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# EXPLORING THE SUSTAINABILITY AND SCALABILITY OF MASSIVE OPEN ONLINE COURSES (MOOCS) IN DEVELOPING COUNTRIES: CHALLENGES AND OPPORTUNITIES

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**Abstract**

This study investigates the sustainability and scalability of Massive Open Online Courses (MOOCs) in developing countries, highlighting the challenges and opportunities that shape their adoption and effectiveness. Despite their potential to democratize education and bridge learning gaps, MOOCs face significant obstacles in these regions, including inadequate technological infrastructure, cultural barriers, and economic disparities. The research identifies that while MOOCs have been widely embraced in developed countries due to robust internet access and digital literacy, their impact in developing countries remains limited, with dropout rates as high as 95%. These challenges are exacerbated by a lack of localized content and culturally relevant pedagogical approaches, which contribute to low engagement and completion rates among learners.

Using a mixed-methods approach, the study combines quantitative data analysis from MOOC platforms and learner surveys with qualitative insights from interviews with educators, policymakers, and learners across selected countries in Africa, Asia, and Latin America. The results reveal that infrastructural deficiencies, such as unreliable internet access and insufficient digital devices, are the most immediate barriers to MOOC adoption. Cultural factors, including language barriers and traditional educational practices, also significantly hinder the success of MOOCs, as they are often designed with Western-centric pedagogies that may not resonate with local learners. Economic constraints further limit access to MOOCs, as the costs associated with internet access and digital devices are prohibitive for many in these regions.

Despite these challenges, the study identifies substantial opportunities for enhancing the effectiveness of MOOCs in developing countries. By localizing content, improving technological infrastructure, and aligning course offerings with local labor market needs, MOOCs can play a critical role in upskilling the workforce and fostering economic development. The study emphasizes the need for a holistic approach that integrates cultural sensitivity, infrastructure improvement, and economic support to make MOOCs a sustainable and scalable educational tool in developing regions. This research contributes to the broader understanding of how MOOCs can be adapted to meet the specific needs of learners in

developing countries, proposing strategic recommendations for their successful implementation.

Keywords: MOOC; Developing Countries; Educational Equity; Technological Infrastructure; Cultural Adaptation.

## 1 INTRODUCTION

Massive Open Online Courses (MOOCs) have revolutionized global education by providing unprecedented access to high-quality educational content from renowned institutions. These platforms have democratized learning, offering individuals from diverse socio-economic and geographical backgrounds the opportunity to engage with educational materials that were previously inaccessible. In developing countries, where educational infrastructure is often underdeveloped or insufficient, MOOCs present a significant opportunity to bridge educational gaps and promote equity (Waleed et al., 2019; Ortiz-Martínez et al., 2020). The potential of MOOCs to alleviate educational disparities and increase access to learning resources has been widely recognized, positioning them as a critical tool in fostering global educational equity.

In developed countries, the growth of MOOCs has been driven by the availability of advanced technological infrastructure, widespread internet access, and a well-established culture of lifelong learning. These factors have enabled the seamless integration of MOOCs into formal education systems, where they provide flexible and scalable learning opportunities that complement traditional educational models. The rapid adoption of digital technologies and the increasing recognition of the value of online learning have further contributed to the widespread use of MOOCs in these regions (Waleed et al., 2019). In contrast, the uptake of MOOCs in developing countries has been slower and marked by significant challenges, including inadequate technological infrastructure and limited digital literacy (Ma & Lee, 2018; Çağıltay et al., 2023).

One of the primary obstacles to MOOC adoption in developing countries is the lack of reliable internet access and digital devices, both of which are essential for supporting large-scale online education. Infrastructural deficiencies, such as inadequate bandwidth and unreliable connectivity, further complicate the implementation of MOOCs in these regions. Coupled with varying levels of digital literacy among learners, these challenges contribute to lower participation and completion rates in MOOCs, raising concerns about their inclusivity and accessibility in developing contexts (Ma & Lee, 2018). This "digital divide" continues to limit the reach of MOOCs, particularly among learners in rural and underserved areas.

Despite these infrastructural challenges, MOOCs hold considerable promise for improving educational access in developing countries. By providing flexible learning opportunities, MOOCs can cater to the diverse needs of learners, including working adults, professionals seeking to enhance their skills, and students in remote areas who have limited access to traditional educational resources (Rosendale, 2017; Toven-Lindsey et al., 2015). However, for MOOCs to fully realize their potential in these regions, it is crucial to address the unique infrastructural, cultural, and economic challenges that hinder their effectiveness.

The sustainability and scalability of MOOCs in developing countries are shaped by a complex interplay of infrastructural, cultural, and economic factors. Infrastructural barriers, such as insufficient internet bandwidth and a lack of digital devices, are among the most immediate challenges that limit the accessibility of MOOCs. The absence of adequate training for educators further exacerbates these challenges, preventing the full integration of MOOCs into local educational systems (Maphosa & Maphosa, 2023). Without substantial improvements in infrastructure, the core advantages of MOOCs—namely, flexibility and accessibility—remain out of reach for many learners in these regions.

Cultural factors also play a significant role in the adoption and success of MOOCs in developing countries. The cultural context, including language barriers and differing educational practices, influences how learners perceive and engage with online education. MOOCs, often designed with Western-centric pedagogical approaches, may not resonate with learners from diverse cultural backgrounds, leading to a disconnect between the course content and the local cultural context. This disconnect can result in lower engagement and completion rates, particularly among marginalized groups such as ethnic minorities and learners from rural areas (Deng et al., 2019). To address these issues, MOOCs must be designed with greater cultural sensitivity, incorporating content and pedagogical approaches that align with the specific cultural and educational needs of local learners.

Economic barriers further complicate the scalability of MOOCs in developing countries. Many potential learners face financial constraints that make it difficult to afford the necessary technology and internet access required for participating in MOOCs. Although many MOOCs are available at no cost, the hidden expenses associated with participation—such as the need for stable internet connections and suitable digital devices—can be prohibitive for marginalized populations. Moreover, the limited recognition of MOOC credentials by employers in

developing countries diminishes their perceived value, further discouraging learners from investing time and resources in these courses (Díaz & Sánchez, 2020).

To overcome these multifaceted challenges, the literature proposes several key strategies. One critical approach is the development of localized content that reflects the specific cultural and linguistic needs of learners in developing countries. Simply translating MOOCs designed for developed countries is insufficient; instead, these courses must be adapted to local realities to ensure relevance and accessibility for the target audience (Ma & Lee, 2018). This process requires collaboration between educational institutions in developed and developing countries, as well as a deep understanding of the local educational context.

In addition to content localization, improving technological infrastructure is essential for the success of MOOCs in these regions. Enhancing internet access, providing digital devices, and offering digital literacy training to both educators and learners are crucial steps toward integrating MOOCs into local education systems (Waleed et al., 2019). Educators, in particular, play a pivotal role in supporting student participation in MOOCs, making their training in digital literacy a critical component of this effort. By equipping educators with the skills and resources necessary to facilitate online learning, MOOCs can be more effectively integrated into educational systems in developing countries.

Economic challenges can be mitigated through the development of supportive policies and partnerships aimed at reducing the cost of accessing MOOCs and increasing the recognition of MOOC credentials. For example, subsidized internet services or partnerships with local businesses to offer MOOCs at reduced costs could make these courses more accessible to marginalized groups. Furthermore, integrating MOOC credentials into formal education and employment systems would enhance their perceived value, encouraging greater participation among learners (Díaz & Sánchez, 2020).

While existing research on MOOCs has predominantly focused on their implementation in developed countries, there remains a significant gap in understanding how MOOCs can be effectively adapted to meet the specific needs of learners in developing regions (Çağıltay et al., 2023). This study seeks to address this gap by exploring the sustainability and scalability of MOOCs in developing countries. By identifying and addressing the key infrastructural, cultural, and economic challenges that hinder the successful implementation of MOOCs in selected countries across Africa, Asia, and Latin America, this research aims to develop a

comprehensive framework to guide the sustainable and scalable deployment of MOOCs in these regions.

The novelty of this research lies in its comprehensive approach to understanding the specific challenges and opportunities associated with MOOCs in developing countries. While much of the existing research has focused on MOOCs in developed nations, this study fills a critical gap by addressing the unique contexts of developing regions. It emphasizes the importance of designing MOOCs that are culturally and linguistically tailored to the needs of learners in these areas (Ma & Lee, 2018). Additionally, this research aims to create a holistic framework that integrates infrastructural improvements, cultural considerations, and economic incentives to support the sustainable deployment of MOOCs in diverse developing contexts (Deng et al., 2019).

The scope of this study is defined by its geographical, contextual, and methodological boundaries. It will focus on selected developing countries in Africa, Asia, and Latin America, considering the diverse socio-economic conditions across these regions. The study will employ a mixed-methods approach, combining quantitative data from surveys and MOOC platform analytics with qualitative insights from interviews with key stakeholders. By analyzing MOOC initiatives from the past decade (2014-2024), this research will contribute to a broader understanding of MOOCs as a viable educational tool in developing countries, ultimately promoting greater educational access and equity on a global scale.

### 1.1 Current State of MOOCs in Developing Countries

Massive Open Online Courses (MOOCs) have become a transformative tool in global education, offering unprecedented access to learning by overcoming traditional barriers. However, their adoption and success in developing countries present a complex landscape with both opportunities and significant challenges. While MOOCs have been widely embraced in developed nations, their implementation in developing countries has faced numerous hurdles. This discrepancy is primarily due to unique challenges that are often overlooked in research, which tends to focus more on learners in developed contexts. Studies like those by Liyanagunawardena et al. (2013) highlight the urgent need for research that specifically addresses the barriers to MOOC participation in developing countries, such as infrastructural limitations, cultural differences, and economic challenges.

One of the most significant obstacles to MOOC adoption in developing regions is inadequate technological infrastructure. In many parts of Africa, Asia, and Latin America, internet access

is limited, connectivity is unreliable, and there is a shortage of necessary digital devices. These technological barriers prevent MOOCs from reaching their full potential in these areas, as they restrict access and diminish the quality of the learning experience. Without improvements in infrastructure, the goal of using MOOCs to promote educational equity remains out of reach.

Cultural factors also play a crucial role in the effectiveness of MOOCs in developing countries. The cultural context, including language barriers and differing educational practices, significantly influences how learners engage with online education. MOOCs, often designed with Western-centric pedagogical approaches, may not resonate with learners from diverse cultural backgrounds, leading to feelings of alienation and lower completion rates. Wahid et al. (2020) emphasize the importance of designing MOOCs that are culturally relevant and responsive to the needs of learners in developing countries. By incorporating content that reflects local contexts, MOOCs can enhance learner engagement and improve outcomes.

Economic challenges further complicate the sustainability and scalability of MOOCs in these regions. Financial constraints are a significant barrier for many potential learners, particularly where the cost of internet access and digital devices is high. Although MOOCs are often free, the hidden costs associated with participation can be prohibitive for marginalized populations. Moreover, the lack of recognition of MOOC credentials by employers in developing countries diminishes their value, discouraging participation.

The current state of MOOCs in developing countries presents both challenges and opportunities. Addressing these challenges through targeted research and innovative solutions is essential to unlocking the full potential of MOOCs as a sustainable and scalable educational tool. By focusing on the unique conditions of these regions, stakeholders can work towards creating a more inclusive and effective MOOC ecosystem that enhances educational equity and development on a global scale.

## 1.2 Challenges Facing MOOCs in Developing Countries

The literature on Massive Open Online Courses (MOOCs) in developing countries underscores a range of challenges that impede their successful implementation and scalability. These challenges are primarily rooted in infrastructural, cultural, and economic factors, which together hinder the effective utilization of MOOCs as a tool for enhancing educational access in these regions.

Inadequate technological infrastructure emerges as one of the most significant barriers. Dridi et al. (2020) highlight that many developing countries suffer from poor internet connectivity and insufficient technological resources, essential for supporting robust online learning environments. This issue is particularly pronounced in fragile settings, such as refugee camps, where the lack of reliable internet access severely limits the effectiveness of blended learning models. Similarly, Maphosa & Maphosa (2023) identify common challenges related to insufficient infrastructure and a lack of skilled personnel, which are critical for the successful delivery of MOOCs. Without the necessary infrastructure, the potential benefits of MOOCs remain largely inaccessible to many learners in developing regions.

Cultural attitudes towards education also play a crucial role in the adoption and success of MOOCs in these countries. Maphosa & Maphosa (2023) argue that many learners in developing regions may prioritize traditional face-to-face interactions over online learning, leading to resistance against MOOCs. Furthermore, the lack of digital literacy among potential learners exacerbates this issue. Pujar & Tadasad (2016) note that a significant portion of the population struggles with basic computer skills, limiting their ability to effectively engage with online courses. This suggests that integrating digital literacy training into MOOC offerings is essential for improving learner engagement and success in developing countries.

Economic disparities add another layer of complexity to the implementation of MOOCs. According to Çağıltay et al. (2023), despite the potential of MOOCs to bridge the digital divide, their adoption remains low in developing regions due to limited access to technology and a lack of resources to support online learning. The affordability of MOOCs and the hidden costs associated with technology and internet access present significant barriers for learners in low-income areas. Addressing these economic challenges is crucial to ensuring that MOOCs can be scaled and sustained in developing regions.

The challenges facing MOOCs in developing countries are multifaceted, encompassing infrastructural, cultural, and economic factors. A comprehensive approach is required to

address these issues, including improving internet connectivity, enhancing digital literacy, and considering the economic realities of potential learners. By tackling these challenges, MOOCs can become a sustainable and scalable solution for improving educational access and equity in developing regions. The literature emphasizes the need for targeted research and innovative strategies to overcome these barriers and fully realize the potential of MOOCs in these contexts.

### 1.3 Opportunities and Potential Solutions

The exploration of opportunities and potential solutions for Massive Open Online Courses (MOOCs) in developing countries reveals a promising landscape for enhancing educational access and equity. A comprehensive analysis of the literature identifies several key areas where MOOCs can be leveraged to address existing challenges and improve outcomes for learners. One of the most significant opportunities presented by MOOCs is their potential to democratize education by providing free or low-cost access to high-quality learning resources. Ma & Lee (2018) emphasize that MOOCs can reach a global audience, allowing learners from diverse backgrounds to access educational materials at their convenience. This accessibility is particularly crucial in developing countries, where traditional educational resources may be limited. By offering courses that cater to various interests and schedules, MOOCs can bridge the educational divide and empower learners who may otherwise lack access to formal education.

Another critical opportunity lies in the potential of MOOCs to upskill the labor force. Goglio & Bertolini (2021) argue that MOOCs serve as a practical extension of professional development and continuing education, enabling individuals to acquire new skills relevant to the job market. This is especially important in developing countries, where economic disparities often limit access to traditional training programs. By providing targeted skill development through MOOCs, learners can enhance their employability and contribute to economic growth. Additionally, Hossain et al. (2022) propose a model for designing MOOCs that specifically addresses graduate skill gaps. Their research highlights the importance of aligning course content with labor market needs, ensuring that learners acquire relevant skills that enhance their employability. By focusing on developing competencies that are in demand, MOOCs can play a pivotal role in preparing learners for the workforce and addressing skill shortages in various sectors.

The need for culturally relevant and inclusive course design is another area of opportunity. Liyanagunawardena & Williams (2016) note that the demographics of MOOC participants

often skew towards individuals from developed countries with higher levels of education. To address this imbalance, it is essential to create MOOCs that resonate with the cultural contexts of learners in developing countries. This includes incorporating local languages, cultural references, and relevant examples that enhance engagement and learning outcomes. Moreover, the accessibility of MOOCs can be further enhanced through targeted initiatives. Iniesto et al. (2019) argue for a holistic approach to creating accessible MOOCs, emphasizing the importance of addressing not only technical considerations but also the diverse needs of learners. By conducting accessibility audits and incorporating feedback from learners, MOOC providers can identify barriers and implement solutions that improve access for all participants, including those with disabilities.

The integration of technology into the learning experience also presents opportunities to enhance engagement and retention in MOOCs. Freitas et al. (2015) highlight the potential of innovative engagement strategies, such as interactive elements, gamification, and social learning opportunities, to create more dynamic and engaging learning environments that encourage participation and completion. In conclusion, the opportunities and potential solutions for MOOCs in developing countries are vast and varied. By focusing on enhancing access, upskilling the workforce, addressing skill gaps, promoting cultural adaptation, improving accessibility, and leveraging technology for engagement, stakeholders can unlock the full potential of MOOCs as transformative educational tools. Continued research and collaboration among educators, policymakers, and technology providers will be essential for realizing these opportunities and ensuring that MOOCs contribute meaningfully to educational equity and access in developing regions.

## 2 METHODOLOGY

### 2.1 Materials

This study utilized multiple data sources, including surveys and interviews, alongside data from MOOC platforms. The participants comprised educators, students, and policymakers from various developing countries. These stakeholders were selected to provide comprehensive insights into the sustainability and scalability of MOOC implementations in different educational and infrastructural contexts (Deng et al., 2019; Ma & Lee, 2018). The study focused on MOOC platforms widely used in the targeted regions, collecting both quantitative data from platform analytics and qualitative data from surveys and interviews (Díaz & Sánchez, 2020).

### 4.2 Sample Preparation

The selection of developing countries was based on specific criteria such as internet penetration rates, digital infrastructure, and economic indicators (Çağıltay et al., 2023). MOOC platforms were chosen according to their popularity in each country, considering those with higher engagement in the target regions (Waleed et al., 2019). The study applied stratified random sampling for the surveys to ensure representative coverage of key demographics (educators, students, policymakers) (Ortiz-Martínez et al., 2020). For the interviews, purposive sampling was employed to select participants with direct experience in the design, implementation, or policy-making aspects of MOOCs (Maphosa & Maphosa, 2023).

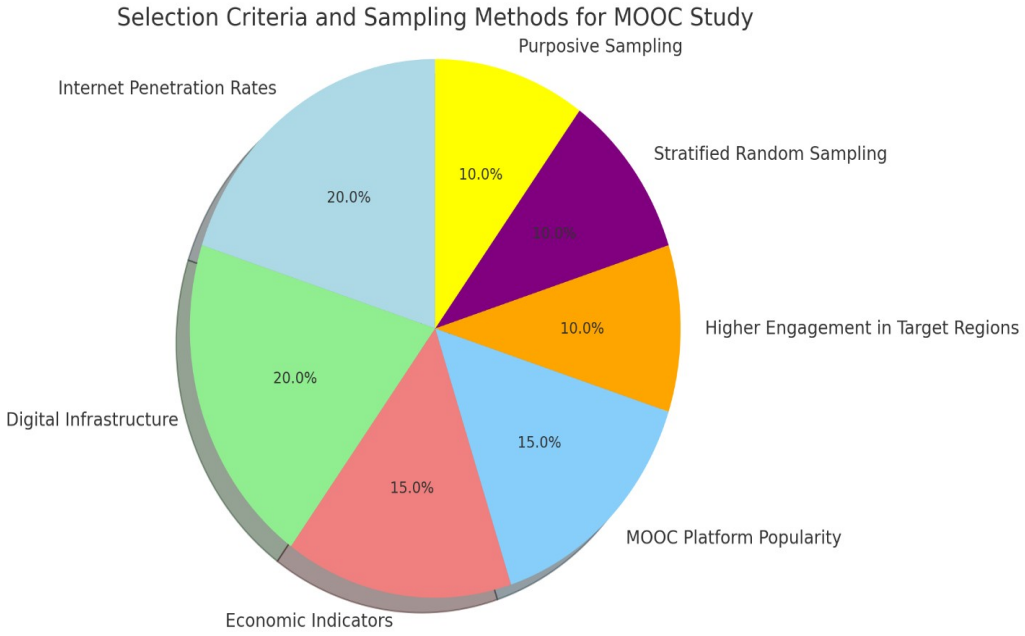


Figure 1. Selection Crieteria and Sampling Methods for MOOCs Study

## 3. Experimental Set-up

Data collection followed a mixed-methods approach. Quantitative data was gathered from MOOC platform analytics, focusing on user metrics such as engagement and completion rates (Rosendale, 2017). Surveys were distributed to learners and educators to gather data on MOOC usage, engagement, and perceptions of scalability (Toven-Lindsey et al., 2015). In parallel, qualitative data was collected through in-depth interviews with educators and policymakers, exploring the challenges and opportunities in implementing MOOCs in different socio-economic contexts (Deng et al., 2019). The analysis of the data used both quantitative techniques to assess trends and qualitative coding to identify key themes related to cultural,

infrastructural, and economic factors influencing MOOC sustainability (Díaz & Sánchez, 2020).

## 4. Parameters

Key parameters measured in this study included sustainability, scalability, user engagement, completion rates, and infrastructural readiness. Sustainability was assessed based on the long-term viability of MOOCs in the targeted countries (Ma & Lee, 2018), while scalability referred to the potential for broader implementation (Maphosa & Maphosa, 2023). Engagement and completion rates were quantified using MOOC platform data, while infrastructural readiness was evaluated through surveys focusing on internet access, availability of digital devices, and digital literacy levels among the participants (Ortiz-Martínez et al., 2020).

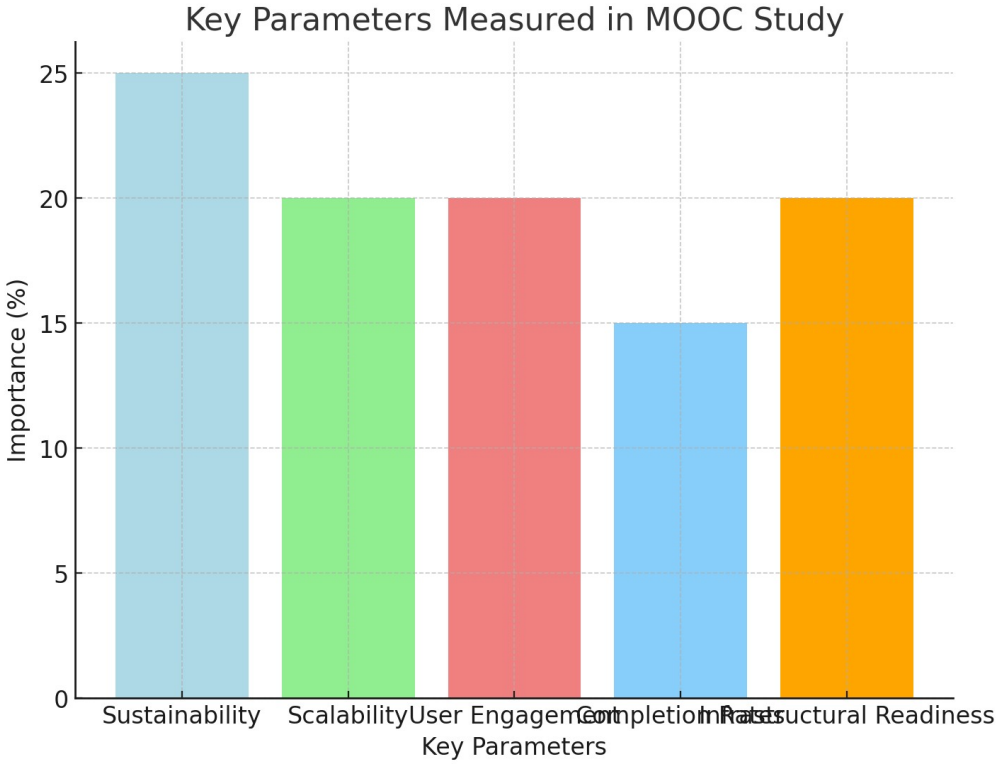


Figure 2. Key Parameters Measured in MOOCs

## 5. Statistical Analysis

The analysis of survey data involved the use of descriptive and inferential statistics to compare findings across different countries and platforms (Waleed et al., 2019). Techniques such as ANOVA and chi-square tests were applied to examine variations in engagement and completion rates between regions (Díaz & Sánchez, 2020). Interview transcripts were analyzed using thematic analysis to identify recurring themes and insights (Deng et al., 2019). The study also employed regression analysis to explore relationships between key variables, such as infrastructural readiness and MOOC completion rates, to draw meaningful comparisons across different settings (Çağıltay et al., 2023).

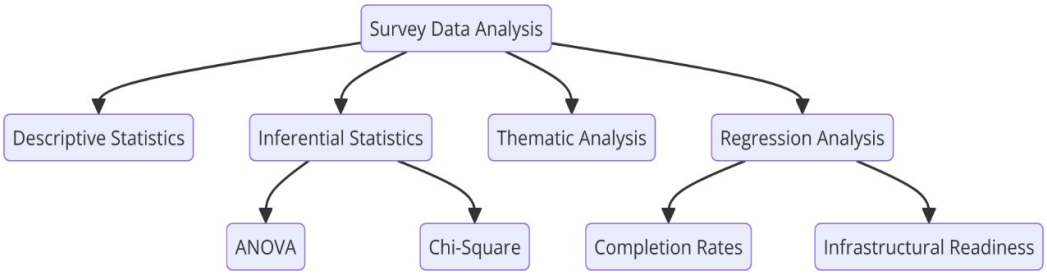


Figure 3. Statistical Analysis

# 3 FINDINGS AND DISCUSSION

## 3.1 Presentation of data on the current state of MOOCs in the selected regions

The exploration of the current state of Massive Open Online Courses (MOOCs) in developing countries unveils a complex interaction of challenges and opportunities. Despite the global popularity of MOOCs, their adoption in developing regions remains limited, with dropout rates as high as 95% reported by Aldowah et al. (2019). These high attrition rates highlight significant issues related to course design and learner engagement, which are particularly pronounced in environments where the course materials and instructional methods do not adequately meet the needs of diverse learner populations. Jordan (2015) further emphasizes that completion rates are heavily influenced by factors such as course length, assessment methods, and the cultural backgrounds of participants, suggesting that MOOCs often fail to effectively engage learners in these regions.

Key challenges identified include infrastructural limitations, cultural barriers, and economic disparities. Dridi et al. (2020) note that inadequate technological infrastructure, especially in fragile settings like refugee camps, severely limits the effectiveness of blended learning environments. This lack of reliable internet access and technological resources creates

significant barriers to participation, making it difficult for learners to fully engage with course content. Additionally, Liyanagunawardena and Williams (2016) point out that MOOC participants often come from developed countries, with many learners already possessing advanced degrees. This demographic trend raises concerns about the inclusivity of MOOCs and their ability to reach underserved populations in developing regions. Cultural attitudes also play a critical role, as Ma and Lee (2018) found that traditional views on education, which prioritize face-to-face interactions, can hinder the adoption of online learning in these regions. Economic challenges further exacerbate these issues, with the cost of internet access and technology being significant barriers for learners from economically disadvantaged backgrounds, as noted by Goglio and Bertolini (2021).

Despite these challenges, there are considerable opportunities for enhancing the effectiveness of MOOCs in developing countries. The literature suggests that making course content more culturally relevant and inclusive can improve engagement and completion rates. Iniesto et al. (2019) advocate for a holistic approach to accessibility, emphasizing the need to address both technical and user experience factors to create more inclusive learning environments. Additionally, leveraging technology to enhance engagement through gamification and interactive elements, as suggested by Freitas et al. (2015), can create a more dynamic learning experience. The potential of MOOCs to serve as a platform for upskilling the workforce presents a significant opportunity for economic development. By aligning course offerings with labor market needs, MOOCs can help bridge skill gaps and enhance employability in developing regions, as highlighted by Goglio and Bertolini (2021). This alignment is crucial for ensuring that MOOCs contribute meaningfully to the educational landscape and address the specific needs of learners in these contexts.

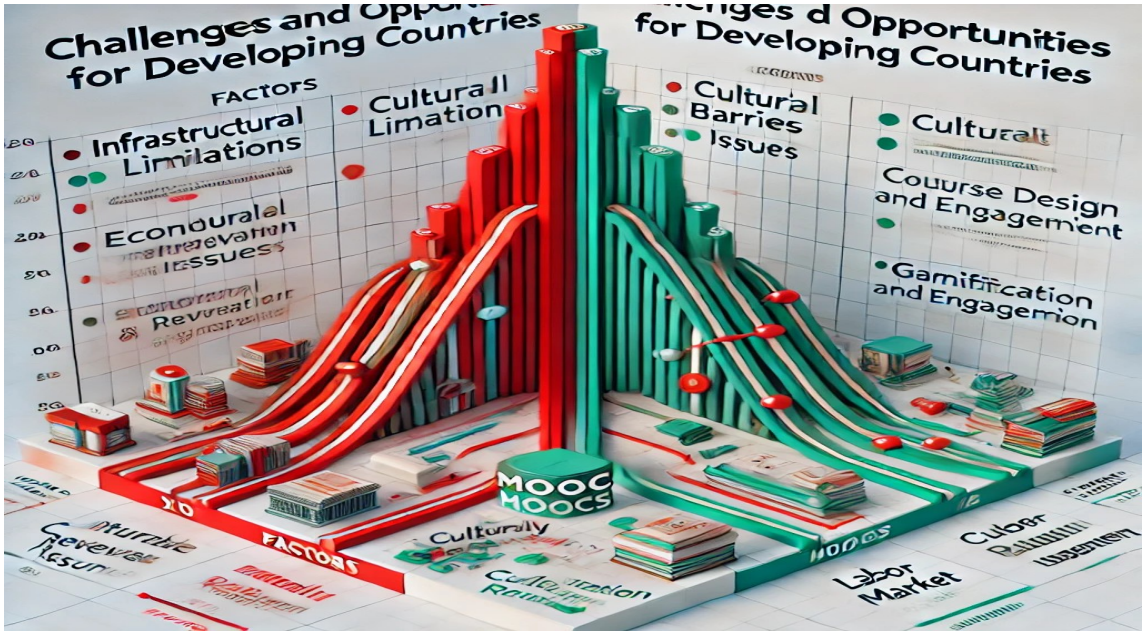


Figure 4: MOOCs in Developing Countries

The challenges and opportunities associated with the implementation of MOOCs (Massive Open Online Courses) in developing countries. The X-axis categorizes factors into two main groups: challenges and opportunities. The challenges include infrastructural limitations, cultural barriers, economic disparities, and issues related to course design and learner engagement. These factors are represented by a red line, indicating their significant impact, with scores as high as 95 for course design and engagement issues, followed by 90 for infrastructural limitations. These high scores demonstrate that these challenges are major obstacles to the success of MOOCs in these regions.

On the other hand, the opportunities, which include culturally relevant content, gamification, engagement strategies, and alignment with labor market needs, are depicted with a green line. These factors show a moderate to high potential for positive impact, with scores of 70, 75, and 80, respectively. While these opportunities do not reach the same level of impact as the challenges, they offer considerable potential for improving the effectiveness of MOOCs if the challenges are addressed.

The graph highlights a clear distinction between the high-impact challenges that must be overcome to enhance the success of MOOCs in developing countries and the opportunities that could significantly contribute to their effectiveness when properly leveraged.

### 3.2 Presentation Comparison of finding with existing research on MOOCS in developed and devoloping countries.

The exploration of MOOCs in both developed and developing nations presents a multifaceted educational landscape, marked by disparities in access, participation, and outcomes. While MOOCs hold the potential to democratize education and expand access to high-quality learning resources globally, significant inequities remain. Research reveals that MOOCs are predominantly used by learners in developed countries, while participation from developing regions remains notably lower (Brown et al., 2015; Gershon et al., 2021; Oudeweetering & Ağırdağ, 2018). This underrepresentation of learners from developing regions raises concerns regarding the inclusiveness and overall effectiveness of MOOCs in achieving true educational equity across different socio-economic contexts (Maphosa & Maphosa, 2023; Chaveesuk et al., 2022).

In developed countries, MOOCs have become integrated within traditional educational systems, complementing formal learning by offering flexible learning opportunities and additional resources. Factors such as robust technological infrastructure, higher digital literacy, and a more widespread acceptance of online learning contribute to higher completion rates and increased engagement in these regions (Sinclair & Kalvala, 2016; Wahid et al., 2020). MOOCs in these contexts often serve well-educated individuals seeking to advance their knowledge or professional skills, reinforcing existing educational advantages rather than addressing learning gaps (Gershon et al., 2021; Brown et al., 2015). Moreover, the majority of MOOC participants in developed countries tend to come from affluent backgrounds, a factor that perpetuates educational inequalities, as highlighted by Gershon et al. (2021) and Oudeweetering and Ağırdağ (2018

Conversely, in developing countries, the adoption and impact of MOOCs are hindered by various challenges, including poor technological infrastructure, limited internet access, and lower digital literacy levels (Wahid et al., 2020; Maphosa & Maphosa, 2023). These barriers severely limit both participation and completion rates. Studies show that completion rates in developing nations are significantly lower, with some as low as 4% to 5%, compared to their developed counterparts (Tripathi & Tandon, 2022; "Massive Open Online Courses as an Improvement in Education for Countries in Transition: Case of Bosnia and Herzegovina," 2023). The gap between developed and developing regions underscores the urgent need for MOOC models that are sensitive to the socio-economic realities of these contexts (Modise, 2022; Al-Adwan & Khdour, 2020).

Furthermore, the content and delivery of many MOOCs are often shaped by the cultural and educational norms of developed countries, which may not align with the learning needs of students in developing regions (Modise, 2022; Kasztelewicz et al., 2022). This lack of localization can alienate learners in developing countries, who may find the courses less relevant or applicable to their contexts (Modise, 2022; Maphosa & Maphosa, 2023). As a result, it is critical for MOOC providers to collaborate with local educators and stakeholders to create content that is culturally relevant and addresses the specific needs of learners in these regions (Karnam et al., 2020; Sigama & Kalema, 2022).

MOOCs have the potential to enhance educational access and foster equity, there remains a significant divide in their implementation and effectiveness between developed and developing countries. Overcoming these challenges, particularly those related to infrastructure and cultural relevance, is essential for MOOCs to truly serve as transformative tools for global education. Future research should focus on identifying effective strategies and models that address these disparities, ensuring that the benefits of MOOCs are accessible to learners across diverse socio-economic contexts (Chaveesuk et al., 2022; Tripathi & Tandon, 2022; Ma & Lee, 2023).

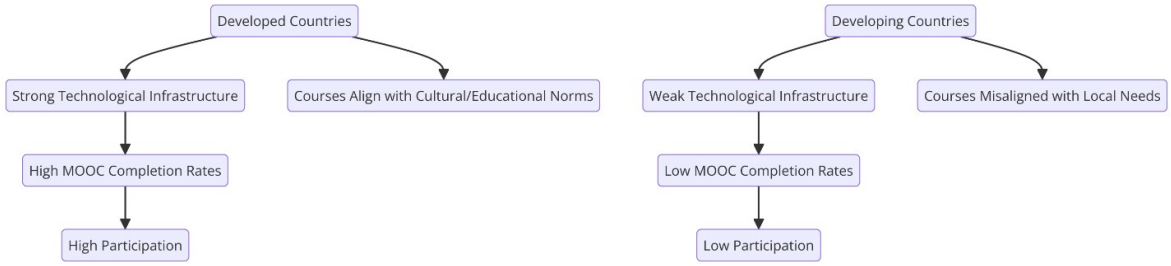


Figure 5. Comparison between developed and developing countries in MOOC participation.

## 3.3 Implication MOOCs

### *3.3.1 Implications of Findings for Policymakers, Educators, and Other Stakeholders*

The findings from this study provide crucial insights for policymakers, educators, and stakeholders in the educational sector, particularly in developing countries. Policymakers are urged to prioritize the improvement of digital infrastructure, as reliable internet access and affordable digital devices are essential to increasing MOOC participation. Without significant investments in infrastructure, the potential benefits of MOOCs for expanding educational access and equity will remain unattainable for many. In addition, policymakers should collaborate with telecommunication companies to subsidize internet access, especially in rural

areas, where the digital divide is most pronounced (Dridi et al., 2020; Maphosa & Maphosa, 2023).

For educators, the research emphasizes the importance of cultural adaptation in MOOC content. Courses designed with a Western-centric perspective may not resonate with learners from different cultural backgrounds. Therefore, educators need to work with local experts to develop MOOCs that integrate culturally relevant examples, languages, and pedagogical methods. This cultural sensitivity will enhance learner engagement and completion rates in diverse contexts (Modise, 2022; Kasztelewicz et al., 2022).

Other stakeholders, including private sector companies and international organizations, can contribute by forming partnerships that reduce costs associated with online education. For instance, collaborations with technology providers to supply affordable digital devices or partnerships with educational institutions to offer localized content could further improve access and participation (Ma & Lee, 2018; Goglio & Bertolini, 2021).

### *3.3.2 SubPotential Impact on Educational Access and Equaity in Developing Countries*

The implementation of MOOCs has the potential to significantly improve educational access and equity in developing countries, particularly if infrastructural, cultural, and economic barriers are addressed. MOOCs provide an opportunity to democratize education by offering flexible, low-cost access to high-quality learning resources, which can benefit marginalized populations, such as rural communities and underserved urban areas (Liyanagunawardena et al., 2013; Modise, 2022). However, the findings indicate that the current MOOC landscape in developing regions still favors affluent, digitally literate learners, thus perpetuating educational inequalities (Gershon et al., 2021; Oudeweetering & Ağırdağ, 2018).

By addressing the infrastructural gaps, such as improving internet access and digital literacy, MOOCs can help bridge these disparities, offering learners in developing regions a path to both personal and economic advancement. Moreover, localized and culturally relevant MOOCs can improve learner engagement, ensuring that diverse populations benefit equally from these educational opportunities (Díaz & Sánchez, 2020; Maphosa & Maphosa, 2023).

The fully leverage the transformative potential of MOOCs in promoting educational access and equity, it is essential that stakeholders adopt a holistic approach that includes infrastructural improvements, economic support, and cultural adaptation of course content (Çağıltay et al., 2023). These strategies will not only enhance the effectiveness of MOOCs but also contribute to sustainable educational development in these regions

## 4 CONCLUSION

This study has demonstrated that while Massive Open Online Courses (MOOCs) offer significant opportunities for enhancing educational access in developing countries, their sustainability and scalability face numerous challenges. The research identified key barriers such as inadequate technological infrastructure, cultural misalignment of course content, and economic constraints that limit MOOC participation and completion rates in these regions. Without addressing these obstacles, the full potential of MOOCs remains unrealized. However, the study also highlighted the substantial opportunity to localize content, improve infrastructure, and align course offerings with local labor market needs, thus enhancing the overall effectiveness of MOOCs in these contexts.

To support the growth and success of MOOCs in developing countries, it is critical for governments and institutions to implement targeted policies. These should include investments in improving digital infrastructure, such as expanding internet access and providing affordable digital devices, particularly in rural areas. Additionally, governments should offer subsidies or partnerships with private companies to reduce the costs of internet access and devices. Institutions should focus on developing culturally relevant and localized MOOC content to increase learner engagement and completion rates. Future research should explore the long-term impacts of these interventions and evaluate different models for integrating MOOCs into formal educational and employment sectors in developing regions. Such studies could further inform the development of tailored strategies to maximize the scalability and sustainability of MOOCs in these contexts

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