics tools, and automated tracking. It includes user metrics, ratings, counts, and percentages. This data is vital for product development due to its objectivity, enabling comparisons, data-driven decision-making, performance evaluation, A/B testing, and experimentation.

It facilitates monitoring user engagement, usage patterns, and retention metrics, revealing how users interact with features and pathways. Additionally, it tracks conversion rates for specific actions. Overall, quantitative data forms the backbone for evaluating product performance, guiding iterative improvements, and optimizing user experience by providing empirical evidence for decision-making and innovation in the product development process.

- Examples of quantitative data:
 - Demographic data: Demographic data collection involves using surveys/questionnaires to gather details like age, gender, income, and CRM data such as personal information, purchase history, feedback. Platforms like SurveyMonkey, Google Forms help create surveys, while CRM systems like Salesforce provide APIs for data extraction, necessitating data cleaning for consistency.
 - Psychographic/ Technological Data Collection: Psychographic and technological data collection methods include lifestyle surveys to gather insights from open-ended questions using text analysis tools like Python's NLTK or spaCy. Social listening involves monitoring online conversations and using web scraping techniques or APIs like Scrapy to collect data. Mobile app usage data is obtained via SDKs like Google Analytics for Firebase, while IoT devices and sensors offer real-time data insights by ingesting data into platforms such as AWS IoT or Azure IoT Hub. These methods provide valuable customer behavior and preference insights.
 - **Customer Service Interactions**: Analyze customer service interactions, including call logs, chats, or emails, to understand concerns, issues, and preferences. Integrate call logging systems with analytics tools to extract insights and patterns from customer service calls. Subsequently apply NLP to transcribed call data for sentiment analysis and topic modeling.

Behavioral Data Collection:

Behavioral Data Collection involves tracking customer behavior across various platforms.

- Website Analytics: Utilize tools like Google Analytics to monitor page views, sessions, and user behavior. Implement event tracking and custom JavaScript to capture specific actions on the website.
- **Purchase History:** Collect data on past purchases, frequency, and preferences. E-commerce platforms provide APIs for extracting purchase data. Store transactional data in a data warehouse for analysis.
- **Social Media Monitoring:** Analyze interactions, comments, and sentiment on platforms like Facebook and Twitter. Use APIs for social listening tools or custom solutions for data collection and sentiment analysis.

• Customized data analysis techniques for product growth

Some of the key reasons why behavioral data is crucial in product development include:

- <u>Cohort Analysis/ Customer segmentation:</u> Cohort analysis allows examining user groups with shared characteristics (e.g., new users, power users, different demographics). Identify trends, such as retention rates and engagement, for each cohort to better target your marketing and product efforts. Segmentation allows create custom segments based on user behaviors, preferences, and demographics. Analyze each segment separately to develop personalized marketing strategies, content, and product features to cater to their unique needs.
- <u>Event Tracking:</u> Customize event tracking helps capture specific user interactions within your product. Track events that are crucial for your product's growth and identify patterns and trends in user behavior related to these events.
- <u>Conversion Funnel Analysis:</u> Tailor your conversion funnel analysis to your product's specific conversion goals, such as sign-ups, purchases, or feature adoption. Optimize the funnel by identifying where users drop off and implementing strategies to improve conversion rates.
- <u>User Path Analysis:</u> Analyze the paths users take within your product. Customize this analysis to understand how users navigate your product, which features they engage with, and where they encounter roadblocks or friction in their journeys.
- <u>Predictive Analytics:</u> Develop custom predictive models based on your product's specific data and user behavior. Predict future user actions, such as churn, to proactively address issues and optimize retention strategies.
- <u>A/B Testing:</u> Customize your A/B testing experiments to test variations of specific product features or changes. Tailor your experiments to focus on what matters most for your product's growth, whether it's user engagement, conversion rates, or revenue.
- <u>Time Series Analysis:</u> Customize time series analysis to evaluate product growth trends over time. Identify seasonality, long-term patterns, and correlations with external events that impact your product.
- <u>Attribution Modeling:</u>Create custom attribution models to understand the contribution of different marketing channels or touchpoints to your product's growth. This helps optimize your marketing spend and strategies.
- <u>Sentiment Analysis:</u> Customize sentiment analysis to monitor user feedback, reviews, and social media mentions specific to your product. Understand the sentiment and opinions of users to address concerns and highlight positive feedback.
- <u>LTV (Lifetime Value)</u> analysis to your product's revenue streams for informed decisions on customer acquisition and retention strategies. Customize market basket analysis to uncover product relationships, identifying cross-selling opportunities. Optimize your funnel strategy by focusing on user drop-off points and apply tailored interventions. Create custom customer journey maps to highlight unique user touchpoints and improve user experience. Customize geospatial analysis to understand user behavior and preferences by location, aiding targeted product and marketing optimizations for specific regions. These tailored analyses empower data-driven decisions, boosting revenue and refining user experiences, addressing specific user needs and preferences.

Conclusion: Customized data analysis techniques are highly valuable for product growth because they allow you to tailor your insights and strategies to your product's unique characteristics and objectives. By analyzing and interpreting your data in ways that are directly relevant to your product, you can make more effective decisions and drive growth in a targeted and efficient manner.

Incorporating behavioral data in product development significantly improves user experiences, feature effectiveness, and overall product performance.

4. CUSTOMER-CENTRIC DATA

Building a successful product vision should always stem from working backwards on an unmet customer need. Hence it is critical for the teams to deeply understand user needs, journey, motivations and behaviors. The product discovery requires usage of quantitative and qualitative insights on the voice of the customer. These are typically achieved by conducting in-depth interviews and survey and ethnographic research to reveal identification of true customer personas and paint a picture of the target user's journey.

These perspectives guide development of user personas that capture key attributes, pain points and requirements. With a foundation of qualitative data, teams can define behavioral and engagement metrics to quantify unmet customer needs, product performance for each cohort. Combining usage analytics with surveys and feedback loops closes the gap between what customers say they want and what they actually use. This mechanism of leveraging continuous customer feedback and data steers the product roadmap to provide the best user experience.

• Understanding the voice of the customer

- Gather customer feedback through surveys, user testing, and community forums (<u>Griffin & Hauser, 1993</u>).
- Analyze feedback and qualitative data to identify key jobs-to-be-done and pain points (<u>Ulwick, 2005</u>).
- Derive actionable user insights for product requirements (Griffin & Hauser, 1993).

• Creating actionable user profiles

- Segment users into personas based on behavior, needs, and attributes (Leavitt, 2006).
- Develop quantitative models of user behavior using techniques like clustering (<u>Dibb & Simkin, 2009</u>).
- Create journey maps to model key user experiences (<u>Halvorsrud et al., 2016</u>).

• Leveraging data for user-centric product development

- Discover user needs
 - Conduct qualitative research like ethnographic studies, interviews, and open-ended surveys to uncover user pain points and needs (Tullis & Albert, 2013).
 - Analyze behavioral data like website analytics to identify usability issues and usage patterns (Palomino & Paz, 2021).
 - Synthesize key insights on user problems and motivations (<u>Dam & Siang, 2022</u>).
- Conceptualize Solutions
 - Prioritize ideas based on estimated user impact, value, and effort using data-driven evaluation techniques like RICE scoring (<u>Wan & Tan, 2020</u>).
 - Develop testable hypotheses on what solutions will effectively address user needs (<u>Brunswicker & Hutschek, 2010</u>).

- Build Minimum Viable Product (MVP)
 - Build clickable prototypes and MVP to test hypotheses (<u>Ries, 2011</u>).
 - Gather qualitative feedback through activities like usability testing and open-ended interviews (<u>Tullis & Albert, 2013</u>).
 - Analyze usage data like clicks, conversions, and retention to identify improvements (<u>Ries, 2011</u>).
 - Rapidly iterate based on tests and data to refine MVP (<u>Rodríguez et al., 2016</u>).
- Optimize Product-Market Fit
 - Conduct A/B testing and controlled experiments to optimize user experience (<u>Young., 2014</u>).
 - Analyze cohort data and core product metrics to diagnose adoption bottlenecks (<u>Chen et al., 2012</u>).
 - Continuously improve product based on user insights and impact data.
- Support Data-Driven Culture
 - Provide analytics training and resources to product teams (Xu et al., 2016).
 - Build data requirements into product development processes (<u>Loukides, 2012</u>).
 - Foster cross-functional collaboration between product, engineering, and data teams (Jones et al., 2020).

5. THE ITERATIVE APPROACH

Taking a product from initial idea to full launch relies heavily on data to drive iterative prototyping, experimentation, and validation (<u>Ries, 2011</u>). This iterative, data-informed approach enables organizations to effectively build products users want and scale adoption (<u>Blank & Dorf, 2012</u>; <u>Eisenmann et al., 2012</u>). Key iterative phases where data analytics informs product development include:

- **Prototyping**: Early prototypes and mockups based on initial user research help form hypotheses about effective solutions (<u>Brown, 2008</u>). These are tested with target users to gather feedback, refine prototypes, and validate hypotheses.
- Minimum Viable Product (MVP): Usage data and direct user feedback from an MVP provides a validated learning loop (<u>Ries, 2011</u>) to identify key features and fixes to build first. Rapid experimentation validates hypothesized priority features.
- **Optimization**: Controlled A/B tests enable ongoing experimentation and hypothesis testing to optimize conversion and engagement (Kohavi et al., 2009). Analytics and user input guide iteration.
- **Scale-up**: Cohort analyses, growth metrics, and usage data evaluate product-market fit and systematic opportunities to improve retention and referral as products scale (<u>Denis,2016</u>).
- **Demonstrating Value**: Metrics demonstrating traction, engagement, and ROI establish credibility when fundraising and selling to customers (<u>Graham, 2022</u>). Analyses like cohort studies powerfully benchmark progress.
- **Data Culture**: Ultimately, valuing data measurement organizationally ensures it informs all decision-making (<u>McAfee & Brynjolfsson, 2012</u>). This is critical for utilizing data throughout product development.
- **Innovation**: Clickstream analytics, surveys, and qualitative insights uncover evolving user needs and enable hypothesis generation for future innovations.

Data is indispensable for modern products to meet user needs and drive sustainable adoption and growth. At each phase, insights from experiments and data analytics inform rapid iterations and steering product development based on validated learning (<u>Ries, 2011</u>). This agile, iterative use of data thereby enables organizations to build the right product for the market.

6. REAL-WORLD EXAMPLES

• Examining success stories of product growth

• Social media:

- A large social media company was doing a major redesign of one of their integrations which will lead to better navigation and usage experience for end users. To track the impact of the program, the product team needed to collect data on a variety of metrics including:
 - 1. User volume: Number of users going to the new version interface, including individual areas of the sites. This will include metrics like number of clicks and types of users (new, existing and other segments0
 - 2. User intent: Time spent on the platform, number of value actions on the platform, return usage, median days used
 - 3. User satisfaction: Net promoter score rating for users, number of times when the users bounce off without performing even one single intentional action

In order to track these metrics, the social media company would need to build data pipelines focusing on user activity, user personas, user activations over a long-term period

• Retail :

- A large retail chain is launching a new product that allows customers to order products and have them delivered to their home. To track the success of the program, the retailer needs to collect data on a variety of metrics, including:
 - 1. Customer satisfaction: This includes metrics such as customer ratings, reviews, and Net Promoter Score (NPS).
 - 2. Order volume: This includes metrics such as the number of orders placed, the average order value, and the number of items sold.
 - 3. Delivery performance: This includes metrics such as on-time delivery rate, delivery time, and customer satisfaction with the delivery experience.
 - 4. Financial performance: This includes metrics such as revenue, profit, and cost per order.

In order to track the above metrics the retailer needs to build data pipelines, collect and process related data and develop a number of Data Pipelines:

These data pipelines will collect the data from different sources, such as the retail website, the retailer's order management system, and the delivery company's tracking system. The data pipelines will then clean and transform the data so that it can be analyzed and visualized in dashboards and reports.

Here are some examples of data pipelines that the retailer could build to collect and process the data needed to track the success of the retail program:

- 1. Customer behavior data pipeline: This data pipeline would collect data from the retail website, such as the number of visitors, the pages they view, and the products they add to their carts. The data would then be cleaned and transformed so that it could be analyzed to identify customer trends and preferences.
- 2. Order processing data pipeline: This data pipeline would collect data from the retailer's order management system, such as the time it takes to process an order, the number of orders that are canceled, and the number of orders that are returned. The data would then be cleaned and transformed so that it could be analyzed to identify areas for improvement in the order processing process.
- 3. Delivery data pipeline: This data pipeline would collect data from the delivery company's tracking system, such as the time it takes to deliver an order, the number of orders that are delivered late, and the number of orders that are lost or damaged. The data would then be cleaned and transformed so that it could be analyzed to identify areas for improvement in the delivery process.
- 4. Financial transactions data pipeline: This data pipeline would collect data from the retailer's financial system, such as the revenue generated from retail orders, the cost of goods sold, and the operating expenses associated with the program. The data would then be cleaned and transformed so that it could be analyzed to track the financial performance of the retail program.

By implementing a variety of business instrumentation metrics and data pipelines, the retailer can collect the data needed to track the success of the retail program and identify areas for improvement

• Wholesale drug distribution:

- In wholesale drug distribution, several key metrics are essential for evaluating success, monitoring performance, and making informed business decisions. These metrics help assess various aspects of the business, from operational efficiency to financial health and customer satisfaction. Here are some key metrics used in wholesale drug distribution:
- <u>Fill Rate:</u>The percentage of customer orders that are fulfilled completely from stock. A high fill rate indicates effective inventory management and the ability to meet customer demand promptly.
- <u>Order Accuracy</u>: The percentage of orders that are shipped accurately and without errors. High order accuracy signifies efficiency in order processing and minimizes returns or customer dissatisfaction.
- <u>Inventory Turnover:</u> The number of times inventory is sold or used in a specific period. High inventory turnover indicates that stock is moving efficiently and not being tied up in excess inventory, which can free up capital and reduce holding costs.
- <u>Average Order Size:</u> The average value of orders placed by customers. Understanding the average order size helps in pricing strategies, forecasting demand, and determining customer buying behavior.

- <u>On-Time Delivery Rate:</u> The percentage of orders delivered on time as promised to customers. High on-time delivery rates ensure customer satisfaction and build trust, contributing to a positive reputation.
- <u>Warehouse Capacity Utilization:</u> The percentage of available warehouse space being used. Efficient use of warehouse space helps in optimizing storage costs and streamlining operations.
- <u>Return Rate:</u> The percentage of products returned by customers. Monitoring return rates helps in assessing product quality, identifying issues with orders, and improving customer service.
- <u>Gross Margin and Profit Margins:</u> The percentage of revenue that remains after deducting the cost of goods sold (gross margin) or operating expenses (profit margin). Analyzing margins helps in understanding the profitability of the business and making informed decisions about pricing, cost control, and efficiency.
- <u>Days Sales Outstanding (DSO)</u>: The average number of days it takes to collect payment after a sale is made. Monitoring DSO helps in managing cash flow and assessing the efficiency of the credit and collections process.
- <u>Compliance Metrics:</u> Metrics related to adherence to regulatory standards such as Good Distribution Practice (GDP) and Good Manufacturing Practice (GMP). Compliance metrics ensure adherence to regulations, minimizing risks and maintaining the quality and integrity of distributed pharmaceuticals.
- <u>Customer Satisfaction and Retention:</u> Measures of customer feedback, satisfaction scores, and retention rates. Satisfied customers are more likely to continue doing business and recommend the distributor, contributing to long-term success.

These metrics collectively provide a comprehensive view of the operational efficiency, financial health, customer satisfaction, and regulatory compliance within a wholesale drug distribution business. Tracking and analyzing these metrics help in making informed decisions to improve performance and overall success.

• Gaming industry:

- A large gaming company is about to bring a new game to market. Typically, companies follow the AERM model (Acquisition, Engagement, Retention and Monetization)
 - Acquisition: They key metric in Acquisiton is tracking RoaS or Return on Ad spend. The goal is to make sure the return is more than the money you actually spend, over a certain time frame.
 - Engagement: This is the bread and butter that most people are familiar with. How many times someone finishes a level, the most popular character used etc.

- Retention: 10 years ago, it used to all be about acquisition and the cheapest way to do so. Since the cost of acquisition rose after Apples ATT changes, it's now more efficient to retain players in an immersive experience versus try to acquire new players while others keep churning out. This is typically measured in 3d / 30d / 90d retention.
- Monetization: This is the other bread and butter metric. ARPU (Average Revenue Per Player) and ARPPU (Average Revenue Per Paying Player)
- In addition the funnel metrics, another critical concept is A/B testing to understand new features. A lot of times, it is not possible to know what players would prefer. A red item or a blue item? A faster character or a stronger character? The easiest way to understand that is to run a A/B test or a multi variate test, so that the guesswork and human preferences is taken out of the decision.

• Education/Non-Profit Use Case:

- University is replacing a legacy system with a modern cloud solution. Measuring the success of the project involves assessing various aspects. Here are some key metrics and performance indicators that can help evaluate the success:
 - Satisfaction and Engagement: Conduct regular surveys to gather feedback from students, staff, Stakeholders about their IT experiences, including the usability of the new system, support service, and overall satisfaction.
 - IT Service Delivery Metrics: After the completion of transition and during the Hypercare phase, the IT team track metrics related to response times, issue resolution, and uptime to ensure efficient and reliable IT support.
 - Alignment with University Goals: Evaluate the extent to which the initiative aligns with the university's strategic goals and mission while adhering to data privacy regulations (e.g., GDPR, FERPA), to ensure the university meets its legal obligations.
 - Return on Investment (ROI): Evaluate the financial impact on the University by comparing the costs to the expected benefits. The savings are not limited to the monetary profits but also include savings in terms of maintenance costs, man-hours and the speed at which the organization can scale and recover in case of a disaster.

7. ETHICAL DATA UTILIZATION

• Data privacy and security considerations

Following aspects are considered while building a product from ground up.

• Privacy

- **Data collection:** Be transparent with users about what data you are collecting and how you will use it. Only collect the data that is necessary for your app to function.
- **Data Protection and storage:** Use robust security measures to protect user data from unauthorized access, use, or disclosure.
- **Data Access:** Allow users to access, correct, and delete their data at any time.

• **Data Sharing:** Be mindful of third-party data sharing. If you are sharing user data with third parties, be transparent with users about who you are sharing it with and how they will use it.

• Security

- Secure your app against common attacks. This includes attacks such as SQL injection, cross-site scripting, and cross-site request forgery.
- Regularly update your app and its dependencies. This will help to patch any security vulnerabilities that may be discovered.
- Implement a secure coding practice. This includes things like input validation and output encoding.
- Use a secure hosting provider. Make sure your app is hosted on a secure server with appropriate security measures in place.

• Legal

- Comply with all applicable laws and regulations. This includes laws and regulations related to privacy, security, and data protection.
- Get appropriate consent from users before collecting or using their data.
- Have a privacy policy and terms of service in place. These documents should explain to users how you will collect, use, and share their data.

• Compliance

- Compliance, in a general sense, refers to the adherence and conformance to laws, regulations, standards, or guidelines that are relevant to a specific industry, organization, or business operation. In the context of wholesale drug distribution, compliance covers various areas to ensure legal, ethical, and secure practices within the pharmaceutical supply chain. Here's an in-depth look at compliance in this sector.
- <u>Regulatory Compliance:</u>
- **FDA Regulations:** Wholesale drug distributors must comply with regulations set by the Food and Drug Administration (FDA) concerning the distribution, storage, handling, and documentation of pharmaceutical products.
- **Drug Supply Chain Security Act (DSCSA):** Compliance with this act requires tracing and tracking pharmaceutical products to ensure their authenticity, safeguarding against counterfeits, and managing product recalls effectively.
- <u>Good Distribution Practice (GDP):</u>
- GDP guidelines ensure that the wholesale distribution of medicinal products is performed in compliance with quality standards, maintaining the integrity of products and minimizing any risks inherent in the distribution process.
- Data Security and Privacy:
- HIPAA (Health Insurance Portability and Accountability Act): Pertaining more to healthcare providers, but relevant due to handling sensitive patient information, HIPAA regulates the privacy and security of patient data.
- General Data Protection Regulation (GDPR): If operating in the European Union, compliance with GDPR regarding the protection and privacy of personal data is essential.

The Crucial Role of Data in Growing Products from 0 To 1: A Comprehensive Analysis

- Quality Control and Assurance:
- Compliance involves maintaining high-quality standards throughout the supply chain to ensure the safety and efficacy of pharmaceutical products.
- Adherence to Good Manufacturing Practice (GMP) standards is crucial to ensure the quality and consistency of manufacturing processes.

• Tackling potential biases in data collection and analysis

I. Assess Data Collection Methods

- Review how user data is captured for possible sampling or measurement biases (<u>Paradis &</u> <u>O'Bien et al., 2016</u>).
- Examine if certain groups are underrepresented or disadvantaged in data collection (<u>Gebru</u> et al., 2018).
- Example: Online surveys oversample certain demographics based on digital access.

II. Evaluate Training Data Sets

- Check training data used in machine learning models for balance across groups (<u>Mehrabi</u> et al., 2022).
- Assess whether proxies could exclude or disadvantage certain populations (<u>Chen et al.</u>, <u>2022</u>).
- Example: Image datasets lack racial diversity.

III. Identify Possible Analysis Biases

- Recognize biases that could be introduced through data cleaning or statistical methods (Suresh & Guttag, 2021).
- Scrutinize default variables, assumptions, and hypotheses for bias (<u>Pessach & Shmueli</u>, <u>2020</u>).
- Example: Dropping outliers skews analysis of job salary data.

IV. Monitor Outputs for Fairness

- Proactively measure algorithmic systems for discriminatory outcomes (AI Ethics, 2022).
- Conduct bias audits on automated decisions and recommendations (Sandvig et al., 2014).
- Example: Review loan approval rates across demographic groups.
- V. Foster Organizational Awareness
 - Provide staff training on preventing bias in data work (<u>Holstein et al., 2019</u>).
 - Create simple checklists and guides to support unbiased data practices (<u>Borghi & Gulick</u> et al., 2022).
 - Cultivate an ethical data culture focused on fairness (<u>Mittelstadt et al., 2016</u>).

Ongoing scrutiny is required to detect biases throughout data pipelines. Cross-functional collaboration and training enables proactive mitigation of potential biases.

• Responsible data usage practices

The below framework helps in understanding responsible data usage practices.

- I. Collect Only Necessary Data
 - Minimize collection of personally identifiable information (PII) and sensitive data (<u>Richards & King, 2014</u>).
 - Carefully evaluate need before capturing each data element (Tene & Polonetsky, 2012).
 - Anonymize data by removing identifiers when possible (<u>Polonetsky & Tene, 2013</u>).
- II. Obtain User Consent
 - Be transparent about how data will be used (<u>Rossi & Lenzini, 2020</u>).
 - Provide clear opt-in consent for secondary uses beyond core functionality (<u>Burkhardt</u>, <u>2022</u>).
 - Allow users control through accessible privacy settings and permissions (Wang et al., 2022).

III. Apply Security Best Practices

- Implement robust technical controls like encryption to protect data (<u>Saltzer & Schroeder</u>, <u>1975</u>).
- Restrict data access to authorized users and uses (<u>NIST, 2022</u>).
- Continuously assess and address vulnerabilities proactively (ENISA, 2012).
- IV. Build in Privacy by Design
 - Incorporate privacy considerations early in system design (Cavoukian, 2009).
 - Adopt strategies like differential privacy and federated learning to preserve privacy (<u>Truong</u> et al., 2021).
 - Conduct privacy impact assessments on new data practices (<u>Puijenbroek, 2015</u>).

V. Practice Ethical Data Governance

- Appoint dedicated roles to oversee data practices and ethics (Floridi & Taddeo, 2016).
- Create a review process for new tools, algorithms, and models (<u>Mittelstadt et al., 2016</u>).
- Continually audit data practices for potential harms (Sivarajah et al., 2020).

VI. Promote Responsible Data Culture

- Provide ongoing staff training on ethical data use (<u>Diakopoulos et al., 2020</u>).
- Empower employees to question unethical practices (King & Richards, 2019).
- Model integrity in data-driven decision making (<u>Vakkuri et al., 2020</u>).

Responsible data utilization supports delivering value to users while avoiding harm, fostering trust, and upholding organizational values.

8. RECOMMENDATIONS FOR DATA-DRIVEN PRODUCT GROWTH

- Practical guidance for implementing data-driven approaches
- Steps to integrate data-centric strategies into the product development process

[Arjun]

- Define clear objectives Define the objectives clearly in the beginning itself. Once that is done align your data collection efforts with these objectives.
- Identify relevant data sources Identify the source of data that is relevant to your product and your target audience. Examples include customer feedback, user behavior data, market research data, competitor analysis etc.
- Establish data collection methods Define the data collections methods that align with our data sources and objectives. Examples include interviews, surveys, user analytics tools etc.
- Data analysis and interpretation Once the data is collected it needs to be analyzed properly using data analysis tools. This is done to identify any useful patterns, trends and areas of improvement.
- Make data driven decisions Once we are able to interpret the data based on the data analysis we did, use the insights to make informed decisions that drive the direction of our product growth. Use the insights to validate the assumptions, prioritize features and allocate resources effectively.
- Iterate and optimize Iterate and optimize the product based on ongoing data analysis by keeping a growth mindset always. Regularly monitor the Key Performance Indicators (KPIs) and user feedback to identify areas of improvement.
- Overcoming Challenges in implementing data driven strategies

Some of the common challenges are:

- Data quality Ensure the data is accurate and reliable.
- Data integration Integrate data from various data sources. Use the data integration tools available in the market to streamline the process.
- Privacy and security Ensure that the product comply with data privacy regulations and protect customer data.
- Data literacy Ensure that people working on the data have enough technical skills to do the data analysis. Consider even hiring technological experts if there are any knowledge gaps.

[Robin]

I. Build a Data-Literate Product Team

- Provide analytics training and skill-building to increase data acumen (Sara Brown., 2020).
- Hire data-oriented product managers, designers, and engineers (Loukides, 2012).
- Cultivate a culture focused on measuring and learning from data (McAfee & Brynjolfsson, 2012).

- II. Define Key Metrics and KPIs
- Identify key product metrics aligned to business goals like engagement, retention, and revenue (Farris et al., 2010).
- Establish metrics framework with input from stakeholders across the organization (Bukhari & Deraman, 2018).
- Continuously review metrics against desired outcomes and adjust if needed.

III. Embed Data Requirements Into Product Processes

- Add data collection, analysis, and experimentation steps to core product processes (<u>Rodríguez et al., 2016</u>).
- Require data-based justification for product decisions and prioritization (Jafarzadeh & Akbari, 2022).
- Conduct regular reviews of KPIs to inform product roadmap (Jones et al., 2020).

IV. Implement Infrastructure for Data Accessibility

- Build pipelines to make product usage and business data accessible (Ismail & Truong et al., 2019).
- Create dashboards and reports tailored for product team analysis (Grial Research Group, 2019).
- Enable flexible segmentation and querying to support dynamic product questions (<u>Haleem & Javaid, 2022</u>).
- V. Apply AI and ML for Deeper Insight
- Use machine learning for advanced analytics like churn prediction, clustering, and forecasting (Amershi et al., 2019).
- Automate personalization and recommendations via AI and ML (Chen et al., 2012).
- Supplement human analysis with AI to uncover deeper insights.

VI. Foster Cross-Functional Data Collaboration

- Break down data silos by sharing key metrics across teams (Kohavi et al., 2009).
- Develop relationships between product, engineering, analytics, and executive stakeholders (Lehtinen & Aaltonen et al., 2019).
- Align on common data models, metrics, and taxonomies (Loukides, 2012).

VII. Continuously Optimize Data Practices

- Dedicate resources to refine data collection, processing, and analysis (Braganza et al., 2017).
- Review processes to identify gaps, redundancies, and opportunities for improvement.
- Maintain focus on driving product value, not just collecting data (McAfee & Brynjolfsson, 2012).

VIII. Scale Data Insights Company-Wide

- Automate reporting to extend access to data insights (<u>Sarker, 2021</u>).
- Share compelling examples of data impact to promote broad adoption.
- Build self-serve data access tools to democratize analytics (Lefebvre & Legner et al., 2021).

Defining key metrics and KPIs that connect to business outcomes provides focus for datadriven product development and optimization.

REFERENCES

- Citing relevant sources and literature to support your arguments
 - 1. Building ETL systems for CRM
 - 2. Sentiment analysis for Customers
 - 3. Customer segmentation
 - 4. a/b testing and experimentation
 - 5. Time series analysis
 - 6. Geospatial analytics
 - 7. Big data streaming analytics
 - 8. HIPAA Privacy rules
 - 9. Mckinsey reference
 - 10. Importance of data privacy
 - 11. Chen et al., 2017
 - 12. Hartmann et al., 2016
 - 13. Schroeder, 2016; Yoo, 2015
 - 14. McAfee and Brynjolfsson, 2012
 - 15. Quaadgras et al., 2014
 - 16. An iPod, a phone and internet communicator. An iPod, a phone, are you getting it?.
 - 17. Griffin & Hauser, 1993
 - 18. Ulwick, 2005
 - 19. Leavitt, 2006
 - 20. Paradis & O'Bien et al., 2016

Citation: Sharan Siddhartha; Amritha Arun Babu Mysore; Patra, Robin; Deshpande, Ameya; Agarwal, Vikrant; Avvari, Vindhya and Choudhury, Abhik, The Crucial Role of Data in Growing Products from 0 To 1: A Comprehensive Analysis, International Journal of Data Analytics Research and Development (IJDARD), 1(1), 2023, pp. 24–41

Abstract Link:

https://iaeme.com/Home/article_id/IJDARD_01_01_003

Article Link:

https://iaeme.com/MasterAdmin/Journal_uploads/IJDARD/VOLUME_1_ISSUE_1/IJDARD_01_01_003.pdf

Copyright: © 2023 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0).



🖂 editor@iaeme.com