Software Startup Ecosystem in Namibia

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Abstract. The number of software startups in Namibia has increased over the last decade, although most of them do not survive for long in the industry. For software startups to thrive, a suitable ecosystem is required to support them as the sustainability of startups is determined by the actions and interactions of the ecosystem actors. We aimed to gain a better understanding of the current software startup ecosystem in Namibia, emphasizing how the startup is connected to and supported by other actors in the ecosystem. Understanding the ecosystem will assist in informing future support needed by software startups to increase their sustainability and the growth of the ecosystem. An online questionnaire was employed to collect data from participants from software startups, as well as institutions that support software startups and entrepreneurs in Namibia. The results show that the Namibian software startup ecosystem is still in its early development stages and offers limited assistance for startups to grow. Access to finance is a challenge for startups, as most of the startups are founded and supported by personal funds, and few are funded by investors and Venture Capital funds and receive little to no financial support from the government. The universities play a role in supporting software startups through software development and entrepreneurial education, and training. Incubators and accelerators, although not a lot in the ecosystem, offer software entrepreneurs mentorship and a supportive environment to grow their businesses. The startups require more funding, access to resources, mentorship, and networking opportunities from other ecosystem actors.

Keywords: Software Startups · Startup Ecosystem · Software Entrepreneurship

1 Introduction

Software startups are new software venture companies founded by individuals who are attempting to break into the market with limited funds and experience. Nanthaamornphong and Wetprasit [1] defined a software startup as a business with the potential to expand its operations by exploring new business models and leveraging technology to conduct business based on innovative ideas. Software startups are important producers of innovation, products, and services as they focus on creating and launching innovative software solutions within a limited time and with minimal resources [1–5]. Although fewer than anticipated, Namibia saw an increase in the number of software startups

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over the last decade (2013 to 2022). In Namibia, software startups are established to satisfy the growing need for software solutions [6, 7]. In addition to providing online services to Namibians, software startups aim to develop technology solutions for the health, agricultural, educational, and economic sectors.

Startups play a pivotal role in enhancing the socioeconomic progress of society [8] as they boost employment opportunities through the creation of new jobs. Software startups can drive job creation in Namibia and positively impact overall economic productivity. However, most startups do not survive for long in the industry due to several challenges such as the lack of resources and producing products that do not stay long in the market. For software startups to be supported and succeed, suitable ecosystems are required to assist them to thrive in the industry. A software startup ecosystem, which includes a variety of agents, is necessary and essential for the growth of startups [9, 10]. The software startup ecosystem in Namibia consists of organizations, institutions, and policies that contribute to the creation, growth, and sustainability of software startups in the country. The sustainability of startup companies is determined by the actions and interactions of the ecosystem elements [11]. It is important to study software startups and their ecosystems to assist individuals aspiring to create software startups and those seeking to provide support to the startups [1]. This research, therefore, aims to study the Namibian software startup ecosystem, as limited studies have focused on understanding the current situation within Namibia's software startup ecosystem. The study is unique in its focus on factors that are specific to Namibia's software startup ecosystem, considering the country's economic and social context. By identifying the challenges and opportunities facing software startups in Namibia, this study provides new insights into how the ecosystem can be supported.

The study aims to answer the following research question: What is the current state of the software startup ecosystem in Namibia? We collected data using a questionnaire from participants from startups, and from institutions that support software startups. We described the components present in the Namibian software startup ecosystem and conducted a SWOT analysis of the startup ecosystem. The remaining sections of this paper are as follows: Sect. 2 presents the related work and Sect. 3 presents the research design. Section 4 presents the results, which are then discussed in Sect. 5. Section 6 concludes the paper.

2 Related Work

There has been a notable research emphasis on software startup ecosystems due to its significant economic and societal impact. Numerous studies have examined the characteristics, challenges, and opportunities of software startup ecosystems around the world. Kon et al. [12] studied the Israeli software startup ecosystem, known for being highly productive, and developed a framework based on their research. The study highlights the ecosystem's strengths, including high-quality software engineering talent and strong government support, and identified limited access to venture capital and a shortage of management skills as challenges. Asmoro and Nugroho [13] developed a conceptual framework for the software startup ecosystem in Indonesia based on a literature review and expert interviews. The conceptual framework established connections between various aspects of startups such as their founders, sociocultural, institutional, technological,

methodological, and educational factors, as well as their environment and ecosystem. The framework is designed to provide a comprehensive understanding of these factors and their influence on the growth and success of startups. Nanthaamornphong and Wetprasit [1] analyzed Thailand's software startup ecosystem, exploring its current state. The study identifies the ecosystem's key players and examines government policies and initiatives to support the ecosystem, such as funding programs, tax incentives, and the establishment of startup incubators and accelerators. Despite the ecosystem's potential to become a regional hub for innovation and entrepreneurship, the authors acknowledge challenges, such as limited access to capital. The study concludes by offering recommendations for stakeholders, especially the government to support the ecosystem's growth and development.

Research on software startup ecosystems has yielded valuable insights into various aspects, such as the role of ecosystem components, government policies and support, and funding sources. Despite progress made in understanding software startup ecosystems, there are still many challenges and opportunities to explore in different contexts, especially in emerging economies like Namibia. The software startup ecosystem in Namibia remains largely unexplored, making it difficult for policymakers and investors to effectively support and advance the ecosystem, hindering its ability to contribute to job creation and economic development in the country. Therefore, conducting a comprehensive study of the software startup ecosystem in Namibia is crucial for identifying key challenges and opportunities, and developing strategies to address them.

3 Research Design

This study aims to address the research question, "What is the current state of the software startup ecosystem in Namibia?". To achieve this goal, we carried out an exploratory study about the startup ecosystem, using the questionnaire as the instrument to collect data. The questionnaire is divided into three parts. The first part focuses on the startup's inception, including the motivation and funding sources used. The second part examines the institutions that support software startups. The third part explores the strengths, weaknesses, opportunities, and threats of the Namibian software ecosystem, using the SWOT analysis framework inspired by Humphrey [14]. The current situation of the ecosystem is covered by the strengths and weaknesses while the opportunities for further development and threats of the Namibian software startup ecosystem for the future are covered by the opportunities and threats. The questionnaire was piloted with four participants to ensure clarity and relevance and the link (https://shorturl.at/uMNP0) was distributed through email and WhatsApp to six participants known to the researchers who own or work for software startups or work for institutions that support startups or from the software development community. Using the snowball sampling method, the selected respondents were advised to forward the link to other potential respondents, and a total of 15 responses were received. A total of 8 respondents are from startups, 3 are from organizations that support startups and 4 are from the software development community.

The analysis of data from the questionnaire, which had both close-ended and open-ended questions, followed a mixed-methods approach. For close-ended data, quantitative

analysis involved calculating frequencies and percentages to summarize participants' responses. For open-ended data, thematic analysis was employed by two researchers through a collaborative approach. One researcher conducted the initial coding process, while the other validated and reviewed the analysis. The analysis started with the familiarization data, followed by data exploration guided by the following statements: establishment of software startups, institutions that support software startups and entrepreneurs, and SWOT of the ecosystem. The researcher assigned initial codes to text and the codes are then refined and organized into broader categories that give rise to themes. Once the coding process was complete, the second researcher independently reviewed the generated codes and categorized themes. Their role was crucial in ensuring the validity and reliability of the analysis.

4 Results

The data collected were analyzed according to three categories: establishment of software startups, institutions that support software startups and entrepreneurs, and SWOT analysis of the Namibian software ecosystem.

4.1 Establishment of Software Startups

The results show that software startups are mostly created because of the existence of a good idea that fills a gap in the market (53%). Following this, some startups are founded due to unemployment (20%) and low earnings in the current job (20%). A smaller portion of startups are founded to make their products and services more competitive in the rapidly digitizing environment (7%). The software entrepreneurial attitude is influenced by both intrinsic, extrinsic, and contextual motivations. Intrinsic motivation is driven by internal factors such as the "*desire to solve local problems with software*", "*the love for technology*", "*interest in technology, especially software*" and the need for "*freedom to explore technologies*". Extrinsic motivation is driven by external factors such as "*market needs*" with "*vast available opportunities*", "*entrepreneurial education*", and the influence of culture, media, and society. According to the results, "*unemployment*", "*market demand and opportunities*" are contextual motivations that drive individuals to initiate software startup ventures. Regarding the sources of funding, startups mostly use personal savings or funds (93%) and funds from family, relatives, or friends (73%), and from innovation competitions (67%). They also use funds from crowdsourcing platforms (13%), loans from banks (13%), or funds from incubators (13%). Few (7%) get funds from project finance. When starting the business, software startups are mostly faced with challenges of lack of funding (93%), followed by dealing with legal, bureaucratic, or procedural issues (60%), target market approach (40%), finding a suitable operating space (33%), finding, and using appropriate technology (27%), finding staff (20%) and finding partners (13%). When it comes to technological aspects that support software start-ups, the respondents mentioned that Open-source software is widely used by software startups to develop their products. A respondent said that "*open-source software allows startups to make use of software at a limited cost*." Respondents also indicated that startups make use of agile methods in their development and make use of digital payment processing systems.

4.2 Institutions that Support Software Startups and Entrepreneurs

The institutions that promote software startups and entrepreneurship include funding institutions, educational institutions, incubators, and accelerators. Funding institutions that support software entrepreneurship include angel investors such as The Namibia Business Angel Network (NABAN) and venture capital funds that invest in startups. The startups also receive funding through competitions funded by companies like Standard Bank, First National Bank, and Mobile Telecommunications Company (MTC). Educational institutions that promote software entrepreneurship are the Namibia University of Science and Technology (NUST) and the University of Namibia (UNAM). They provide education and training to software developers who become software entrepreneurs. A respondent indicated that "*Namibia University of Science and Technology has hackathons and sponsorship opportunities*". Another respondent also said that "*NUST hosts events that developers from startups can attend, to improve when it comes to software engineering and entrepreneurship*". NUST also has the High-Tech Transfer Plaza Select (HTTPS) state-of-the-art facility which aims to facilitate technologically accelerated innovations and offers a unique environment for startups. Incubators and accelerators such as The Namibia Business Innovation Institute (NBII), The Namibia Investment Promotion and Development Board (NIPDB), and StartUp Namibia promote software entrepreneurship in Namibia. A respondent indicated that "*NIPDB offers capacity building to TechNovators*". The respondent indicated that the NBII is one of the co-working spaces where software startups meet. Other respondents indicated that "*NBII provides space for software startups to meet and take part in the training they offer*", and "*mentors software entrepreneurs with innovative ideas to start their businesses"*. When it comes to the legal frameworks in Namibia that influence software startups, startups are influenced by labor law, BIPA regulations, and copyright protection of innovative ideas.

4.3 SWOT Analysis of Software Startups Ecosystem

When it comes to the current strengths of the software startup ecosystem, developers in the software startups are determined to work hard together for their startups to survive. A respondent indicated that "*Namibia is at its peak of digital transformation, and this is a major motivation for startups*". Innovative ideas also exist, as one respondent indicated that "*there are a lot of creative ideas for software entrepreneurs"*. Another opportunity is also associated with "*localized solutions that can have a regional and international impact"*. The current weaknesses of the software startup ecosystem include a lack of funding and mentorship, a lack of knowledge on pricing, and the small market. The lack of funding is a major weakness as a responded indicated that "*There is a lack of funding for software startups. More funding institutions could come on board to provide funding."* Another respondent said that "*people have great ideas, however, a lot of them lack startup capital*." Another weakness is that startups mostly only develop for the local market and hardly for the global market. The startups need to also think of getting their products out to the global market. A respondent indicated that "*The population in urban areas and internet connection is not enough to make software entrepreneurship a niche market*." Also, most of the software developers in the startups do not have the

needed entrepreneurial skills, and business knowledge, which affects the operation of the startup.

The future opportunities in the software startup ecosystem include software development and entrepreneurial education of new software entrepreneurs, the emerging market as "*more people will know how to make use of software solutions in the future*" and innovative ideas among software developers. Incubators and accelerators can offer mentorship to new software entrepreneurs and a supportive environment in which to grow their businesses. A respondent wrote that "*the future is bright as software opportunities will always be there. With the economic crisis, youths will come up with even greater innovative solutions.*" The threats facing the ecosystem include competition and poor software quality. Software startups face the threat of competing with other established software companies in the country. A respondent indicated that "*More people like using international software that is already established*." Also, the ecosystem faces threats when it comes to software quality as customers expect software of high quality which the startups may not be able to provide due to limited resources. The summary of the Namibian software startup ecosystem as a SWOT analysis is shown in Table 1.

Table 1. Software startup ecosystem summarized as a SWOT analysis.

Positive	Negative
Strengths • Collaboration • Determination to work hard • Peak of digital transformation • Existence of innovative ideas • Localized solution	Weaknesses • Hard to access capital • Lack of funding • Limited entrepreneurial skills • Lack of governmental support • Small local market
Opportunities • Entrepreneurial education and mentorship for entrepreneurs • Software development skills and technology training • Emerging markets • Innovative solutions	Threats • Competition • Poor software quality • Lack of funds

5 Discussion

The software startup ecosystem consists of startups, entrepreneurs, government and private investors, universities, and support organizations, which are essential to the sustainability of the startup. Funding is a crucial component for the operation of software startups. However, it is also a major challenge for startups, as only a few receive funding from private funding bodies and little to no financial support from the government. Startups in Namibia experience a constraint of restricted access to capital, which is a challenge also encountered by startups in other global contexts [1]. However, the severity

of this challenge appears to be amplified within the Namibian context, primarily due to the economic and funding dynamics in the country. This is a concern as startups' growth and viability are put at risk by the lack of funding and a significant reliance on personal capital [11].

Compared to other ecosystems such as that of Israel [12], Namibia's ecosystem has significantly fewer incubators, accelerators, co-working spaces, venture capital, and angel investor networks. Incubators and accelerators can assist in offering mentorship to software entrepreneurs and a supportive environment to grow their businesses. However, Namibia has few startup incubators and accelerators that can foster the growth of software startups. The lack of startup incubators and accelerators in Namibia requires a holistic strategy that incorporates efforts from educational, governmental, and private sectors, as well as the international community. Collaborations with educational institutions would enable knowledge-sharing, and research support, although Intellectual Property Rights (IPRs) can be a complex issue when it comes to collaborations with higher education institutions (HEIs). Government intervention could encompass introducing policies and incentives, particularly in the tax sector, that can encourage the establishment of incubators and accelerators. Engaging the private sector could increase the resources available to startups through financial investments and partnerships with incubators and accelerators. Additionally, forging international partnerships with established incubators and accelerators could enhance global expertise and networks in the ecosystem.

Namibia's local software market is relatively smaller and more nascent compared to the mature markets in established software ecosystems such as those of Israel and Thailand [1, 12]. The customer base in Namibia is limited due to the country's smaller population and economy. The small market size means that startups have a smaller customer base for their products and services to target in the country. Startups can maximize the potential within the local market through niche targeting, while also considering opportunities for growth beyond national borders. The challenge of a small market should encourage startups to think globally from the outset and to seek customers and market needs beyond Namibia's borders. This mindset can drive innovation, diversify income streams, and potentially lead to stronger international connections. Poor quality software poses a significant threat to the Namibian software ecosystem. This threat emanates from various factors, including limited resources and skill gaps. Poor quality software limits the growth of local software startups by tarnishing their reputation and hindering customer satisfaction and trust. Therefore, fostering a culture of quality assurance is crucial to mitigate this threat. Additionally, enhancing product quality is a key component for startups looking to expand beyond local boundaries and enter regional or international markets.

The identified opportunities in the ecosystem offer space for new directions and strategies to strengthen and expand the ecosystem. As previous research has highlighted the need for government support to foster ecosystem growth [1], we also call on the government to support Namibian startups. The government still has a lot to contribute to the ecosystem, especially the Ministry of Information and Communication Technology should foster innovation by establishing conducive environments through permissionless innovation policies instead of restrictive ones to permit or foster a culture of experimentation. Our recommendation to practitioners operating within the Namibian software

startup ecosystem is that they should concentrate on problem-solving to address customer needs and demands, attract investment, establish strong networks, utilize available resources, and adopt emerging digital technologies. By implementing these measures, practitioners can position themselves favorably for success within the constantly evolving industry. The study contributes to research by providing a case study of an emerging software startup ecosystem in a developing country, offering insights into the challenges and opportunities unique to the context.

The limitation of the study is the relatively small scale and emerging nature of the ecosystem itself. As Namibia is still developing its technology industry, the sample size of startups, entrepreneurs, and ecosystem stakeholders is limited, leading to challenges in obtaining comprehensive data and insights. The data is interpreted within the context of the ecosystem's current developmental stage. Although the study provides valuable insights into the current state of the ecosystem, the findings cannot be generalized. The results are however valuable for informing ecosystem improvement efforts, guiding investment decisions, and facilitating collaboration among stakeholders, all of which collectively support the ecosystem's growth and development within its specific context.

Future research can concentrate on several strategic directions, directed by the findings of a SWOT analysis of Namibia's software startup ecosystem carried out in this study. It could involve capitalizing on identified strengths through initiatives that enhance existing advantages and address the weaknesses by investigating innovative approaches to overcome challenges related to funding and local market size. Exploring opportunities pinpointed by the analysis could lead to research on innovative solutions and entrepreneurial skills amongst software developers. Similarly, mitigating threats could entail in-depth studies on improving software quality and competitive strategies. Future work could also focus on exploring how modern entrepreneurial approaches such as Lean Startup is adopted in the Namibian ecosystem.

6 Conclusion

The study shows that the software startup ecosystem is still developing and offers limited assistance for startups to grow. Software entrepreneurs in the ecosystem are highly influenced by the family, culture, media, innovative ideas, and society in which they live. Namibian universities, incubators, accelerators, and angel investors support the startups, although limited. Access to finance continues to be a challenge for startups, as we identified the recurring need for funding. The challenges and threats identified in the ecosystem need to be addressed to promote the growth and success of software startups, as startups have the potential to significantly contribute to Namibia's economy, especially through job creation.

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