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Improving Operational Efficiency in Software Startups using Data Analytics

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ABSTRACT

Data analytics has become an essential component of decision-making in contemporary organizations, enabling businesses to make informed strategic and operational choices. However, unlike large and well-established software enterprises, many software startups have not fully leveraged the capabilities of analytics despite operating in highly dynamic and data-centric environments. Existing research provides limited insight into how analytics is interpreted and implemented within software startups, creating a significant knowledge gap in this domain.

This study aims to explore the role and understanding of analytics in software startup ecosystems. To achieve this objective, qualitative data was gathered from three widely adopted analytics platforms frequently utilized by startups. The collected data included platform documentation, user guidelines, and practical experience reports shared by startup organizations. Content analysis techniques were employed to systematically examine and interpret the information.

The findings revealed four major concepts that represent the practical understanding of analytics in software startups: analytics instrumentation, experimentation, diagnostic analysis, and insight generation. The first concept focuses on the configuration and integration of analytics systems, while the remaining concepts describe how startups utilize analytics to evaluate performance, identify issues, and derive actionable insights for business growth and product improvement.

The study further highlights that analytics assists startups in understanding customer behavior, improving product-market fit, optimizing marketing strategies, and supporting continuous experimentation. By integrating analytics into product development and business operations, startups can reduce uncertainty and make more effective strategic decisions. The findings also emphasize the importance of establishing a metrics-driven culture to enhance organizational performance and long-term sustainability.

This research contributes to the growing body of knowledge on software startup analytics by providing an initial conceptual understanding of analytics practices in startup environments. Furthermore, the identified concepts can serve as a foundation for future empirical studies and guide startups in implementing analytics-driven strategies for informed decision-making. Future work may include validation of these findings through direct interaction with software startup teams and industry practitioners.

Moreover, The adoption of analytics-driven approaches helps organizations improve innovation, enhance customer satisfaction, and optimize resource utilization. The research also emphasizes the growing importance of integrating analytical practices into startup ecosystems to support sustainable growth and long-term business success.

CCS CONCEPTS

Software and its engineering → Software creation and management

KEYWORDS

Software startups, Data Analytics, Business Intelligence, metrices, experimentation, diagnostic analysis, data-driven decision making

INTRODUCTION

In the modern digital economy, analytics has emerged as a significant factor in enhancing decision-making processes within software organizations. Businesses increasingly rely on analytical techniques to extract meaningful insights from large volumes of project and operational data. These insights support organizations in improving performance, optimizing business strategies, and adapting to rapidly changing market conditions. The growing importance of analytics has transformed traditional software business practices into more data-oriented approaches that emphasize informed and evidence-based decision-making.

Established software enterprises extensively utilize analytics due to their access to large-scale datasets, advanced infrastructure, and sufficient organizational resources. Through analytics, these organizations monitor project progress, evaluate customer behavior, and improve product quality and operational efficiency. As a result, analytics has become a core component of strategic planning and business growth in mature software companies.

In contrast, startup companies operate in highly uncertain and dynamic environments where innovation, rapid adaptation, and scalability are critical for survival. Software startups, in particular, focus on developing software-intensive products and services while simultaneously searching for sustainable and scalable business models. Unlike traditional companies, startups must make quick decisions with limited resources and incomplete market information. This environment requires startups to continuously learn from customer feedback, product usage, and market behavior. To manage uncertainty and accelerate product validation, software startups commonly adopt Lean Startup principles and Agile development methodologies.

These approaches encourage iterative development, continuous experimentation, and rapid feedback collection. During this process, startups often modify their products, target audiences, or business strategies in response to market insights and customer needs. Such strategic changes are commonly referred to as pivots. Pivoting may involve altering product features, redefining customer segments, improving user experience, or revising marketing and acquisition strategies.

Analytics can play a vital role in supporting these decisions by enabling startups to collect, monitor, and analyze relevant business and product data. Through analytics, startups can evaluate user engagement, measure product performance, identify operational issues, and make data-driven improvements.

Despite its potential importance, research on analytics in software startups remains limited. Existing studies have primarily focused on software development methodologies, entrepreneurial practices, and innovation management, while comparatively little attention has been given to the practical understanding and implementation of analytics in startup environments.

Therefore, there is a need to explore how software startups perceive and utilize analytics during product and business development activities. Understanding this relationship can provide valuable insights into how startups make informed decisions under uncertain conditions and how analytics contributes to their growth and sustainability.

The primary research question guiding this study is:

RQ: How is analytics understood in the software startup context? To address this research question, the present study adopts an exploratory approach using secondary qualitative data obtained from analytics platforms frequently used by software startups. The collected information includes platform documentation, usage guidelines, and experience reports from startup organizations. The findings of this study contribute to the emerging field of software startup research by identifying key areas where analytics supports product development, experimentation, and business decision-making. Furthermore, the study provides a conceptual foundation for future research on analytics-driven practices in software startup ecosystems.

2 RELATED WORK

Research on analytics in software startups is still limited compared to established software organizations. Existing studies mainly focus on challenges, metrics, and information management practices rather than providing a complete understanding of analytics in startup environments.

A study by Usman Rafiq et al. identified several common analytics-related mistakes in software startups, particularly in information collection, analysis, communication, and usage. These issues can negatively affect decision-making and startup growth.

Similarly, Berg et al. discussed the challenges faced by startups while implementing analytics, including limited resources, lack of expertise, privacy concerns, and insufficient data availability. Their study also highlighted that early-stage startups often struggle to apply advanced analytics effectively.

Other studies have focused on startup metrics and measurement practices. Kamulegeya et al. categorized startup metrics into business, product, organizational, project, and design metrics. Additionally, Kemell et al. reported a large number of metrics suitable for startup environments, although many were more applicable to mature startups.

3 RESEARCH METHOD

This study adopts an exploratory research approach due to the limited understanding of analytics in software startup environments. To develop an initial understanding of how startups perceive and utilize analytics, secondary qualitative data was collected from analytics platforms commonly used by software startups. The use of secondary data is considered effective for research conducted under limited time and resource constraints.

The collected data primarily consisted of textual information such as platform documentation, usage guidelines, and experience reports. To analyze the data, this study employed content analysis, a widely used qualitative research method suitable for areas with limited existing theory or knowledge.

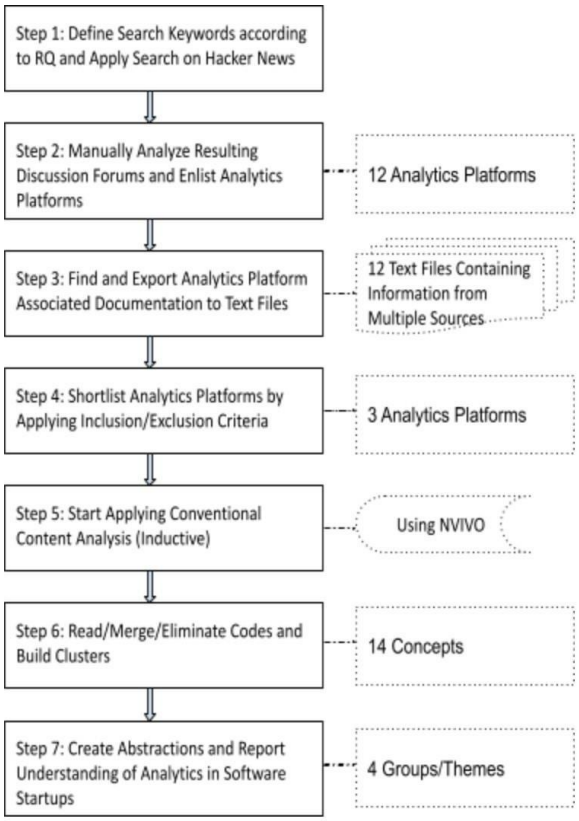

Figure 1: Data Collection and Analysis Procedure

Specifically, a conventional content analysis approach was applied to identify important themes and concepts related to analytics in software startups.

Figure 1 illustrates the overall process of data collection and analysis used in this study. The following subsections explain the procedures for data collection, filtering, and analysis in detail.

3.1 Data Collection

To address the research question, this study focused on analytics platforms commonly used by software startups. As an initial step, information regarding popular startup analytics tools was gathered from discussions on Hacker News, a widely recognized platform within the startup and technology community. Search keywords such as *analytics*, *metrics*, and *startups* were used to identify relevant discussions and recommendations.

Search terms such as *analytics*, *metrics*, and *startups* were used to identify discussions related to analytics practices in startups. Manual examination of these discussions helped in identifying several analytics platforms frequently mentioned by startup communities. These discussions also provided insights into platform features, implementation practices, comparisons, and real-world usage scenarios.

The identified platforms included both open-source and proprietary analytics solutions such as Amplitude, Mixpanel, Google Analytics, Plausible, Matomo, and several others. After identifying these platforms, detailed information was collected from their official websites, technical documentation, blogs, user testimonials, and developer resources. Additional information was also obtained from GitHub repositories, especially for open-source platforms where implementation guides and community discussions were available. To strengthen the reliability of the collected data, the study further explored G2, a trusted software review platform containing feedback from real users and organizations. The information from G2 helped in validating platform popularity, usability, and adoption among startup companies Based on predefined inclusion and exclusion criteria, three

analytics platforms were selected for the final dataset:

1. Amplitude
2. Mixpanel
3. Plausible

The selection criteria included platform maturity, active usage within startup communities, availability of extensive documentation, and the presence of startup-related implementation stories and experiences. In total, the final dataset consisted of qualitative textual data and multiple startup experience reports describing how analytics was implemented and utilized in software startup environments.

3.2 Data Analysis

This study employed content analysis, a qualitative research method, to analyze the collected textual data. Content analysis is widely used in software engineering research for examining qualitative information and identifying meaningful patterns, concepts, and themes. Unlike thematic analysis, content analysis allows coding categories to emerge directly from the data itself, making it suitable for exploratory studies where existing knowledge is limited.

A conventional content analysis approach was applied inductively to understand how analytics is perceived and utilized in software startup environments. During the analysis process, the collected documents were read multiple times to gain a comprehensive understanding of the data. Relevant phrases, statements, and descriptions related to analytics were carefully identified and highlighted. Particular attention was given to sections where the concept, implementation, or practical use of analytics was discussed.

The identified text segments were then coded using descriptive labels derived from the original wording of the data sources. New codes were introduced only when the existing codes were insufficient to represent newly identified concepts. Throughout the analysis, unnecessary or repetitive references that only mentioned analytics platform names without meaningful context were excluded.

After completing the coding process, the generated codes were systematically reviewed, compared, and refined. Similar codes were merged together, while unrelated or redundant codes were removed. Based on similarities and relationships among the codes, multiple clusters and categories were created to organize the findings in a structured manner. As a result, the analysis produced 16 themes, which were further grouped into four major high-level categories representing the overall understanding of analytics in software startups.

To support and manage the qualitative analysis process efficiently, the study utilized NVivo, a software tool commonly used for qualitative data organization and content analysis.

4 FINDINGS

This section presents the major findings obtained from the qualitative analysis of the collected data. The analysis identified

14 important themes that were closely related to the implementation and usage of analytics in software startup environments. These themes reflected different activities and practices through which startups understand and apply analytics during product and business development processes

To provide a structured interpretation of the findings, the identified themes were grouped into four high-level categories: analytics instrumentation, experimentation, diagnostic analysis, and insight generation. The categorization was developed inductively based on the relationships and similarities observed among the extracted themes.

The first category, analytics instrumentation, focuses on the setup and integration of analytics within startups. It includes the processes, strategies, and techniques used to collect, manage, and track relevant data. This category mainly represents how startups establish analytics systems and prepare their products for data collection and monitoring.

The remaining three categories describe the practical application of analytics in startup environments. Experimentation refers to the use of analytics for testing ideas, validating assumptions, and evaluating product or business changes. Diagnostic analysis focuses on understanding user behavior, identifying issues, and analyzing

performance-related problems. Finally, insight generation represents the process of deriving meaningful conclusions and actionable knowledge from collected data to support strategic decision-making.

The findings also indicate that software startups increasingly rely on analytics to improve customer engagement, optimize product performance, and support business growth. Analytics enables startups to identify user preferences, monitor customer interactions, and evaluate the effectiveness of different business strategies. Moreover, startups use analytical insights to minimize uncertainty and make rapid adjustments in highly competitive and dynamic market conditions.

Another significant observation from the analysis is that analytics is not limited to technical evaluation alone but also supports strategic planning and long-term organizational development. The collected data demonstrates that startups integrate analytics into multiple stages of product development, customer acquisition, and operational management to improve overall efficiency and innovation.

Together, these four high-level themes provide a comprehensive understanding of how software startups perceive and utilize analytics for improving products, understanding users, and making data-driven decisions. Figure 2 illustrates the overall process through which software startups manage and apply analytics in their operational activities.

Additionally, the findings reveal that startups consider analytics an essential tool for reducing business risks and improving decision accuracy. By continuously monitoring data and user interactions, organizations can quickly identify emerging trends and respond effectively to changing market demands. The study also highlights that analytics encourages a culture of continuous learning and improvement within startup teams.

4.1 Instrumenting Analytics:

4.1.1 Defining Goals

The analysis revealed that software startups using analytics generally begin by defining clear business and product goals. Analytics platforms also encourage startups to establish measurable objectives before collecting data. These goals are often directly connected to business success, customer retention, and product growth.

The findings suggest that startups focus on measuring only meaningful metrics instead of collecting excessive or irrelevant data. Common objectives identified in the study included reducing customer churn, improving conversion rates, increasing user engagement, and enhancing customer retention. The data also showed that startups monitor metrics that are strongly linked to business performance and organizational growth.

4.1.2 Asking Questions

Another important finding indicates that startups use analytics to answer critical business and product-related questions. Asking relevant questions helps organizations identify what should be measured and how analytics can support decision-making.

The study identified several commonly asked questions in startup environments, such as:

- Which features are most frequently used?
- Which customers are highly engaged?
- What factors lead to customer churn?
- Which acquisition channels perform best?
- What actions are users performing on the platform?

These questions help startups better understand customer behavior, product performance, and business outcomes.

4.1.3 Metrics as a Culture

The findings also highlight that some startups consider metrics as an integral part of their organizational culture. In such environments, analytics is embedded into the product development process, where every feature and user interaction is associated with measurable metrics.The study suggests that successful analytics implementation requires consistency across development teams and platforms, including web and mobile applications. Shared terminology, standardized event tracking, and alignment between stakeholders were identified as important practices for maintaining effective

analytics systems.

4.1.4 Tracking Goals

Once goals are established, startups continuously monitor and track relevant metrics to evaluate progress and performance. The findings show that startups frequently use analytics to measure customer acquisition, conversion rates, partner performance, and marketing effectiveness.

Tracking goals enables startups to identify high-performing channels, improve customer conversion strategies, and optimize product performance. The collected data also demonstrated that startups regularly monitor user actions and conversion-related metrics to assess business growth and operational success.

Unifying Analytics

The study further identified the importance of unifying analytics across startup operations. Two major forms of unification were observed. The first involves integrating analytics across multiple platforms, such as web and mobile applications, to maintain a centralized view of user activity and performance data.

The second form focuses on collaboration and alignment between different organizational teams, particularly engineering and product teams. Shared understanding of goals, event tracking methods, and performance metrics helps ensure consistent implementation of analytics throughout the development lifecycle. This coordination enables startups to collect accurate and meaningful data that supports strategic decision-making.

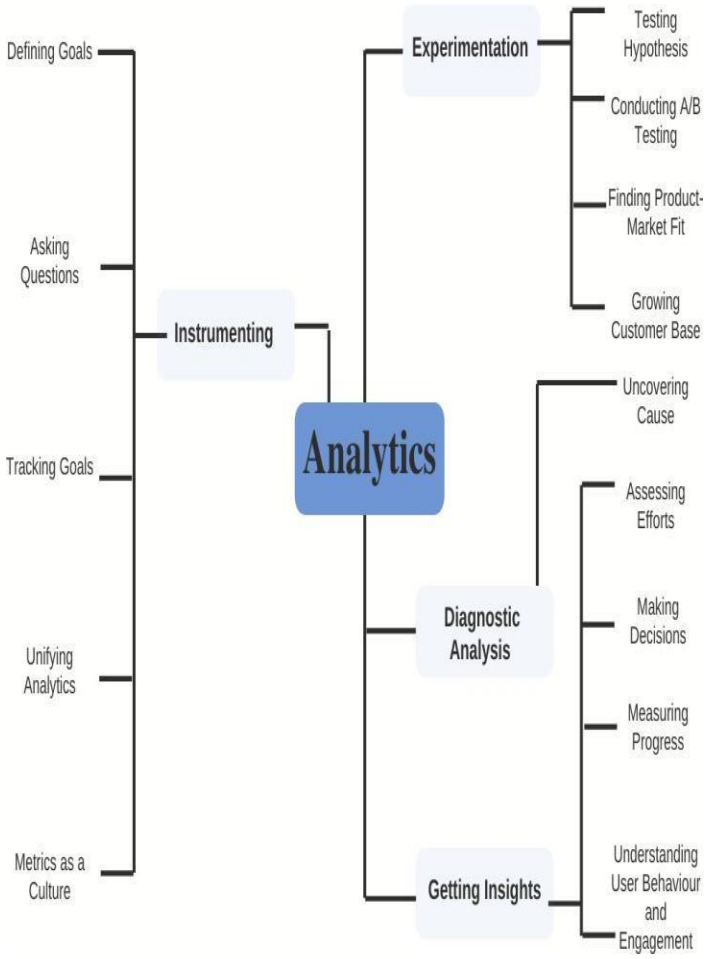

Figure 2: How Software Startups Understand Analytics

4.2 Experimentation

4.2.1 Testing Hypotheses

The findings indicate that software startups frequently use analytics to test business and product-related hypotheses. Since startups operate in uncertain environments, they continuously experiment with ideas related to customer behavior, product features, and marketing strategies. Analytics platforms support this process by enabling startups to collect and analyze data quickly.

The study found that startups often use analytics to validate assumptions, identify successful features, and evaluate customer acquisition strategies. In several cases, analytics helped startups disprove incorrect assumptions, preventing unnecessary investment of time and resources.

4.2.2 Conducting A/B Testing

Another important application of analytics identified in the study is A/B testing. Startups commonly conduct A/B tests to compare different versions of product features, interfaces, or marketing strategies. Analytics tools help organizations measure the outcomes of these tests and understand user responses.

The findings suggest that A/B testing assists startups in improving product performance, increasing user engagement, and optimizing conversion rates. Analytics also enables startups to monitor the effectiveness of experiments and make informed decisions based on measurable outcomes.

4.2.3 Finding Product-Market Fit

The analysis further revealed that analytics plays a significant role in helping startups achieve product-market fit. Startups use analytics to better understand customer needs, user behavior, and product performance. By analyzing customer interactions and feedback, organizations can determine whether their products effectively satisfy market demands.

The findings also indicate that analytics allows startups to move beyond basic performance measurements and gain deeper insights into customer experiences. This helps organizations refine their products and improve alignment with market expectations.

4.2.4 Growing Customer Base

The study identified customer growth as another experiment-driven activity supported by analytics. Startups continuously test different approaches to improve customer acquisition, activation, and retention.

In some cases, unexpected product changes or experiments resulted in significant improvements in customer engagement. Through analytics, startups were able to trace the root causes of these improvements and use the insights to refine future growth strategies. The findings highlight that analytics is essential for understanding customer behavior and supporting data-driven growth decisions in software startups.

Furthermore, analytics assists startups in identifying the most effective customer acquisition channels and marketing campaigns. By monitoring user interactions and conversion patterns, organizations can allocate resources more efficiently and focus on strategies that generate better customer engagement. The analysis also revealed that startups use analytics to study user retention trends and improve customer satisfaction through personalized experiences.

Diagnostic Analysis

4.2.5Uncovering Causes

The findings indicate that software startups use analytics to identify and diagnose unexpected situations or unusual changes in product performance. These situations may include sudden increases in website traffic, changes in user activity, or a decline in customer conversion rates. Analytics helps startups investigate such incidents and determine the underlying causes behind them.

The study identified several examples where startups successfully used analytics to understand unusual behavioral

patterns. In one case, a startup observed recurring spikes in user activity during specific days of the week. Through analytics, the organization discovered that users were accessing the platform at the beginning of each work week to review business-related information and updates.

Similarly, another startup experienced a sudden decline in customer conversion rates. By analyzing analytics data, the company identified that a minor modification on the homepage had negatively affected user behavior and conversions. These findings demonstrate that analytics plays an important role in helping startups diagnose problems, understand user interactions, and make corrective decisions based on evidence rather than assumptions.

4.3 Getting Insights

4.3.1 Assessing Efforts

The findings show that software startups use analytics to evaluate the effectiveness of their business and product development efforts. Startups analyze the impact of marketing campaigns, product features, interface changes, and customer acquisition strategies to determine which activities produce the best results. These insights help organizations optimize future strategies and better understand customer needs. Analytics also enables startups to identify ineffective approaches and redirect resources toward more productive initiatives.

4.3.2 Measuring Progress

Another important use of analytics identified in the study is measuring organizational and product progress. Startups utilize analytics to monitor growth, track performance metrics, and understand ongoing business activities. The findings suggest that analytics provides measurable indicators that help startups evaluate whether they are moving toward their goals and objectives. By continuously monitoring these indicators, startups can make timely improvements and maintain strategic direction.

4.3.3 Making Decisions

The analysis further revealed that startups rely on analytics-driven insights to support decision-making processes. These decisions are often based on information gathered through experimentation, progress tracking, and evaluation of organizational efforts. Analytics helps startups determine where additional investments are necessary and where resources can be reduced or optimized. The findings indicate that data-driven decision-making allows startups to improve products, enhance customer experiences, and develop more effective business strategies.

Additionally, analytics enables startups to make faster and more accurate decisions in highly uncertain business environments. By relying on real-time data and measurable outcomes, organizations can reduce risks associated with strategic planning and product development.

4.3.4 Understanding User Behavior and Engagement

The study also found that analytics plays a significant role in understanding user behavior and customer engagement. Startups use analytics to monitor how users interact with products, identify highly engaged customers, and analyze customer journeys across different platforms. These insights help organizations improve retention, optimize conversions, and enhance overall user experience.

Furthermore, analytics enables startups to move beyond assumptions by providing concrete evidence regarding customer behavior and preferences. The findings suggest that understanding not only *what* users do but also *why* they behave in certain ways is essential for developing effective products and improving customer satisfaction.

5. DISCUSSION

The findings of this study suggest that analytics in software startup environments has a distinct meaning compared to the traditional understanding presented in software engineering literature. Unlike big data analytics or software analytics, startup analytics appears to be more closely related to web and product analytics. Software startups primarily use analytics to monitor user behavior, support experimentation, track product performance, and make data-driven business decisions. However, further research is still required to develop a deeper understanding of analytics practices within startup ecosystems.

The results also indicate that analytics can help startups overcome several operational and communication challenges. Previous studies highlighted issues such as poor communication, insufficient information gathering, and ineffective information handling in startup environments. The current findings suggest that proper instrumentation and unification of analytics can reduce these challenges by improving collaboration between teams and enabling better information management. Additionally, analyzing data from multiple perspectives helps startups identify meaningful trends and avoid incorrect conclusions.

Another important observation from this study is the emphasis on building a metrics-driven culture within startups. Several startups integrate metrics and analytics directly into product development activities, ensuring that features and business actions are continuously measured and evaluated. This practice supports informed decision-making and long-term strategic planning. Although existing literature provides limited explanation regarding this metrics-oriented culture, the findings indicate that startups consider continuous measurement essential for improving products and understanding customer needs.

In contrast to some previous studies, this research confirms that software startups actively use analytics in different stages of product and business development. One possible reason for this difference is that the present study specifically focused on software startups, whereas earlier research also included hardware-oriented startups. Furthermore, the study demonstrates that startups interpret analytics differently from the broader software engineering perspective, where analytics is often associated with big data or software process analysis. Finally, the findings reveal a strong relationship between analytics and metrics. Goals, questions, and experimentation activities within startups generate measurable metrics that support evaluation and decision-making processes. However, the exact relationship between analytics and metrics requires further investigation, making it an important area for future research.

5.1 Threats to Validity

This study contains certain limitations that may affect the validity and generalizability of the findings. One important concern related to internal validity is the use of secondary data. Since the data was collected from external sources such as platform documentation, blogs, and user reports, there was limited control over the quality, completeness, and depth of the information. To reduce this limitation, data was collected from multiple reliable sources and filtered using predefined inclusion and exclusion criteria.

Another limitation associated with external validity is the selection of only three analytics platforms from a larger set of available platforms. Although the selected platforms were chosen based on popularity, documentation quality, and startup relevance, some useful information from other platforms may have been excluded. Additionally, the collected data varied in scope and length across different sources. However, the dataset included startups from different regions, industries, and product platforms, which improved the broader applicability of the findings.

A potential reliability threat also exists in the coding and analysis process. Since the qualitative coding was primarily conducted by a single researcher, there is a possibility of subjective interpretation or researcher bias. To minimize this issue, the identified codes and themes were reviewed and discussed during the analysis process.

Finally, the study acknowledges that the current understanding of analytics in software startups remains preliminary. Further research based on primary data collection, such as interviews and case studies with startup teams, is necessary to validate and strengthen the findings presented in this research.

6. CONCLUSION AND FUTURE WORK

Software startups operate in highly uncertain environments where rapid decision-making, limited resources, continuous innovation, and product development challenges are common. To survive and grow successfully, startups must regularly evaluate their strategies, understand customer needs, and adapt their products according to market demands. In this context, analytics plays an important role by providing meaningful information that supports data-driven decision-making.

This study contributes to the growing field of software startup research by presenting an initial understanding of how analytics is perceived and utilized in startup environments. The findings highlight key aspects of analytics, including instrumentation, experimentation, diagnostic analysis, and insight generation. These concepts demonstrate how startups use analytics to monitor performance, test hypotheses, understand user behavior, and improve business and product strategies.

Although the study provides valuable insights, several areas still require further investigation. One important direction for future research is the validation of these findings using primary data collected directly from software startups through interviews, surveys, or case studies. In addition, further studies are needed to explore the relationship between analytics and metrics, as both concepts are often closely connected and used interchangeably in startup environments.

Future research may also investigate how the use of analytics evolves across different stages of the startup lifecycle. Understanding how startups adopt and utilize analytics during early, growth, and mature stages could provide deeper insights into analytics-driven practices and their impact on startup success.

REFERENCES

[1] Florian Auer, Chhong Shing Lee, and Michael Felderer. 2020. Continuous experiment definition characteristics. In 2020 46th Euromicro Conference on Software Engineering and Advanced Applications (SEAA). IEEE, 186–190.

[2] Vebjørn Berg, Jørgen Birkeland, Ilias O Pappas, and Letizia Jaccheri. 2018. The Role of Data Analytics in Startup Companies: Exploring Challenges and Barriers. In Conference on e-Business, e-Services and e-Society. Springer, 205–216.

[3] Steve Blank. 2020. The four steps to the epiphany: successful strategies for products that win. John Wiley & Sons.

[4] Jan Bosch, Helena Holmström Olsson, Jens Björk, and Jens Ljungblad. 2013. The early stage software startup development model: a framework for operationalizing lean principles in software startups. In International Conference on Lean Enterprise Software and Systems. Springer, 1–15.

[5] Alistair Croll and Benjamin Yoskovitz. 2013. Lean analytics: Use data to build a better startup faster. " O'Reilly Media, Inc.".

[6] Kai-Kristian Kemell, Xiaofeng Wang, Anh Nguyen-Duc, Jason Grendus, Tuure Tuunanen, and Pekka Abrahamsson. 2019. 100+ Metrics for Software Startups-A Multi-Vocal Literature Review. arXiv preprint arXiv:1901.04819 (2019).

[7] Joanna F DeFranco and Phillip A Laplante. 2017. A content analysis process for qualitative software engineering research. Innovations in Systems and Software Engineering 13, 2 (2017), 129–
141.

[8] Latifa Guerrouj, Olga Baysal, David Lo, and Foutse Khomh. 2016. Software analytics: challenges and opportunities. In 2016 IEEE/ACM 38th International Conference on Software Engineering Companion (ICSE-C). IEEE, 902–903.

[9] Hsiu-Fang Hsieh and Sarah E Shannon. 2005. Three approaches to qualitative content analysis. Qualitative health research 15, 9 (2005), 1277–1288.

[10] Melissa P Johnston. 2017. Secondary data analysis: A method of which the time has come. Qualitative and quantitative methods in libraries 3, 3 (2017), 619–626.

[13] Grace Kamulegeya, Raymond Mugwanya, and Regina Hebig. 2018. Measurements in the early stage software start-ups: a multiple case study in a nascent ecosystem. Foundations of Computing and Decision Sciences 43, 4 (2018), 251–280.

[14] Zijad Kurtanović and Walid Maalej. 2018. On user rationale in software engineering. Requirements Engineering 23, 3 (2018), 357–
379.

[15] Patrick Mikalef, Ilias O Pappas, John Krogstie, and Michail Giannakos. 2018. Big data analytics capabilities: a systematic literature review and research agenda. Information Systems and e-Business Management 16, 3 (2018), 547–578.

[16] Jevgenija Pantiuchina, Marco Mondini, Dron Khanna, Xiaofeng Wang, and Pekka Abrahamsson. 2017. Are software startups applying agile practices? The state of the practice from a large survey. In International Conference on Agile Software Development. Springer, Cham, 167–183.

[17] Ilias O Pappas, Patrick Mikalef, Michail N Giannakos, John Krogstie, and George Lekakos. 2018. Big data and business analytics ecosystems: paving the way towards digital transformation and sustainable societies. Information Systems and e-Business Management 16, 3 (2018), 479–491.

[18] Usman Rafiq, Jorge Melegati, Dron Khanna, Eduardo Guerra, and Xiaofeng Wang. 2021. Analytics Mistakes that Derail Software Startups. In Evaluation and Assessment in Software Engineering. 60–69.

[19] Eric Ries. 2011. The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses. Currency.

[20] Michael Unterkalmsteiner, Pekka Abrahamsson, Xiaofeng Wang, Anh NguyenDuc, Syed Shah, Sohaib Shahid Bajwa, Guido H Baltes, Kieran Conboy, Eoin Cullina, Denis Dennehy, et al. 2016. Software startups–a research agenda. eInformatica Software Engineering Journal 10, 1 (2016).

[21] Thomas P Vartanian. 2010. Secondary data analysis. Oxford University Press.

[11] Charles K Davis. 2014. Beyond data and analysis. Commun. ACM 57, 6 (2014), 39–41.