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Contribution of online education in access to higher education in Mozambique: Case of ISCED (2015-2018)

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Abstract The Mozambican government adopted Distance Education in order to offer study opportunities to populations living far from large urban centers and who could not reach traditional face-to-face teaching. The aim of this article is to demonstrate the contribution of online education, adopted by the Higher Institute of Education and Science during a period in which the lack of access to higher education promoted an upsurge of national inequality and the development of distance education was focused on a blended perspective. The research was designed with mixed method, using the case study method, based on three sources (observation, interviews, and documents). Was used SPSS 21 (IBM) Amonk, New York, USA and Excel (Microsoft) Washington DC, USA for statistical analysis. In terms of results, it can be seen that the online modality allows many Mozambicans to have access to higher education in Mozambique through the virtual learning environment.

Keywords: disruptive innovation, study opportunities, online, teaching

1. Introduction

In the current context of the problem of access to higher education in countries whose level of economic development is an obstacle to the well-being of the population, giving greater importance to education in general and to higher education, in particular, is an appropriate measure for improving the national economy. Considering "the relationship between higher education and the national economy contributes to economic development and makes it possible to leverage the socio-economic growth of the entire population of the country (Schutzer and Campos 2014). It is education that gives substance to and builds the main bases for the development of a society. The influence of education unfolds directly in social indicators, placing an emerging country on the path to overcome underdevelopment. Therefore, education should be considered the "number one" instrument for the resizing of the structure, both political and economic (Brito 2010).

The fact is that the government of Mozambique has always been guided by the formation of its people. According to Intaque and Subuhana (2018), "The Constitution of the Republic of 1975 considered access to education to be a duty and a right of the entire population, in which the State assumed the role of promoting the necessary conditions so that all Mozambicans could have this right". On the subject, Mazula mentions that, after independence, the Mozambican government had the main objective "the formation of the New Man, with full awareness of the power of his intelligence and the transforming force of his work, in society and in nature; new man free of superstitious and subjective conception" (Mazula 1995).

With these actions, it is clear that education has been a priority for the Mozambican government since the time of Mozambique's independence. However, there is a great challenge in terms of the economic conditions to sustain the whole complex process of materializing an education that is truly comprehensive to all Mozambicans, with the main focus on higher education given the number of existing public and private universities.

In the context of the expansion of education, during the Third Frelimo Congress, held in 1977, at the time of the analysis of the issue of access to education, the first initiatives on distance education in Mozambique were born, according to Neeleman and Nhavoto (2008). With the civil war (1977-1992), efforts to implement distance education had to be stopped. At that time, communications were cut off, schools were operating with increasing difficulties, and many teachers, especially in rural areas, were in danger of death.

Already in the 1990s, many initiatives were carried out in DE in Mozambique, such as the creation of the Banking Training Institute (IFM)[1], the Mozambican Open Secondary Education (ESAM) program[2]. However, there was no significant transformation in educational terms since the number of students enrolled in DE was still negligible compared to the number of enrolments in face-to-face education, according to data from the Ministry of Education of Mozambique (Mombassa and Arruda 2018).

Mombassa and Arruda (2018) also point out that in the 2000s, a new Commission rewrote the strategy. The set of priority pilot projects was submitted for financing through a credit from the World Bank. At this time, the debate on the EaD path in Mozambique was placed under the following terms: Mozambique will not be able to undertake the expansion and diversification of educational opportunities that the Government advocates without resorting to distance education.

It was in the midst of these great debates and moments of decision making on the future of distance education that the commission opted for the creation of the National Institute of Distance Education (INED), responsible for the coordination of distance education, but leaving the production of the courses mainly to the existing institutions, Mombassa and Arruda (2018). INED was created with the responsibility of developing and managing infrastructures for distance education and providing training in specific methodologies for course designers of the various institutions.

The existence of studies that demonstrate the contribution of online education in Mozambique can help the government and other education actors to better reflect on educational policies and interventions aimed at promoting this type of education. In this perspective, this article aims to demonstrate the disruptive innovation process of the largest private higher education institution in Mozambique, focusing on the provision of higher education based on *online* learning technologies.

1.1. Literature review

The concept of online teaching or e-learning, according to Keegan (1980), is characterized by the physical separation of teachers and students by the use of an auto electronic network for the distribution of educational content. Also, because it is influenced by a particular educational organization (thus distinguishing itself from self-study and private tutorials) and by ensuring two-way communication, through the network, between students, between students and teachers, and other stakeholders.

Accordingly, online teaching focuses on interactive learning in which a teaching-learning process is developed, with content availability and feedback from learning activities.

According to Mombassa and Arruda (2018), since 2000, Mozambique has been introducing reforms aimed at providing public institutions with modern technologies as a means of improving public services. For higher education, this scenario would contribute to enabling HEIs to embrace technologies and to diversify and improve their education services, which at the time was an innovative factor.

The promotion of Technologies in higher education in Mozambique is the responsibility of the Ministry of Science and Technology, Higher Education and Technical-Vocational (MCTESTP). This is the central body of the State apparatus, which, in accordance with the principles, objectives, policies, and plans defined by the government, directs, plans, and coordinates the activities within the scope of Science and Technology, Higher Education, and Technical-Vocational Education. Created by Presidential Decree no. 1/2015, of 16 January, this Ministry aims to promote the offer of scientific and technological solutions to citizens in the strategic areas of development defined in the programs of the Government of Mozambique, combined with the promotion of access, expansion, and quality assurance of education at the levels of Technical-Vocational and Higher[3] Education.

In 2005, the Ministry of Science and Technology established the Mozambique Education and Research Network, MoRENet. The MoRENet project is part of the Implementation Strategy of the Informatics Policy. This is a nationwide data network that interconnects academic institutions of higher education and research, developing non-profit activities. The network is intended to be a means for the rapid and effective exchange of teaching and research data among its members and has as its main philosophy to take advantage of and make use of the fiber infrastructure already deployed in the country. The network accommodates public and private academic institutions and research centers. MoRENet is one of the founding members of the UbuntuNet Alliance for Education and Research Networks[4].

[1] It was the first recognized institution dedicated to the training of workers in the banking sector. This institute, created in 1994, opted for the adaptation to the Mozambican context of manuals produced in Portugal, reaching about 3000 people.

[2] ESAM is a non-profit, community-based educational institution belonging to the Catholic Diocese of Lichinga, dedicated to the promotion of General Secondary Education and Teacher Training. Since its arrival in Niassa in 1995, it has set out to increase access to secondary education, favouring rural areas where, at the time, there were no secondary schools.

[3] http://www.mctestp.gov.mz/por/O-Ministerio/Natureza

[4] http://www.morenet.ac.mz/index.php/pt/

1.2. Disruptive innovation

For Audy (2017), “innovation, as derived from scientific knowledge, is the result of a continuum that has in research and the generation of new knowledge its origin and driving force”. It was in this context that many universities in Mozambique began to improve their student services. In Audy's view, “the relationships between science, technology, innovation, and development are interactive, simultaneous and complex, with people as the main driving force of a virtuous cycle, research as a basis, innovation as a vector and development as a consequence” (Audy 2017).

According to Leonel et al (2010), The expression “Disruptive Innovation” (Table 1) was introduced by Christensen (1997), in his book “The Dilemma of Innovation”, being present today in the corporate glossary of all major companies in the world. Disruptive innovations are dramatic, creating new demands, industries, markets, applications, and processes, economic or social. It generates significant, exponential improvements in the performance or quality indicators where they apply (Audy 2017). Still, according to the same author, “Disruptive innovation involves breaking with the status quo, establishing change”, in this context, the greatest barrier emerges, “the resistance to change, either by the people involved in the process or by the institutions themselves, which are ultimately represented by people also, in the performance of their managers” (Audy 2017).

Table 1 Main indicators of a disruptive innovation.

N°	Author	Assumptions
1	Audy (2017)	Disruptive innovations are dramatic, creating new demands, industries, markets, applications, and processes, economic or social. Generate significant, exponential improvements in the performance or quality indicators where they apply.
2	Audy (2017)	Disruptive innovation involves breaking with the status quo, establishing change, and the greatest barrier emerges, the resistance to change, whether by the people involved in the process or by the institutions themselves, which are ultimately represented by the people themselves, in the actions of their managers.
3	Rodrigues et al (2010)	Disruptive innovations, on the other hand, are innovations that allow new market participants to enter the market from relatively simple solutions.
4	Rodrigues et al (2010)	However, disruptive innovation is associated with radical changes, breaking with current paradigms, generating a new technological level where it applies, opening a whole new range of development possibilities and new cycles of incremental innovation, aiming at its sustainability over time.
5	Rodrigues et al (2010)	Disruptive innovation is a methodology to be used by organizations to obtain high returns and growth in the market.

In the view of Leonel et al (2010), disruptive innovations, on the other hand, are innovations that allow the entry of new market participants from relatively simple solutions. The introduction of such innovations opens the door for them to move ahead of consolidated companies and even leaders in their sectors. However, disruptive innovation is associated with radical changes, breaking with current paradigms, generating a new technological level where it applies, opening a whole new range of development possibilities and new cycles of incremental innovation, aiming at its sustainability over time.

According to Leonel et al (2010), there are two types of disruptive innovation: disruptive new market innovations and disruptive low market innovations. Disruptive new market innovations refer to non-consumer-oriented innovations that do not have access to certain products and services due to price, considered high and disruptive low market innovations refer to those innovations introduced in situations where consumers of a product or service do not use (and do not value) all the attributes (sometimes resources that require sophisticated and expensive technologies) incorporated to them by providers and leaders (Leonel et al 2010).

Still on the subject, Leonel et al (2010) state that several authors highlight disruptive innovation as a methodology to be used by organizations to obtain high returns and growth in the market. In fact, in “Fundamentals for Growth”, Christensenzet al (2002) observe that companies interested in generating high-growth businesses should seek disruptive opportunities because the leaders of the sector will not be motivated to pursue them. In the context of higher education, Audy (2017) states that "through the lens of disruptive innovation, educational institutions are at a crossroads, or incorporate this innovation, or will be overcome or challenged by new institutions that emerge or by those that incorporate these new technologies".

In the context of innovation, the development and role of the university, we can identify three examples of disruptive innovation in higher education with profound impact on the present and future of universities, according to (Audy 2017) being: (1) online learning technologies, (2) changes in the profile of jobs in the world of work and continuing education (long life learning), and (3) the third mission and action as a vector of economic and social development. The following is just one example that constitutes the central theme of this article, analyzing the potential impacts, which technology or disruptive approach and the resulting challenges and opportunities.

1.3. Online learning technologies

According to Mombassa and Arruda (2018), one of the gains of significant growth in the field of Information and Communication Technologies in Mozambique "was the introduction of content on technologies in the secondary education curriculum, the consolidation of thematic programs in higher education, and the introduction of distance education in public and private institutions" (Mombassa and Arruda 2018).

Online learning technologies (Table 2) are the vector of radical transformation in the field of education, so much so that worldwide, the success of distance learning is only being possible due to the evolution of Information and Communication Technologies (ICTs). Because, through them, it is possible to have access to content quickly, in an interactive and innovative learning environment. Some of the main technologies used in distance learning center courses are: Virtual Learning Environments (VLE), Video-classes, Audio and Video Conferencing, Chats and Forums, and Virtual Libraries.

Table 2 Some of the main online learning technologies.

Virtual Learning Environments (VLE)	Are online environments that the student accesses, through the computer, to attend the classes and perform the activities. The student receives an access password and enters the "virtual classroom" from anywhere and at any time, just be connected to the Internet. It is in this environment that the course contents and other interactive tools are available, such as video classes, audio and video conferences, chats, forums, and virtual libraries.
Video-classes	As the name implies, these are recorded video lessons that the student can access at any time. They can combine the teacher's speech with presentations, images, sounds, and interactivity. They are usually designed to make the course content more attractive, holding the student's attention for as long as it takes for them to understand that subject.
Audio and Video Conferencing	It is a type of technology that allows students and teachers to establish two-way communication through communication devices such as the computer. In distance learning, audio and video conferencing allow real-time contact between students and tutors or teachers.
Chats and Forums	With chat tools and discussion forums, students can clear up their doubts directly with teachers or tutors or promote group discussions. These conversations are usually stored and are available for the student to access the history at any time.
Virtual Libraries	To meet the needs of students 24 hours a day, 7 days a week, the colleges that offer distance learning higher education courses have virtual collections, where it is possible to download (download) study and consultation materials in digital format, free of charge.

2. Methodology

The present research was designed under the mixed method, using the case study method, to analyze in depth the phenomenon under study. The case study is characterized as an appropriate research strategy when: (1) the questions of interest of the study refer to the how and why; (2) the researcher has little control over the events; (3) the focus is on a contemporary phenomenon in a natural context (Yin 2001). This conception is reinforced by the arguments of Merriam (1988), who defends the case study as an appropriate method for research in which the researcher's interest privileges the understanding of social processes instead of the close relationship between variables. It is within the conception of Merriam (1988) that this study was designed.

In this research, we sought to interpret, in light of the current specialized literature, which are the intervening factors and their relationships, from the point of view of the evidence observed and experiences pointed out by social subjects who were directly involved in the events related to the phenomenon under study. Data and information from a case study can be collected from four different sources: observation, formal documents from the organization under study, personal interviews, and questionnaires. In this study, it was used especially from three sources (observation, interviews, and documents). Some statistical analysis software was also used, such as SPSS 21 (IBM) Amonk, New York, USA, where an ANCOVA analysis was performed and a Chi-square test. Also, was used Excel (Microsoft), Washington DC, USA.

The interviews were carried out occasionally with the four founding members of the African Institute for the Promotion of Distance Education (IAPED), one of whom is an IAPED Administrator and three are members of the ISCED Directorate General, with the following functions: A General Director, an Administrator, and a Technology Director. The other members of the ISCED Directorate General interviewed are: An Academic Director and a Director of Postgraduate Studies, Research, and Extension. A Head of the Systems Administration Section was also interviewed.

The object of the study is an institution of higher education called the Higher Institute of Science and Distance Education (ISCED). It is located in Mozambique, with its headquarters in the city of Beira, has about 10.327 students. The reasons for its choice for this study are based on evidence that it is the only higher education institution in Mozambique to offer distance learning courses in the online modality and has registered very rapid growth. In just four years, it not only tripled the number of students (from 2.535 to 8.457), but expanded its representation in the provinces from 4 to 10 resource centers, consolidated

the quality of its educational services and increased the horizontality of the academic degree offer from six to eleven degrees. This behavior results from the introduction of disruptive innovations, justifying a deeper analysis of its innovation process

3. Results

3.1. Study context

The Instituto Superior de Ciência e Educação à Distância (ISCED) is an open and distance higher education institution, approved by Ministerial Decree no. 41/2014 of 15 August. ISCED is owned by the African Institute for the Promotion of Distance Education (IAPED), created in 2012, by a group of Mozambicans with extensive experience in education, especially in distance education, whose statutes were published in BR no 50, III Série, 4º supplement, of 18 December 2012. It is registered at the Registry of Legal Entities under number 100350467.

ISCED opens its doors for the first time in 2015, with two departments, the Department of Social and Human Sciences and the Department of Economics and Management, offering six-degree courses, namely: Law, Political Science and International Relations, Public Administration, Accounting and Auditing, Environmental Management and Human Resources Management to around 2 535 students. At that time, ISCED had four Resource Centres, namely CRs in Beira, Chimoio, Maputo, and Nampula. In 2016 it opened four more RCs, in Xai-Xai, Maxixe, Tete, and Quelimane, and finally in 2017, it will have a representation throughout the country with the opening of two more RCs: Lichinga and Pemba. In 2018, it diversified its course offerings by introducing the course in Information Systems Management and Business Management, as well as the creation of a new department of Education Sciences with the courses in Geography, Portuguese, and History Teaching. It currently has eleven undergraduate courses, including some short courses such as activist training program, English for Communication, and Secretariat.

It maintains agreements with different institutions at the national and international levels. In fact, at a national level, within the scope of scientific-pedagogical exchange, ISCED has memoranda of understanding with the Universities of Eduardo Mondlane, Zambezi, Pedagogical and Catholic of Mozambique. Within the scope of implementation of short courses for HIV-AIDS activists and the FDC (Foundation for Community Development); Within the scope of the Course on Accounting and Auditing and Joint Training of Accountants in the country with ANEMO, the Order of Accountants and Auditors of Mozambique (OCAM); Within the scope of the Degree courses in Nursing, the ITL (Instituto Técnico Lugenda); Within the scope of the Law Course, the IPAJ (Instituto de Patrocínio Jurídico); the National Association of Nurses of Mozambique (ANEMO) and within the scope of the Environmental Education Project, the Company IMPETRO.

At the international level, ISCED has collaboration ties with UNISA (South Africa), ZOU (Zimbabwe Opens University), OUT (Tanzania), NOUN (Nigeria), Aveiro (Portugal), and Piracicaba Methodist (Brazil), within the scope of scientific exchange and teacher mobility. ISCED is a member of the African Council for Distance Education (ACDE), DEASA (Distance Education Association of Southern Africa), AAU (African Association of Universities), and the Distance Learning Association of Portuguese Speaking Countries.

ISCED acts in accordance with the values of Democracy and respect for human rights; Equality and non-discrimination; Valuing the ideals of the homeland, science, and humanity; Respect for cultural differences; Promotion and defense of the concept and social practice of development in an integral, inclusive, participatory, diversified, ecological, humanist and creative sense of individuals and societies; Rigour and competence; Freedom of cultural, artistic, scientific and technological creation; Contribution to the development of the country in general and of communities in particular; Freedom to learn and teach; Innovation; and Professionalism

3.2. Expansion of online education - the case of ISCED

As noted earlier, ISCED comes from a recent trajectory of significant deployment and expansion in the higher distance education market in Mozambique. Admittedly, it takes more than market availability to achieve such a leap. The contextual analysis of the evolution of the ISCED and its strategy for the provision of educational services can clarify this issue.

According to the interviewees, founding members of IAPED, the proposal of higher education offer of ISCED differs from the way of offer of other HEIs in the way that this institution has carried out the vision of its Directorate. Instead of competing for space with other HEIs in the field of face-to-face and distance learning, mostly concentrated in the capital cities, ISCED preferred to focus on the field of distance learning in online modality by massifying the use of online learning technologies. Dealing with these social strata, however, would be to offer educational services to a group marginalized by the system hitherto existing. This has been clear since the founding of ISCED, according to the founding members of IAPED: "In the context of the production and massification of higher education, the idea was to provide distance education capable of covering the vast territory that the country possesses to countless Mozambicans who had already completed grade 12 and were working in the districts without being able to continue their studies without having to purchase printed or physical teaching materials and without requiring students to spend a lot of time with frequent trips to face-to-face sessions, in order to reduce their training costs".

In fact, in order to materialize this vision, one of the first decisions of the institution was to provide the student with the possibility of having access to the teaching material and lessons at any place and time through online learning technologies. This aspect, associated with the courses offered and the need of the public to attend higher education without having to leave their place of residence or work, without having to travel long distances to access the university, would have a great influence on the possibilities of choice of candidates, increasing their chances of choosing the institution.

In the first four years of its existence, ISCED focused on offering a political pedagogical project based on distance learning in the *online* modality, with accessible course prices and highly efficient *online* learning technologies. In addition to the range of *online* courses, the pedagogical project needed to give you a native structural problem inherited from the previous face-to-face regime and distance learning: the weak domain of ICTs by students and collaborators, particularly tutors.

In the experience of the interviewees, the Director-General and the Technological Director of ISCED were unanimous that: "To deal with this problem [weak domain of ICTs on the part of students and collaborators in particular the tutors], we needed to submit them to constant training that would allow the student and the tutor to gain experience ... we think we achieved this goal because from the 2nd block of the 1st year of attendance students were minimally familiar with the system ... in fact the greatest innovation was learning by doing...".

Another challenge was the material - "will the Mozambican be able to buy Tablet, Laptop, Computer?" according to the interviewed ISCED Administrator, this doubt raised and that was hanging in their heads, was overcome when "it was decided to distribute the - Tablet of the ISCED brand - to the students".

The challenge that would compromise the future of the institution was the school dropout experienced in 2016, according to the Administrator of ISCED, which due to the offer of the Tablet and consequent attraction, there was also the greater inflow of students of new income. However, the obligation to pay the fee for the first three months at once was a very big stalemate considering that it was an atypical year because in the same year, the economic crisis was felt with greater impact, which resulted in greater school dropout experienced at ISCED to date. Whereas the dollar rate this year rose from 48 MT in January to 71 MT in December due to the financial crisis[5].

According to the Director of Postgraduate Studies, Research and Extension of ISCED, in addition to these reasons, the school dropout experienced in the first two years of the institution's existence was motivated, on the one hand, by the lack of independence on the part of the students, due to the paradigm of face-to-face and semi-face teaching in which they were used to, which generated a certain resistance to change, "I remember that there were cases in which the tutor and the student did not interact..." and to solve this challenge, the responsibility of the student was called to evolve thanks to the retention policy. The level of participation of students in the platform went from 0% to around 80% and the tutor-student interaction evolved in the same way even though with some delay.

According to the Technological Director, the main challenge faced in the technological area is related to the quality of the Internet - "the national technological structure, I speak of voice telecommunications, as well as the Internet are still characterized by a lack of access and reliability and with high costs, for example, the cost of bandwidth, Megabytes, devices such as tablet, computer, cell phone ... is still high".

The focus on information and communication technologies was very decisive, as it allowed the provision of the education service at a price appropriate to the follow-up where ISCED operates. In addition, as the Technological Director of ISCED and the Administrator of IAPED add, several systems were introduced, Esura, for the management of students' academic processes, Primavera, which is responsible for the management of administrative processes and is in sync with Esura, SGR for assistance to students, and the availability of a computer network in resource centres with internet access.

Another innovative milestone, according to the Academic Director of ISCED, was "the introduction of a thesis management system (SCIPRO), which in addition to allowing the monitoring of the production of scientific papers between the student and the supervisor under monitoring by one to two co-supervisors, this system is configured to perform the verification of the originality of scientific papers, in order to reduce the rate of plagiarism in academic work at the end of the course in higher education, something that previously did not exist in the country".

From an innovative perspective, this is an ongoing project to be implemented in 2020, which according to the interviewees, members of the Directorate General, were unanimous in stating that "ISCED became the first higher education institution in Mozambique to conduct a public consultation to present the intention to create new courses in Mozambique and receive inputs from the community. We intend to include in a vertical growth the introduction of four master's degree courses and horizontal growth to introduce nine-degree courses".

Another factor pointed out by the General Manager and the Director of ISCED interviewed as innovative in the trajectory of the institution was its rapid economic growth "we had positive economic growth (...), yes, there was growth, not 100%, but in the first four years we had a satisfactory growth, even based on a price policy in which our monthly fee is affordable, set at 3,500.00 MT".

[5] https://freecurrencyrates.com/pt/exchange-rate-history/USD-MZN/2016

Over a period of four years, scalability by physical space was resolved "we opened Resource Centres duly equipped with technological material as well as a physical library throughout the country, in the capital cities. And after the acquisition of own land, the project for the construction of new buildings is in progress", according to the Administrator of ISCED.

According to the IAPED Administrator: "The administrative and academic processes are all automated, based on an efficient information system. The tutors do not need to deal with the students' grades; they are automatically entered into the system as soon as the evaluations are carried out and corrected. Students enroll, access their grades and academic transcripts, submit their papers, resolve routine pending issues, and pay their tuition fees via the Internet. The course coordinators manage the platform, monitor the presence of the tutors and plan the distribution of classes with the help of the internal tutors strictly via the platform".

According to the Academic Director, ISCED has been able to make great strides in the area of distance learning by having online learning technologies as its main pillar - "as you can see, we have in our facilities all the equipment we need, in our Moodle platform, which is the Virtual Learning Environment (VLE), you can find incorporated some video lesson links that our tutors share, Audio and Video Conferencing, Chats and Forums and a Virtual Library available to students".

According to data referring to Students enrolled by academic year and center (Figure 1), 2016 was the year with the highest number of students enrolled, around 7,251 students, which corresponds to an increase of 4,716 students, compared to 2015, which had an enrollment of 2,535 students. This drastic rise was certainly due to the policies adopted by the ISCED administration, namely: i) the introduction of the ISCED branded tablet offers to each student who enrolled and paid a quarterly fee, a fact that reduced the student's challenge regarding the lack of financial capacity to purchase a computer or tablet, material that is still very expensive in the national market; ii) the credibility gained at the end of 2015 that, after all, it is possible in Mozambique to attend distance higher education online using the Online learning technologies.

Still, in Figure 1, we can see that the province of Nampula, or simply the Resource Center of Nampula, is the one that holds the largest number of students in the whole country, around 1698. Several reasons may be behind this event, first because the province of Nampula is the most populous in the country with about 5,758,920 inhabitants according to the Census (2017) of these 130,694[6] has only the medium level, therefore a high number of people looking for universities; second because it is a province located in the northern part of Mozambique, where in addition to the poverty rate being high around 67%[7], and there is a very small number of public and private universities compared to the central and southern region of the country.

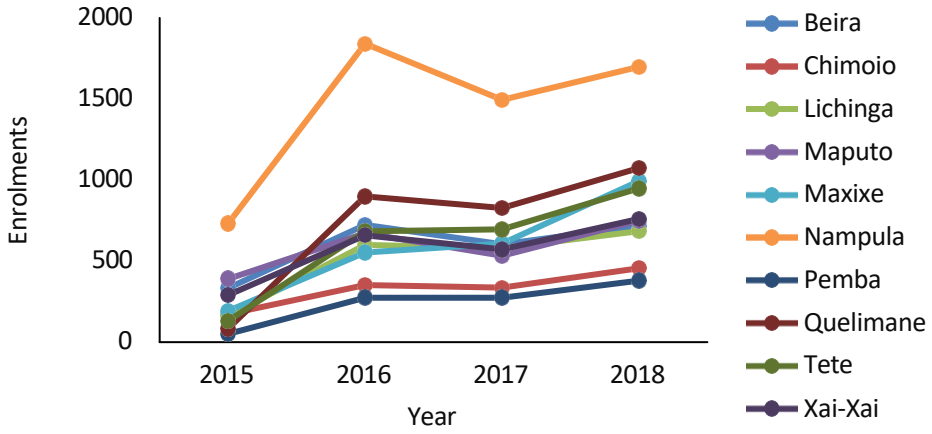

Figure 1 Students enrolled by academic year and center.

For data referring to Students Enrolled by academic year and age (Figure 2), we can see that there are significant differences between the ages of students taking into account genders, according to the chi-squared test $p < 0.001$. It can be noted that in all years of the study, ISCED received a greater number of students aged 25 years and above, a fact that may be related to the capacity for self-financing, since most of these students, if not all, are or workers wage earners, or self-employed persons, or scholarship holders.

For students enrolled by academic year and gender (Figure 3), an anchovy test was performed to check if there were significant differences between individuals who enrolled between different genders in different years. It can be seen that the difference between men and women enrolled per academic year is constant.

As for the data referring to Students enrolled by center and gender (Figure 4), these reveal that ISCED has more male than female students. However, the CR's of Nampula has the largest number of female students in relation to all other centers. The CR's of Maxixe and Xai-Xai are the only ones whose number of female students is greater in relation to male students.

[6] http://www.ine.gov.mz/estatisticas/publicacoes/anuario/nacionais/anuario-estatistico-2017.pdf

[7] http://documents1.worldbank.org/curated/en/600731554132409626/pdf/Overview.pdf

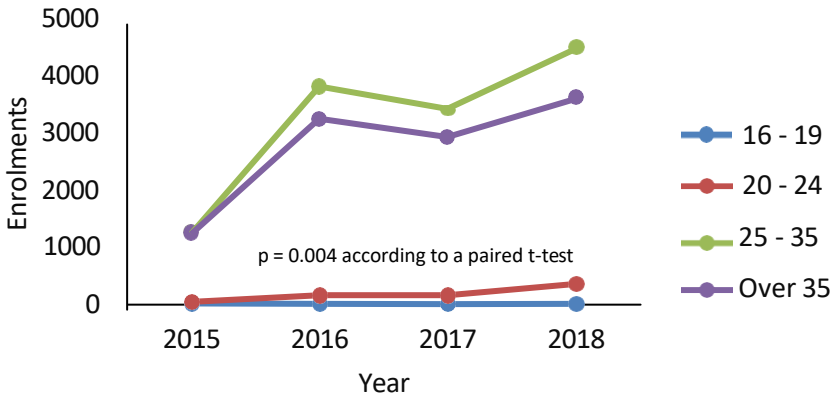

Figure 2 Students Enrolled by academic year and age.

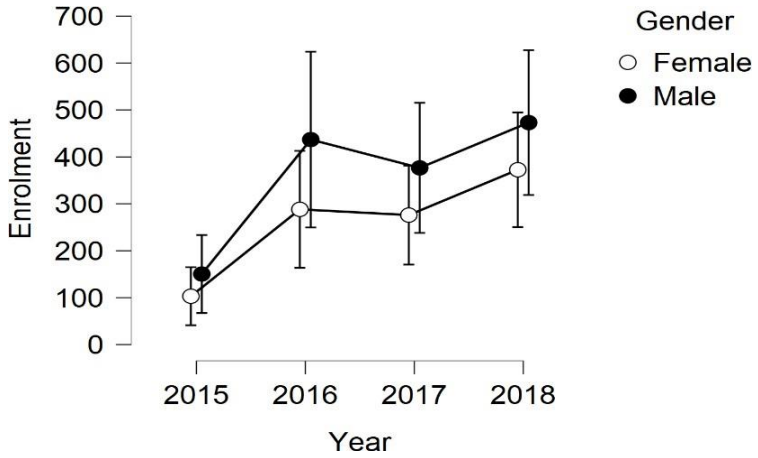

Figure 3 Students Enrolled by academic year and gender.

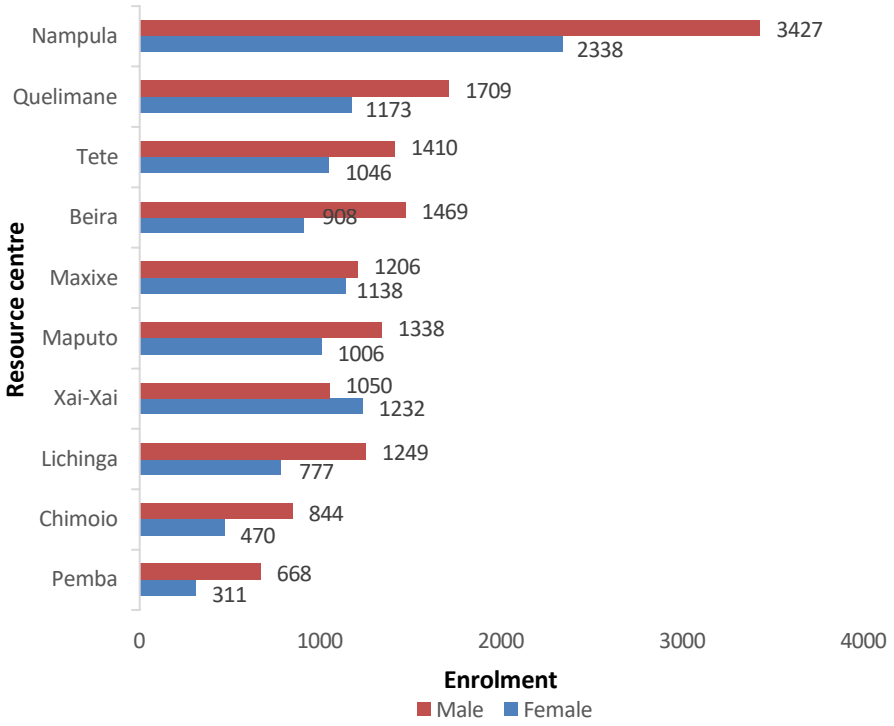

Figure 4 Students enrolled by center and gender.

4. Discussion

In analyzing the contribution of ISCED, from the point of view of access to education, in higher education in Mozambique, it is necessary to take into account the occurrence of the main indicators of disruptive innovation (Table 3). What happened at ISCED can be summarised in the innovative approach based on a disruptive perspective in which common market standards are broken, and new practices are introduced in a radical way (Audy 2017). The reality of distance learning in higher education in Mozambique was closer to that of a semi-presential education in which students often had to travel to the distance learning center to participate in face-to-face sessions, submit physical assignments, acquire teaching material (module in physical format).

Table 3 Occurrence of the main indicators of disruptive innovation in the ISCED.

N°	Author	Assumptions	Occurrence in ISCED
1	Audy (2017)	Disruptive innovations are dramatic, creating new demands, industries, markets, applications and processes, economic or social. Generate significant, exponential improvements in the performance or quality indicators where they apply.	✓
2	Audy (2017)	Disruptive innovation involves breaking with the status quo, establishing change, and the greatest barrier emerges, the resistance to change, whether by the people involved in the process or by the institutions themselves, which are ultimately represented by the people themselves, in the actions of their managers.	✓
3	Rodrigues et al (2010)	Disruptive innovations, on the other hand, are innovations that allow new market participants to enter the market from relatively simple solutions.	✓
4	Rodrigues et al (2010)	Disruptive innovation is associated with radical changes, breaking with the current paradigms, generating a new technological level where it is applied, opening a whole new range of development possibilities and new cycles of incremental innovation, aiming at its sustainability in time.	✓
5	Rodrigues et al (2010)	Disruptive innovation is a methodology to be used by organizations to obtain high returns and growth in the market.	✓

This modality presents a structure that entails a lot of transport costs due to the numerous trips to the distance learning center, the printing of teaching material, production of works, etc. Moreover, these and other characteristics meant that many Mozambicans with the main emphasis on adults who already work and want to resume their studies, young recent high school graduates (12^{th} grade) who are unable to enter public higher education through contests or shortage of places and others who are in the most remote areas of the country without access to universities and with numerous difficulties in access routes to move to the cities were without access to higher education.

With the introduction of online teaching in 2015 by ISCED, the group previously marginalized by the distance learning system now finds an option to access higher education, supported by online learning technologies, which allow them to attend classes even from their place of residence or work. More than 10 000 people today can now attend higher education, thanks to the online education proposed by ISCED in Mozambique.

However, this same public, on the one hand, devoid of means such as laptop, tablet or computer and, on the other hand, without mastery of ICTs as a consequence of the paradigm of face-to-face teaching where they came from, were subject to the syndrome of resistance to change. This dilemma in which the students found themselves in this new modality of teaching, which until then was unknown to them, required them to reinvent themselves, thus creating in a short space of time profound changes in their profile. This scenario would confirm the postulate of disruptive innovation that, according to Audy (2017) and Leonel et al (2010) "is associated with radical changes, breaking with the current paradigms, generating a new technological level where it applies, opening a whole new range of development possibilities and new cycles of incremental innovation, aiming its sustainability over time".

The innovation introduced by the ISCED made it possible to set affordable prices for its market segment, with a monthly fee set at 3,500.00 MT, about $ 56. However, since 2015-2018 the institution has grown economically by about 188.2 %, achieving financial stability.

Its definitive step is revealed by betting more and more on online learning technologies. The introduction of SCIPRO in the management of academic processes at ISCED is a milestone, considered unique in the country, since it broke with the old habits of student-tutor interaction in the process of preparing the course conclusion work, allowing a verification of the originality of academic work within the institution, thus combating the occurrence of plagiarism.

The use of the main technologies used in distance learning center courses, namely Virtual Learning Environments (VLE), Video-classes, Audio, and Video Conferencing, Chats and Forums and Virtual Libraries, gives the Institute the status of leader in the distance learning sector in the online modality in Mozambique, as a result of the process of disruptive innovation of its business.

5. Final considerations

The ISCED has been distinguished by its growth since its first four years of existence by the available data. Since its launch in the online distance learning market, i.e. between 2015 and 2018, ISCED has tripled (from 2,535 thousand to 8,457 thousand) the number of students placing it in a position of leader in the Mozambican educational market in the field of use of online learning technologies.

The government of Mozambique, within its priorities, is increasingly concerned with the expansion of higher education in order to overcome the problem of access to education in Mozambique. ISCED, in response to this challenge facing the country in the education sector, through the introduction of distance learning in the online modality, has made its contribution in terms of access to higher education. The decision to invest in online learning technologies for the development of online education in higher education in Mozambique is not only new in the country but also a disruptive innovation, as it has broken with the usual standards and generated a radical change in the market.

The Ministry of Science and Technology, Higher Education, and Technical Vocational Training is the right body to accredit ISCED on the one hand, and on the other, to advocate it at international level in order to make quality technological services more accessible at affordable prices. This action involves, first of all, confirming with Microsoft the existence of ISCED in Mozambique as a higher education institution that contributes to the development of human capital, a fact that would allow the opening of doors for the acquisition of Microsoft products at more affordable prices.

The Ministry of Education and Human Development (MINED) is responsible for considering the possibility of introducing ICT training from primary education. The Mozambican population must seize this educational opportunity provided by ISCED and monitor the ongoing technological development.

The challenge facing ISCED is to continue to invest in improving the quality of its services and systems in order to satisfy the needs of the market, which is increasingly demanding. In order to enrich knowledge on the contribution of access to higher education in Mozambique, ISCED can invest in the continuity of mapping its students' places of origin in a more specific perspective from the district level and later to the village. This study will allow the identification not only of the main points of origin of its students, but also better monitoring of the evolution of the number of existing staff in each region, whether these are the result of the training acquired at ISCED or not.

Through a university extension project, the ISCED, can develop a series of scientific and technological days involving young people and adults with high school already completed and who are not attending higher education in all rural regions of the country in order to encourage the community to invest in the use of ICT's thus promoting distance learning in the online modality.

Conflict of Interest

The authors declares no conflicts of interest.

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