ECLIPSE® FOUNDATION

State of Open Source in the Global South

Research Report



Contents

Introduction....04
Summary of Findings 06
OSS Participation & Motivations....08
Impacts of OSS Participation....10
Global South & Policy Considerations....14
Conclusions & Recommendations....16
Methodology....18

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



Introduction

Open source software (OSS) has transformed the global technology landscape. From online shopping, to browsing the internet, to reading this report on a phone with an open source operating system, billions of people engage with and consume open source software daily. If you're reading this report, you're keenly aware of the role open source plays in fueling the global economy.

For a decade or more, numerous articles have been written about "the next billion consumers," the digital native consumers from the Global South[1] who will play a central role in the global economy in the coming decades. But we sought to answer different questions: What about the next million innovators? What about the software developers in low-and middle-income countries who are using, building with, and creating open source software?

How are they using open source? What are their motivations? What are their challenges? What is the nature of their innovations? How is it shaping their careers, and how does that impact their lives and the societies in which they live?

We believe this community's voice has a vital contribution to make to the conversation.

[1]The UN Conference on Trade and Development (UNCTAD) defines the Global South as a region comprising developing and emerging industrial economies in Africa, Asia, the Caribbean, and Latin America.

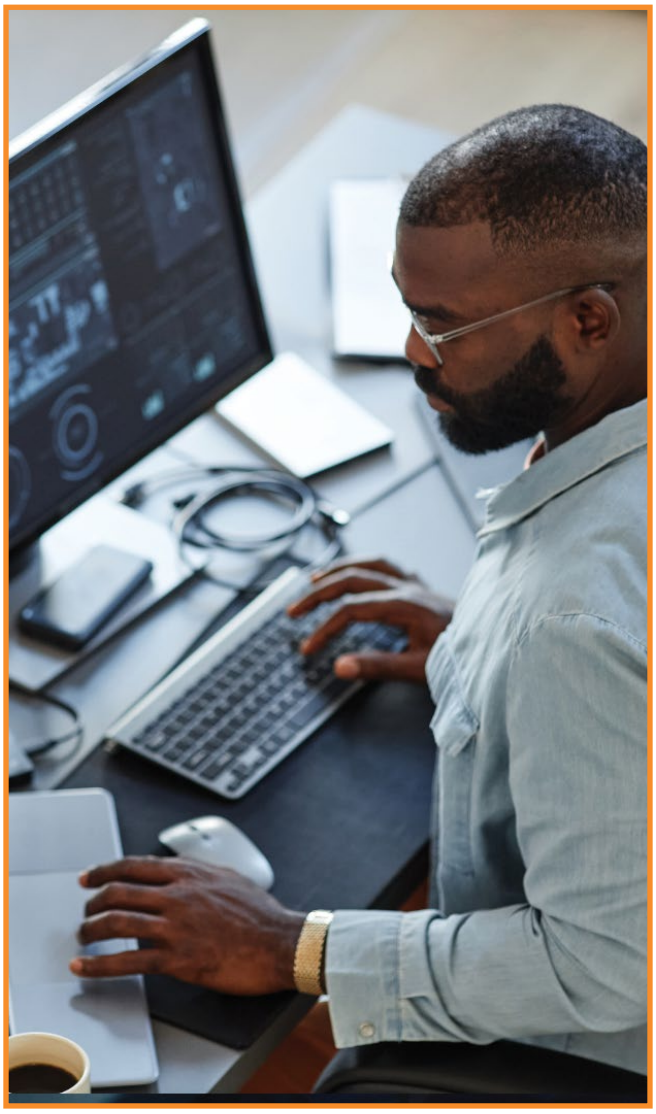
COPYRIGHT (C) 2024, ECLIPSE FOUNDATION, INC. | THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENSE (CC BY 4.0)

Our primary objectives with this study are to:

- Explore attitudes and opinions of developers in the Global South.
- Amplify a growing, important, and underrepresented community.
- Investigate how software developers in the Global South interact with OSS and how it impacts their careers and professional development.
- Understand how OSS not only shapes their professional lives, but also creates positive impacts on society, economic growth, and community development.
- Contribute to a public understanding of how open source and its developers can be supported in the Global South.

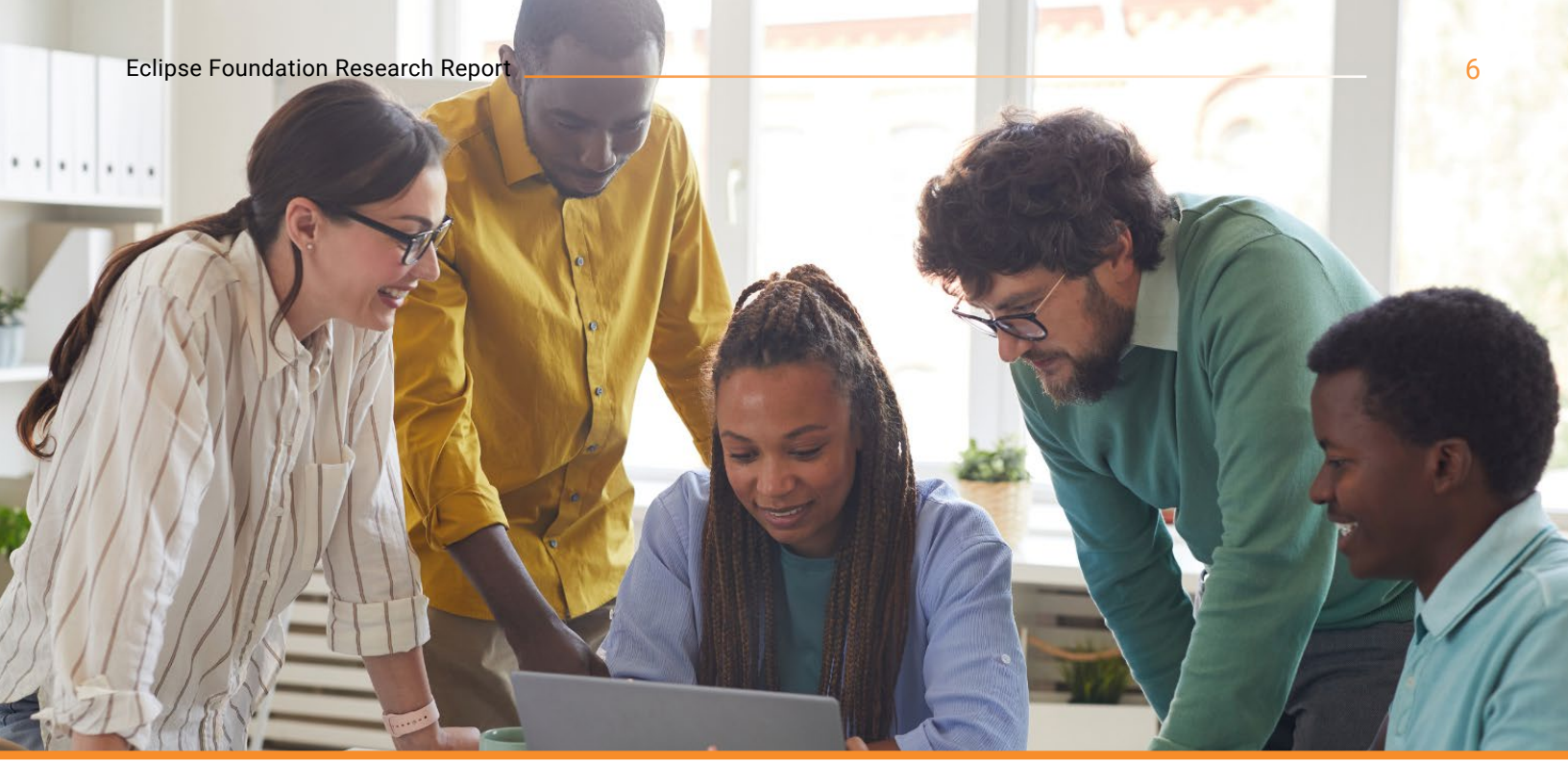
To achieve these goals, we conducted a comprehensive survey [Methodology] across the selected countries[2], capturing perspectives from a broad cross-section of developers with varying levels of OSS exposure and proficiency. This approach enabled us to identify key drivers, barriers, and innovative use cases emerging from Global South OSS communities.

We hope the insights from this research will guide policymakers, businesses, and other stakeholders in the Global South on how to support OSS communities in their regions, fostering local innovation and contributing to the global open source ecosystem.



[2]Our research included participants from 18 countries across the Global South: Africa (South Africa, Kenya, Nigeria, Ethiopia, Egypt, Lesotho, Morocco, Gambia), Latin America (Brazil, Argentina, Colombia, Chile), and Asia (India, Singapore, Vietnam, Indonesia, The Philippines, Thailand). We selected these countries because they have some of the fastest-growing developer communities globally, according to the latest GitHub State of the Octoverse report--https://github.blog/2023-11-08-the-state-of-open-source-and-ai/.

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



Summary of Findings

The OSS ecosystem in the Global South is thriving. Participation is active, and adoption is widespread. More than three-quarters of respondents (77%) report using OSS, underscoring a robust foundation for innovation and engagement. Beyond consumption, these developers are also actively contributing. A substantial 37% of respondents contribute to OSS projects, 28% maintain them, and 22% create new projects.

Driving OSS adoption in the region involves a multifaceted approach of informing, empowering, and supporting users. These developers tell us exactly what they need in order to improve the experience of using open source. Key factors include fundamental technological support, such as implementing security best practices (63% say this would make their OSS experience better), to delivering quality documentation (61%), and utilising OSS licences (60%).

Significantly, 61% of respondents link open source to career growth opportunities, recognising the benefits of both using and contributing to OSS projects. Engaging with OSS fosters accelerated learning, which leads to career advancement, and more learning, and more advancement creating a virtuous cycle of usage and benefits from usage.

They recognise the value of OSS not only for themselves but also for their countries. Nearly two-thirds (64%) say it enhances educational access in their country, 62% say it strengthens the software developer workforce, and 56% say it spurs entrepreneurship and innovation in their countries.

The impact of OSS extends beyond the tech sector, driving economic and social growth (46%), fuelling tech innovation (33%), and improving access

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)

to education (31%). Notably, 59% of developers strongly believe OSS will significantly influence their country's economic growth in the coming decade. More mature OSS communities report broader positive impacts, including enabling women to build skills and advance their careers.

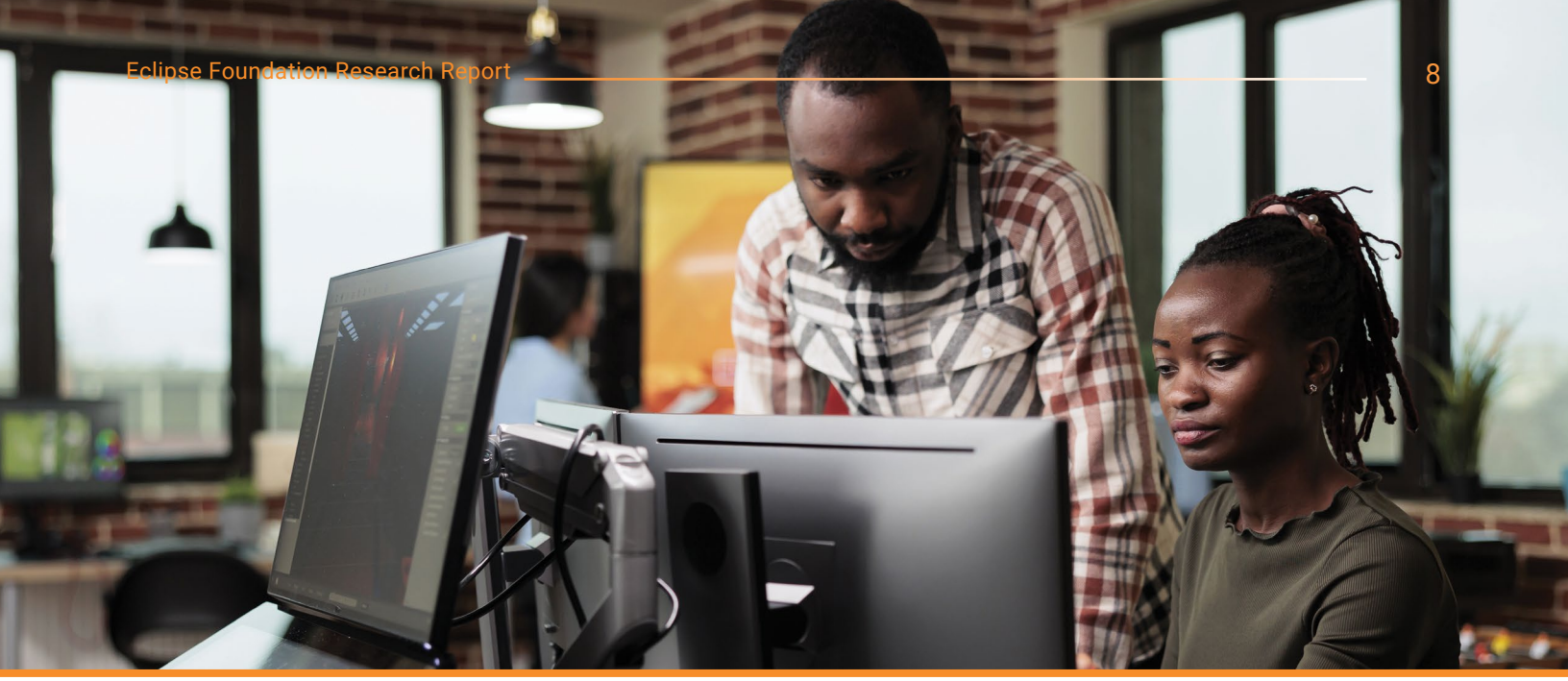
Gender equality is a key issue that OSS can help to solve. In our interviews with policymakers, one participant said, "In Malawi, OSS can play a role in empowering women by offering them opportunities to learn, contribute, and lead in the tech industry. Open source platforms often encourage community collaboration, allowing women to engage in projects and build their skills in a supportive environment." This participant went on to say, "OSS enables the creation of software solutions that address specific gender-related issues, such as applications focused on women's health or educational resources aimed at closing the gender gap. OSS can play an important role in bridging the digital gender divide and get more girls in the ICT workforce."

Policymakers recognise the United Nations' role in promoting Digital Public Goods (DPGs) and view the UN as a facilitator for collaboration on OSS projects. They advocate for partnerships between the UN and OSS foundations to govern and promote DPG-qualifying initiatives.

According to the Digital Public Goods Alliance, digital public goods (DPGs) are openly licenced digital solutions that adhere to privacy and other applicable laws and best practices, do no harm, and help achieve the United Nations' Sustainable Development Goals (SDGs). These goods are designed to be freely used, modified, and shared by anyone and can include software, data sets, AI models, standards, and content.

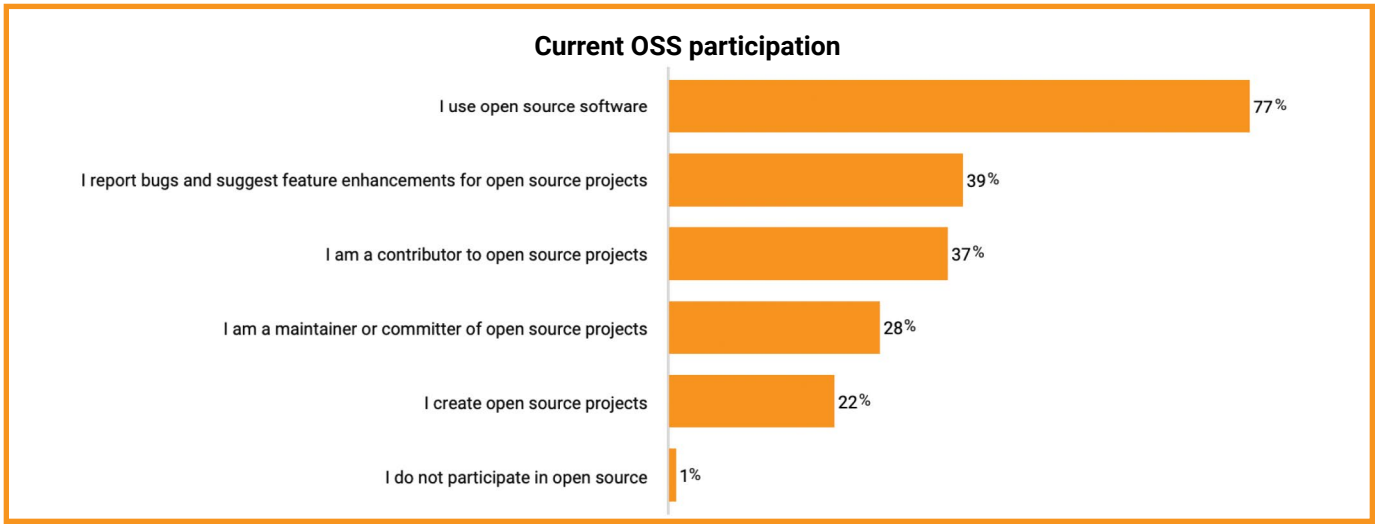
These findings highlight the transformative potential of OSS in the Global South — democratising access to cutting-edge technology, fostering skill development, and reducing inequalities. However, realising this potential requires concerted efforts. Collaboration among governments, donors, NGOs, OSS groups, foundations, and entrepreneurs is essential to providing the necessary infrastructure, mentorship, training, funding, and job opportunities, thereby nurturing the immense talent present in the Global South.

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



OSS Participation & Motivations

This research confirms that OSS has found significant traction in the Global South. Over three-quarters of respondents report using OSS and more than a third actively contribute to projects.



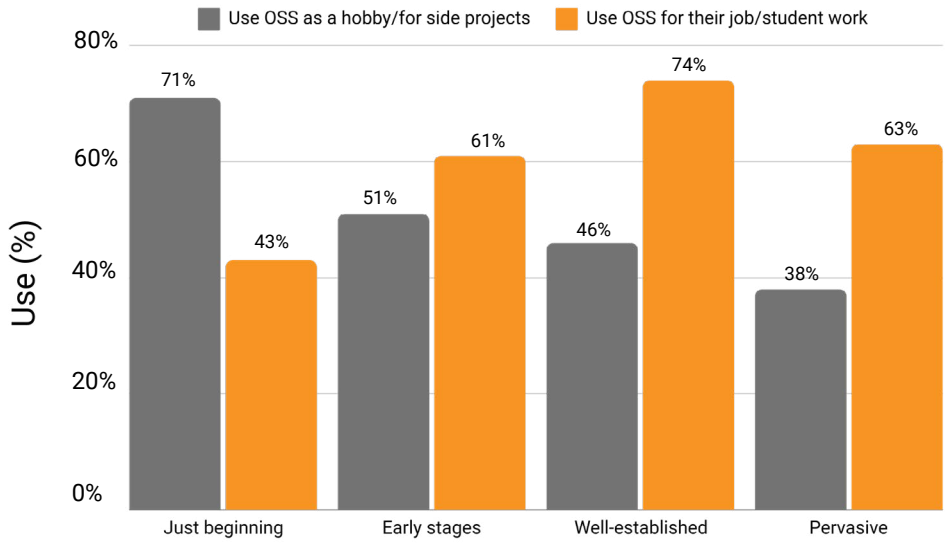
Far from being mere consumers of OSS, developers in the Global South are actively shaping the future of technology. Among them, 39% report bugs and suggest feature enhancements, 37% contribute to OSS projects, and 22% create OSS projects and tech solutions tailored to local needs.

While these numbers are promising, they also highlight substantial growth potential, particularly in areas like project creation and maintenance, indicating untapped opportunities for increased engagement and innovation in these regions.

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)

OSS engagement in the Global South is most commonly initiated through one's job, with developers continuing their involvement due to opportunities for skill development (52%), career advancement and financial benefits (49%), and creative problem-solving (46%). The value of OSS in the workplace is evident, with 56% of developers citing increased flexibility for customisation and adaptability, and 54% reporting accelerated development through the use of existing code components. This not only streamlines projects but also facilitates continuous learning, further enhancing developers' skill sets.

While these results are pervasive throughout the study, there was an associated, moderating effect between a country's overall OSS maturity and the nature of a developer's participation. In countries at earlier stages of OSS maturity, developers are more likely to experiment with OSS and use it as a hobby. In contrast, countries with higher levels of OSS maturity, have more developers actively using OSS as part of their occupations. This correlation helps illustrate the OSS adoption journey and can inform stakeholder about the varying types of support OSS communities need in different countries and regionsOSS communities develop, their perceived positive impact on both economic and social fronts intensifies.



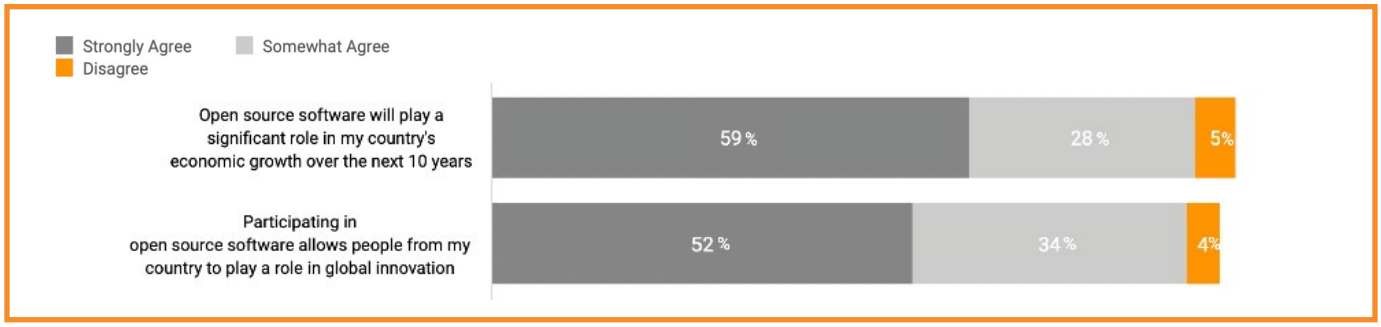
Country's level of OSS maturity

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



Impacts of OSS Participation

Our study suggests developers value the utility of OSS and also its broader impact. A majority (59%) expect OSS to significantly drive their countries' economic growth over the next decade. Further, over half (52%) view OSS participation as a means for their nations to contribute to global innovation.

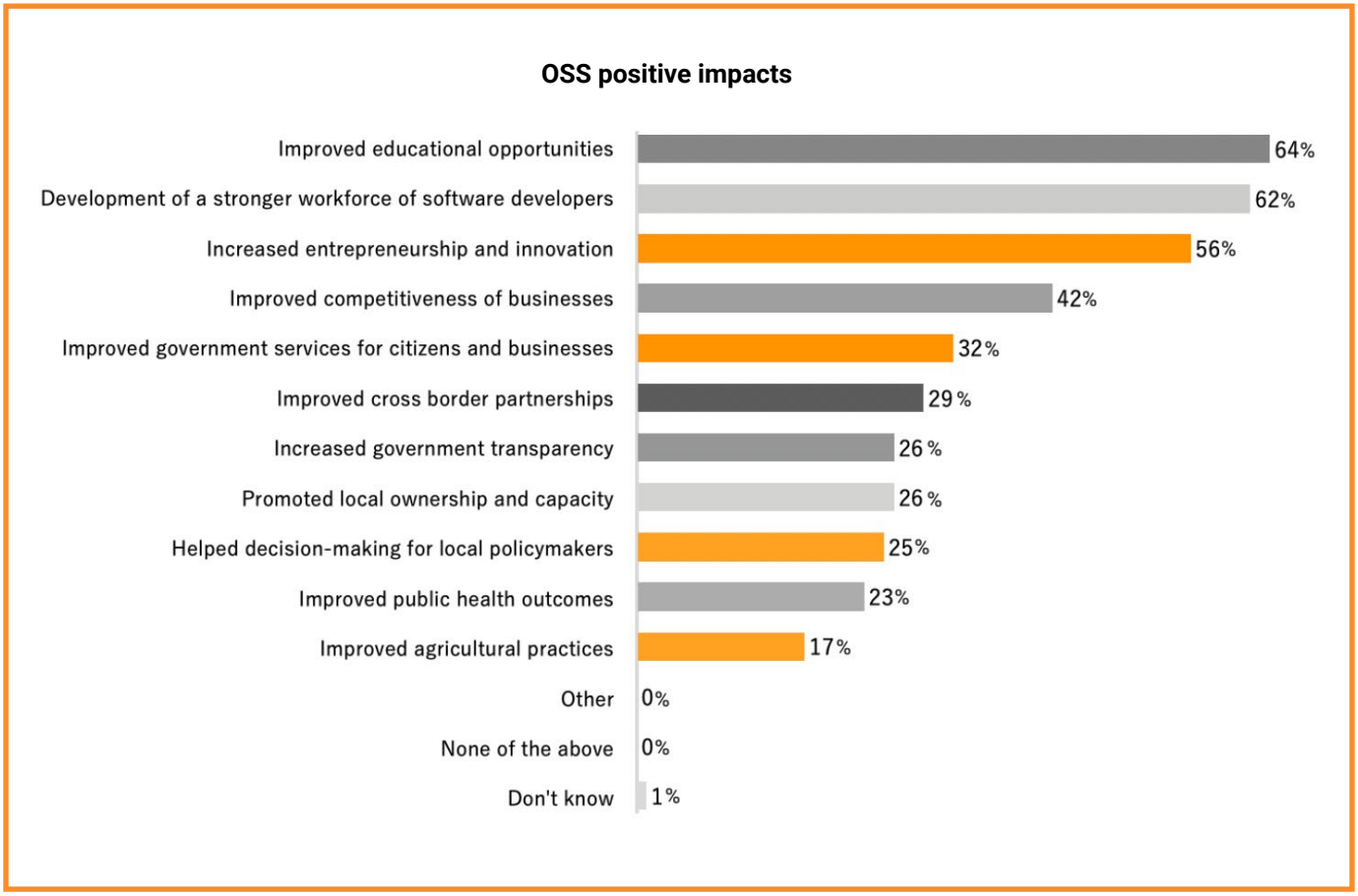


Developers see OSS as advancing Sustainable Development Goals (SDGs), particularly in driving economic growth and job creation (55%), improving access to quality education (50%), and enhancing industry and infrastructure (43%). Its influence extends across sectors, notably in expanding educational opportunities (64%), strengthening the software developer workforce (62%), and fostering entrepreneurship and innovation (56%).

One policymaker said: "By promoting transparency and accountability, OSS aligns with sustainable development, forming a solid foundation for sustainable economic growth in the Global South over the coming decades."

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)

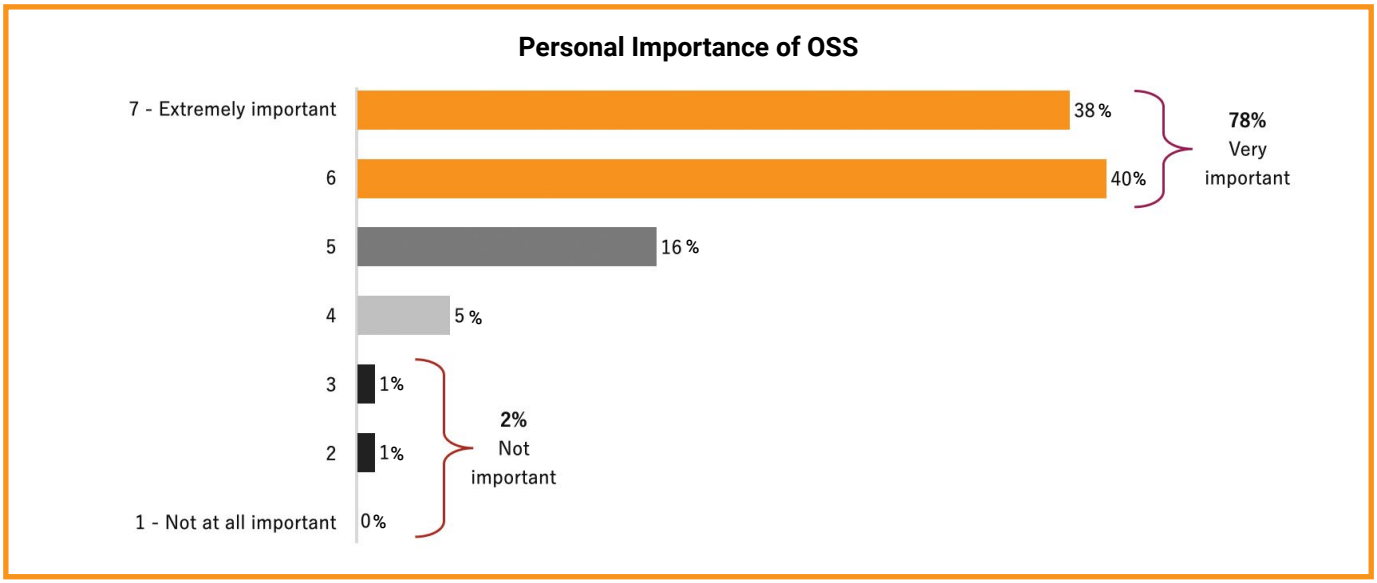
This influence is poised to increase further. While 70% of participants report their OSS communities are still developing, the vast majority (84%) indicate these communities are growing, with just over half describing this growth as “rapid.” This trend suggests a promising future for OSS ecosystems in this region.



Personal Impacts

Several critical elements shape developers’ beliefs about the impact of OSS. One key factor is a strong correlation between developers’ personal and professional investment in OSS and their perception of its societal value. A significant majority (78%) view OSS as crucial for advancing their personal goals, while 73% consider it very important to their work or studies. This alignment between individual aspirations and professional development underscores the pervasive importance of OSS in the lives of developers in the Global South.

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



This personal and professional significance creates a virtuous cycle of OSS usage and benefits. Developers who place high importance on OSS tend to view it as more flexible (63%) and more secure (50%) than proprietary software, while also recognising its role in facilitating continuous learning (61%) and connecting them to a global community of peers who can provide guidance and advice (58%).

Developers who consider OSS personally important report enhanced career prospects and financial benefits. Compared to their peers, these developers are more likely to experience expanded career opportunities (45% vs. 31%) and increased earnings (36% vs. 29%) through their involvement with OSS. And while impacts on technological skills and networking are marginal for most developers in our sample, those who said OSS was personally important were more likely to say using OSS has improved their technical skills (45% vs. 37%) and has expanded their professional networks (37% vs. 30%).

Societal Impacts

The impacts of OSS extend beyond personal benefits for these highly engaged developers. They perceive OSS as a key driver of economic and social progress. The impacts of OSS on both the tech sector and broader economic development in the Global South are substantial.

A majority (65%) of these developers believe that

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)

their countries' digital sectors are fundamentally dependent on OSS. In an open-ended question about local OSS impacts, 33% of participants highlighted A majority (65%) of these developers believe that their countries' digital sectors are fundamentally dependent on OSS. In an open-ended question about local OSS impacts, 33% of participants highlighted its influence on technology and innovation. They noted that OSS makes technology more accessible to a wider population and contributes to overall improvements in software development practices. These findings underscore the critical role of OSS in driving technological advancement and democratising access to digital tools in emerging economies.

The survey also revealed strong perceptions of OSS's economic impact. An overwhelming 86% of participants agreed that OSS participation enables people from their countries to contribute to global innovation, fostering international collaboration and knowledge exchange. When asked about local impacts in an open-ended format, 46% of respondents pointed to economic and social benefits. These include enhanced job creation and employment opportunities, as well as improved access to government and healthcare services. Such responses indicate that OSS is perceived not just as a technological tool, but as a catalyst for broader economic development and social progress in the Global South.

A key moderating factor in all of this is the maturity of a country's OSS community. OSS community maturity significantly shapes perceptions of OSS's impact. Developers from more established OSS communities report stronger economic benefits than their less mature counterparts (62% vs. 55%) and are more optimistic about OSS's role in future economic growth over the next decade (70% vs. 59%). These mature communities also perceive broader societal benefits, with higher agreement that OSS enables women to develop skills and advance careers (51% vs. 43% in less mature communities), and that it enables their countries to contribute to global innovation (66% vs. 52%). This correlation suggests that as OSS communities develop, their perceived positive impact on both economic and social fronts intensifies.

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



Global South & Policy Considerations

While our study primarily focused on developers, we also sought insights from policymakers and OSS leaders to gain a more comprehensive view of the OSS ecosystem in the Global South. These participants generally expressed strong belief in the positive impacts of OSS on their communities. One interviewee highlighted critical factors that will influence the direction of OSS communities, saying, "The direction of the community will depend on factors like government support, international partnerships, and the growth of technology education and infrastructure."

Perhaps unsurprisingly, 7 out of 9 policymakers interviewed as part of this study were aware of the United Nations' involvement in Digital Public Goods (DPGs). They view the UN as playing a crucial role in facilitating collaboration and promoting OSS projects that align with the DPG definition, suggesting a growing recognition of the intersection between OSS, international development, and public policy[3].

These policymakers advocated for partnerships between the UN and OSS foundations. Such collaborations are essential for effectively governing and promoting projects that qualify as DPGs. This recognition of the potential synergies between international organisations, OSS communities, and local development initiatives indicates a growing awareness among some policymakers of the importance of OSS and DPGs in development strategies for the Global South.

[3]The UN Secretary General's High-level Panel on Digital Cooperation called for a multi-stakeholder initiative to support the use of digital public goods, which resulted in the creation of the Digital Public Goods Alliance.

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)

"Sustainable development... means finding ways to grow the economy while also taking care of people and the environment," said one policymaker. "Collaboration between government, private sector, civil society, and international partners is essential to achieve sustainable development goals and create a more resilient and equitable future."



COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



Conclusions & Recommendations

This study demonstrates that open source software plays a crucial role in driving innovation, economic growth, and social development across the Global South. Developers in low-and middle-income countries are increasingly shaping the future of technology and OSS, bringing unique perspectives and innovative solutions to global challenges. Their contributions enrich the global OSS ecosystem with diverse approaches to problem-solving, often born from addressing local needs with limited resources. These developers are not merely adopting existing technologies, but actively creating and adapting OSS to suit their specific contexts, resulting in more versatile and globally applicable solutions and innovation. By participating in global OSS projects, they are fostering cross-cultural collaboration and driving innovation that benefits users worldwide, ultimately leading to a more inclusive and representative technological landscape.

Yet, there is still significant room for growth in OSS participation and engagement in the Global South region. To fully unlock this potential, we recommend efforts in the following key areas:

1. Enhance OSS adoption:

- Implement robust security practices
- Provide career growth opportunities
- Ensure comprehensive documentation
- Promote appropriate OSS licensing

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)

2. Foster multi-stakeholder collaboration:

Encourage partnerships among governments, international organisations, NGOs, OSS foundations, educational institutions, and private companies to provide:

- Necessary infrastructure
- Mentorship and training programs
- Funding opportunities
- Job creation in the OSS sector

"Promoting open source software participation in the Global South requires building capacity and providing education to local communities," said one policymaker. "Develop training programs, workshops, and resources to help people gain the skills needed to contribute to OSS. This focus on capacity building ensures that your efforts have a lasting impact, fostering a new generation of open source developers in the Global South."

Specific Recommendations for Key Stakeholders:

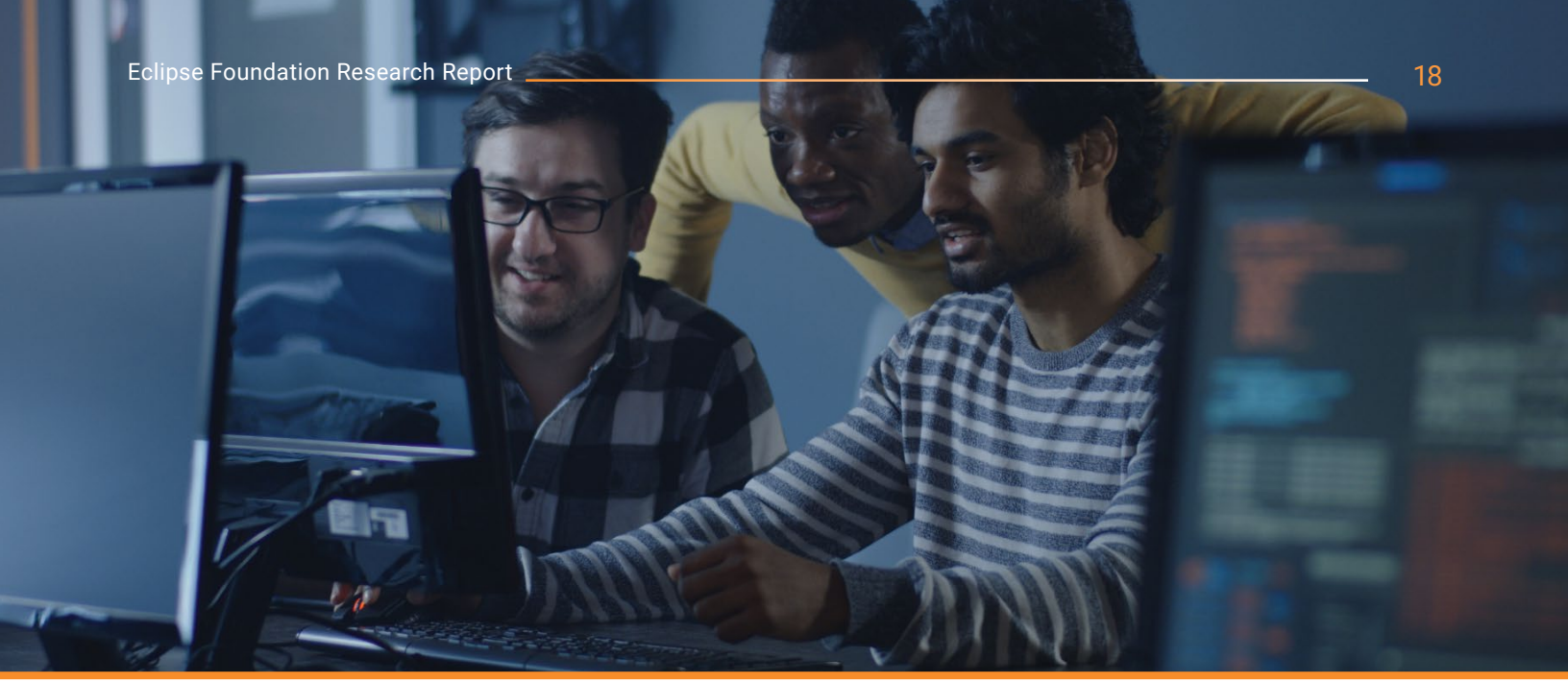
For Developers: Take advantage of OSS as an opportunity to experiment and build up high-demand skills. Actively engaged with the OSS community to build your network and deepen your understanding of the technology and trends you are working on. Leverage these collaboration and learning opportunities to drive career growth and innovation.

For Policymakers: Create an OSS-friendly environment for companies, individual developers, and students. Promote community groups to foster networking and a broad support structure. Incentivise and support company engagement with OSS and the OSS community. Partner with OSS foundations to promote sustainable development goals and regional innovation.

For Business Leaders: Support developers by offering grants, sponsorships, and funding for OSS projects and foundations relevant to your business. Organise local workshops, hackathons, and meetups to foster collaboration. Identify potential employees based on their contributions to OSS projects.

By implementing these recommendations, we can nurture talent in the Global South, creating a more inclusive and innovative global OSS ecosystem. As these communities grow, their contributions will increasingly shape the future of technology, driving economic growth and international collaboration.

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



Methodology

This survey was conducted and produced by ClearPath Strategies, a strategic consulting and research firm, and commissioned by the Eclipse Foundation. Following are the firm's research notes for this survey.

Respondent selection

The survey included 407 respondents sourced from a leading global online panel provider using both online sources and phone recruits. Additionally, 16 respondents were sourced via OSS community partners in the Global South.

Respondents were selected based on role, geographic location, and familiarity with and use of OSS. Selected respondents were further screened based on self-reported IT knowledge and attentiveness to survey questions.

Qualitative data was collected via 8 in-depth interviews and 9 qualitative survey responses with OSS community leaders and policymakers in the Global South.

Geographic quotas

The survey included respondents from 18 different countries. We combine these broadly into three geographical regions: Africa (51% South Africa, Kenya, Nigeria, Egypt, Ethiopia, Morocco, Lesotho, Gambia), Asia (36% India, Singapore, Vietnam, Indonesia, The Philippines, Thailand), and Latin America (11% Brazil, Argentina, Colombia, Chile).

Industry

The final breakdown of respondents by industry is as follows: IT 54%, Financial Services 9%, Telecommunications 7%, Healthcare, Pharmaceuticals, Biotech, Life Sciences 5%, Wholesale and Retail, 4%, Non-Financial Services 4%, Light Industry 3%, Infrastructure, Construction,

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)

Engineering 2%, Transportation 2%, Public Sector, Government 2%, Accommodation and Food Services 1%, Non-Governmental Organisations 1%.

Additional notes on respondent screens

Potential respondents were screened out on several criteria:

Role: This survey was primarily limited to software developers in the Global South. A small number of policymakers were also interviewed to answer questions related to Digital Public Goods (DPGs) and Digital Public Infrastructures (DPIs).

Employment status: All participants were asked to provide their employment status, and only full-time or part-time employees or students were invited to participate in this research.

"Attention" level: It is easy for respondents to speed through surveys or not pay enough attention to provide useful data. We make an effort to exclude these respondents, as they provide generally less useful data. In this survey, respondents were screened out for "attention" reasons if they said they could explain the made-up term "Greenfield as a Service (GaaS)" to a colleague in the same question used for the Information Screen noted above.

A note on margin of error

It is technically impossible and improper to list a margin of error for a survey of this type. The respondents for this sample were recruited from a variety of sources, including online panels and phone recruits with support from regional open source community organisations. The relationship of this sample to the total universe of potential respondents, about which we do not know the true demographics, is unknown. As such, the exact representativeness of this, or any similarly produced sample, is unknown.

Collaborators

- Open Source Community Africa
- FOSSASIA

COPYRIGHT (C) 2024, ECLIPSE FOUNDATION | THIS WORK IS LICENCED UNDER A CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL (CC BY-SA 4.0)



ECLIPSE®
FOUNDATION

About the Eclipse Foundation

The Eclipse Foundation provides our global community of individuals and organisations with a business-friendly environment for open source software collaboration and innovation. We host the Eclipse IDE, Adoptium, Software Defined Vehicle, Jakarta EE, and **over 415+** open source projects, including runtimes, tools, specifications, and frameworks for cloud and edge applications, IoT, AI, automotive, systems engineering, open processor designs, and many others. Headquartered in Brussels, Belgium, the Eclipse Foundation is an international non-profit association supported by over **360** members.

To learn more, follow us on social media @EclipseFdn, LinkedIn, or visit eclipse.org.